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LEONARD GREENBURG, M. D., EXECUTIVE DIRECTOR

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CARBON MONOXIDE POISON IN THE HAT INDUSTRY

By May R. Mayers, M.A., M.D.

Division of Industrial Hygiene

Exposure to carbon monoxide gas in workrooms where there are large numbers of small gas-heated appliances in operation is very great at this time of year. In industries where large gas-heated appliances are used, they are usually installed with considerable care, and overhauled from time to time for purposes of efficiency. The greatest hazard to health from constant exposure to carbon monoxide gas in the lower concentrations, therefore, occurs in industries such as the hat industry, where the appliances used are relatively small and inexpensive, and the attention paid either to their installation or upkeep often is insufficient. In fact, this industry illustrates so well the problems common to such a large number of industries as to warrant a rather detailed account of the situation as found there on recent investigation.

Hat manufacturing in New York City now occupies a relatively small number of high loft buildings in and about the West Thirties. There are, indeed, some sixty odd hat factories at present within a radius of only a very few square blocks in this district. With this concentration of the industry into so limited an area, came a sudden demand for quantities of gas far in excess of that contemplated when some of the loft buildings were erected. With this new development came also the introduction of large numbers of gas-heated appliances—gas-heated hat presses of various sorts, and gas-heated boilers for making steam—sometimes in the hands of persons ignorant of their proper operation and of the dangers latent in improper operation.

In the early days, the women's hat industry was in the hands of a few stable well established concerns. Within a few years, however, the situation was practically revolutionized, and at the present time, the industry is in the hands of a large number of very small hat manufacturers, all in the keenest competition with one another. Many more hats are being produced than ever before. There has been a corresponding increase in the total quantity of gas equipment in use. The outlay is small; a few sewing machines and hat presses are readily obtainable on credit. Almost any employee can go into the business for himself, if he is enterprising, and if he has no luck he can give up his shop, and go to work for some one else again the next season. The more or less primitive industrial organization now obtaining in the hat industry is, therefore entirely analogous to what is found in many other industries where a small initial investment is required, and where competition is intense. The work is highly seasonal, and subject moreover to all sorts of fluctuations of style, so that in the hectic rush of production often little thought appears to have been given to considerations of efficiency of operation of the machines or to health maintenance of the workers.

Gas Leaks

The uniformity of equipment and of procedure in large and small workshops alike, is very interesting. In general they tend to buy their hat presses and their steam boilers from the same manufacturers—apparently with little regard to safety approval by the American Gas Association Laboratories. They even buy their rubber tubing for use on the presses from the same wholesale dealers, seemingly through ignorance of, rather than in defiance of, the regulations specifically prohibiting the use of any flexible tubing except that approved by the City Department of Health.

As one walks alongside of the presses—whether they are actually in operation or not—there is frequently a distinct odor of gas. If one investigates further, one is surprised and disturbed at the number of places from

which small amounts of gas are escaping, due to faulty connections, worn-out tubing, etc. When the employers, or any of the workers in the vicinity are questioned they usually express very genuine surprise. They have all become so accustomed to the smell of gas they do not appear to notice the leaks. Those most anxious to cooperate with the investigator usually strike a match at once, and begin running it along some of the gas connections, and especially the rubber tubing which has been the object of special criticism. Sometimes the leak is so large they get a light. Then they hasten to put some kind of a patch over it, and look entirely self-satisfied. More often there is no light obtained because the leak is too small, and they return from their efforts looking distinctly injured, for they believe that they have thereby proved conclusively that no leak exists. One is quite as much impressed with their desire to be informed, and their willingness to cooperate as one is with their ignorance. They all know that gas is dangerous and they are entirely prepared to do what is necessary to keep their workrooms free from gas—provided that their competitors are required to comply with the same regulations. They know far less about the dangers of carbon monoxide poisoning which results from incomplete combustion of the gas in improperly designed gas-heated appliances; and those in need of cleaning and repair. They require a great deal of education. The industry must be treated as a whole, however. No single plant can afford to adopt standards which are higher than those of its competitors.

Poor Combustion in Hat Presses

The hat presses or hat blocks have passed through many stages of development over a period of many years. Though originally designed for steam, they were later converted to burn gas. Poor combustion in the operation of these presses is due, in large measure, to the fact that in the process of conversion the steam chamber was never properly modified for its new use as a combustion chamber for gas. Various types of gas installations have been tried, but none of them has proved entirely satisfactory from the standpoint of good combustion.

The Consolidated Gas Company and the American Gas Association have long been interested in this problem, and they have been instrumental recently in assisting in the development of a modification of the heating elements in the hat block, now in use, so that its carbon monoxide production may be maintained within safe limits. Only 1 part per 10,000 of carbon monoxide was found in tests of flue gases given off by these machines—which means that there would be far less than that amount in the air of the workroom as a whole.

In the case of all new installations, it is suggested that hat block manufacturers make alterations in the original castings so that the ordinary ring burners may be used for heating. Where old installations are used, however, they should be modified along these newly developed lines, so as to make their operation safe.

A helpful discussion of the problem and its solution as presented by the American Gas Association follows:

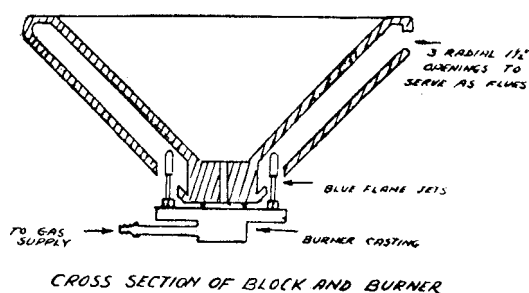
"There are several makes of hydraulic hat blocks used in the New York District, but they are all practically identical in construction. At the top of the casting which is to be heated, there are three radial space $1\frac{1}{2}$ inch openings (formerly steam inlet connections) which are to be used as flue outlets, and at the bottom there are six $1\frac{1}{2}$ inch holes (formerly condensation outlets) which can be used for firing the blocks (see sketch).

"The burner equipment originally used on the blocks and which is still in use in a great many cases consists of two crude pipe burners with fixed orifices and primary air openings, and a single large port. With these burners combustion is poor, and the flames

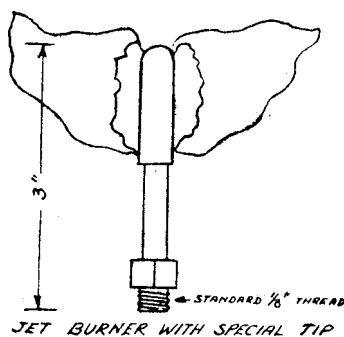
float. In 1931 this situation was remedied by heating the blocks with six barber jets connected to a circular manifold at the base of the castings. However, this burner has not been widely adopted, and now to encourage the safe utilization of the gas, a new burner has been developed which is an improvement over this former burner from the viewpoint of heat distribution.

"The new burners consist of a round burner-casting attached by screws to the bottom of the block, which acts as a manifold for six blue flame jet type burners, one jet projecting into each of the six condensation holes. The tips of these jets are constructed as shown in the sketch, so that the flame produced is flat and fan shaped, and can fit into the steam jacket space without impingement. The jets have No. 58 orifices and the normal consumption of the burners is about 25 cu. ft. per hour.

HAT BLOCK AND SUGGESTED IMPROVED BURNER



CROSS SECTION OF BLOCK AND BURNER



JET BURNER WITH SPECIAL TIP

"Because of the fact that the condensation outlets on all the blocks are not exactly in the same position the burner castings are blank and have to be tapped (standard $\frac{1}{8}$ " pipe thread) on the district in accordance with the dictates of each particular job. This can be done with a hand drill and the proper size tap. Holes also have to be drilled and tapped in the bottom of the block casting for the screws that hold up the burner assembly. Since the entire block casting moves up and down in action the gas connection is made by means of a flexible tubing.

"It is absolutely essential that the three flue outlets be left open and unrestricted, and that the burner tips be placed in their proper position. That is, there should be no impingement of the flames on the casting."

Steam Boilers

The steam boilers used in the hat industry are heated by gas, and are the other important source of carbon monoxide production in these workrooms. All such boilers are required to be flue-connected at the present time so that all flue gases may be properly exhausted at their source. Frequently, fans are not kept in operation, and windows which are counted on for ventilating boiler rooms are kept closed. The exhaust system provided for all such steam boilers should be kept in good repair and must be in operation at all times when the steam boilers are in use.

Summary

Both employer and employee must be educated to an understanding of the elementary principles of safety in the use of gas equipment. Practically it has always been found necessary to point out the following:

a. Injury to health may result either from leaking gas, or the production of carbon monoxide gas by poorly designed ill-kept equipment.

b. Small leaks incapable of lighting when a match is applied are just as important as the larger ones.

c. The fact that no one smells a leak is of no significance because it is easy to become accustomed to the odor.

d. Improvised patches on gas leaks are no remedy. They must be properly repaired.

e. Appliances must be kept cleaned and free from soot in order to prevent unnecessary production of carbon monoxide poisoning in their operation.

f. The free maintenance service of the Gas Company should be called upon frequently, and their recommendations as to replacement of worn parts should be promptly complied with.

g. A yellow flame or one which appears to spread or float is dangerous.

h. If the weather is cold, and the presses are cold, a dangerous amount of carbon monoxide gas may be released when the flame under them is started. A gas flame from an improperly adjusted burner impinging on a very cold surface may release a considerable amount of carbon monoxide gas. It is well to start the gas some time before the workshop opens so that the room may be thoroughly ventilated before workers are permitted to enter.

i. All flexible tubing must be of the type approved by the City Department of Health.

j. Steam boilers should always be properly vented. Exhaust fans must be in operation at all times when the boilers are in use.

Several times in the last few years workers in establishments of the general type above described have suddenly been overcome by carbon monoxide gas. All of these occurrences were in Winter and on Monday mornings which gave them something of an air of mystery until investigation revealed the following: The building is cold after Sunday with the heating plant a little late getting started. The workers come in, and because of the cold, do not open any windows. Frequently, in order to warm the room quickly, every gas-heated appliance that is available is rapidly lighted—even those which will later be turned out as not needed for the day's work. Steam boilers are started with windows closed and fans not operating, in order to get heat for the workroom. The result is an abnormally great production of carbon monoxide gas in the room—partly because of the flames impinging on unusually cold surfaces; partly because more than the usual number of appliances are put into operation; partly because many of the appliances are of poor design and in poor repair, and partly because exhaust systems in connection with the steam boilers have not been started promptly. All of this added to the "normal" leakage of raw gas in such establishments and the fact that all windows are kept tightly closed explains this Monday morning phenomenon.

GAS BURNER TESTS

At a conference on December 7, called by State Industrial Commissioner Elmer F. Andrews and participated in by representatives of the Consolidated Edison Company, manufacturers of hat blocking machinery, and the Division of Industrial Hygiene to consider the problem of carbon monoxide poisoning in the hat industry during the winter months, it was decided to launch a series of practical tests of new types of gas burners for hat machinery.

It was the consensus of those present that improved burners which would give more complete combustion of gas would not only do much to remove the hazard of carbon monoxide poisoning at its source, but would be a less expensive and a more effective remedy than the installation of hoods or exhaust ventilation systems in congested workrooms. The tests are to be conducted in hat manufacturing workrooms by the hat machinery manufacturers and engineers of the gas company to meet hygienic standards set by the Labor Department.

SILICOSIS HAZARD IN AMERICAN INDUSTRY*

By Leonard Greenburg, M. D., Executive Director, Division of Industrial Hygiene, State Department of Labor

During the past year front page stories about workers who contracted silicosis while excavating the water tunnel at Gauley Bridge, West Virginia, have made the public conscious of the hazards of industrial dust.

Although silicosis was news to most people, the dangers of dust inhalation have been known for several centuries. Georges Agricola, a mining engineer of the sixteenth century, in his book *De Re Metallica*, described dust conditions in dry mines and warned that dust "penetrates into the windpipe," and "eats away the lungs and implants consumption in the body."

Prior to 1900 there is little mention of pulmonary fibrosis or silicosis in American medical literature. In 1907 Dr. F. L. Hoffman, statistician of the Prudential Life Insurance Company, published the first significant American study of the subject. He emphasized the importance of dust as a factor in occupational mortality. In 1915, stimulated by the studies of the South Africans on silicosis in gold mining, Edwin Higgins of the U. S. Bureau of Mines and his associate, Dr. Anthony J. Lanza, published a paper on pulmonary disease among miners in Joplin, Mo. The contributions of Hoffman and Higgins and Lanza, mark the real beginning of our knowledge of the disease in this country.

Since 1915 research studies on the effects of dust inhalation have been conducted in the laboratory, in the clinic and in industry; and engineers have worked on the problem of silicosis prevention by controlling dust dissemination in the workroom air. While our knowledge of pulmonary disease produced by dust inhalation is by no means complete these laboratory and field studies have gone a long way toward clarifying our understanding of the effects of two kinds of dust on human and animal lungs.

Dangerous Dusts

The first of these dangerous dusts is quartz (crystalline silicon dioxide), the inhalation of sufficient amounts of which produces silicosis. The second dust capable of doing pulmonary damage is asbestos and the disease it causes is known as asbestosis. The facts about other dusts are not clearly established and any conclusions with reference to their effects must still be viewed with caution.

When fine quartz dust is inhaled after passing the defenses of the upper respiratory tract it reaches the terminal air sacs of the lung where the exchange of gases between the blood and air takes place. At this point the dust, being foreign matter, is ingested by scavenger or dust cells which carry it through the walls of the air sac to the lymph drainage canals just outside the air sacs. Normally it is along these canals that foreign substances are carried from the air cells to lymph tissue in the lung or at the point where the windpipe enters the lung itself. But when silica is being removed the particle kills the scavenger cell which is transporting it, with the result that the dust particles are not all removed from the lung substance. Instead they may be found along the course of the drainage canals and in the small aggregations of lymph tissue along these canals. If no further change in the lung resulted probably all would be well. But apparently these small particles of quartz dust in their new location are highly toxic to the tissue cells in their immediate vicinity for these cells are altered and replaced by scar or fibrous tissue. This scar tissue does not possess the properties of normal lung tissue; through it the normal exchange of gases between the air and the blood cannot take place.

With the continued inhalation of quartz dust the amount of scar tissue increases and finally encroaches on the normal air sacs to such an extent that the lungs cannot oxygenate sufficient blood to supply the body's needs. The victim then finds himself short of breath—at first only when doing heavy work, then at moderate tasks and finally even when at rest.

After silicosis has made marked progress, tuberculosis frequently develops. Just why or how the lungs become infected is not now known, but the fact remains that many

cases of advanced silicosis terminate with a tuberculous infection.

A Chronic Disease

The terms "chronic" and "acute" used in reference to disease are often misunderstood. By an acute disease is meant one which develops in a relatively short time, a matter of days or weeks, while a chronic disease runs over months or years. The development of silicosis is a matter of many months, in most cases of years. It is obviously a chronic disease.

Since inhaled quartz dust is the causative agent in producing silicosis and since silicosis is a chronic disease, it follows that the more quartz dust inhaled the more rapid the rate of the disease's development. A person exposed to a dust containing 95 per cent quartz, as in sandblasting castings, is exposed to a greater risk than the worker in a coal mine where the quartz concentration may be only 2 or 3 per cent.

A second controlling factor is the duration of exposure. It is obvious that in two years of occupational exposure a worker will inhale about twice as much quartz dust as in one year in the same employment.

The third major factor in determining the amount of quartz taken into the lungs is the concentration of dust in the atmosphere. If we examine workers in a very dusty establishment and those in a less dusty plant and study our results, we shall find that in the first group silicosis supervenes earlier in occupational life, and the rate of silicosis incidence is higher than in the second group, comparing workers employed equal lengths of time.

In considering the concentrations of dust it must be borne in mind that particles of all sizes may not gain access to the lungs. Only those small enough to reach the terminal air sacs do real damage. These particles range from 1/2500 of an inch down to 1/50,000 of an inch. There is one exception to this statement, asbestos dust, which will be considered later.

In attempting to estimate the silicosis hazard of a given occupation the investigator must always bear in mind these factors: the quartz dust content of the air, the concentration of particles per cubic unit of air, the duration of exposure, the size of the particles present. There is still another important factor, not of the environment but rather of the individual. This is the element of personal susceptibility. It has been noted by many investigators that workers in the same plant, at the same task and at contiguous workplaces or benches often do not develop silicosis in equal degrees. In fact one worker may be an early victim of the disease while his neighbor is comparatively free from it. Personal susceptibility appears to play a major role in the development of silicosis. This angle of the problem presents interesting grounds for speculation and research. The industrial statistical studies discussed later, eliminate the element of variations in susceptibility by including large groups of workers.

Mortality Rates

In attempting to show the influence of dust inhalation on mortality one naturally turns to the mortality returns of the United States, England and Wales. But silico-tuberculosis, as a rule, runs a rapid course terminating fatally, and practically all silicosis deaths are listed as tuberculosis in these tables.

The following table, from the report of the registrar general, presents the standardized respiratory tuberculosis mortality rates for 1921-1923 for England and Wales, and compares the eight occupations having the highest mortality rates from tuberculosis with the rate for all occupied and retired males.

Occupation	Rate per 100,000
All males, occupied and retired.....	150
Tin and copper miners, all underground workers.....	1886
Cutlery grinders	1323
Metal grinders	637
Stone workers and slate workers.....	512
Potters	411
Barmen	402
File cutters	365

Of the eight occupations listed, all except one are associated with inhalation of quartz dust. It will be observed that tin and copper underground miners have

* Survey Graphic, December, 1936.

a tuberculosis rate more than twelve times that for all occupied or retired males, and file cutters who work on sandstone grinding wheels largely composed of quartz have a tuberculosis rate of more than twice that of all occupied and retired males.

American statistics corroborate the findings of the British investigators. Some years ago Dr. William H. Drury, then in the department of public health at Yale, reported a mortality study of ax grinders in a Connecticut factory. With the help of the plant physician who had been there over twenty years, it was possible to corroborate all the death returns for the twenty years 1900 to 1919. The grinding wheels used in this factory were of natural sandstone with a very high quartz content. This table compares Dr. Drury's findings with the tuberculosis deathrates for Connecticut, for the district, and for the other employees in the same plant:

District or Group	Deathrate per 100,000
State of Connecticut.....	150
State of Connecticut (male population)	170
Ax factory district (3 towns, entire population) ..	200
Employees of ax factory (all)	650
Employees of ax factory, polishers and grinders.....	1900
Employees of ax factory, others	160

It will be observed that the tuberculosis rate for grinders and polishers in this ax factory was twelve times that of the other employees of the factory and that the ax factory district had a tuberculosis rate of 200 as compared with 150 for the state as a whole. This table also shows that the contribution of tuberculosis deaths from a local industry or group of industries may adversely affect the mortality rate of a general population group. In other words if the high incidence of tuberculosis associated with certain occupations could be reduced, a reduction might be expected in the general tuberculosis rate for the entire area.

Detailed Studies

The most valuable silicosis data come from detailed studies in selected industries, but only a few such studies have been made. The U. S. Public Health Service through its publication has made available the greater part of this knowledge in the United States. Among the industries in which the dust hazard has been studied in detail are: the scouring powder industry, granite stone cutting, and silverware.

Some brands of scouring powder contain quartz as the abrasive agent, which may constitute 75 percent or more of the finished product. The quartz is usually very finely pulverized in order to prevent scratching; hence the dust is potentially very dangerous. Dr. Eugene S. Kilgore of San Francisco writing in the *Journal of the American Medical Association* summarizes his experience with cases of silicosis arising in this industry. In one case which resulted after eleven months of occupational exposure, the patient experienced marked shortness of breath in attempting to climb one flight of steps. Dr. Kilgore cites the cases of six employees who worked from ten to twenty-seven months in this industry, five of whom were dead from silicosis at the time of his publication. This occupation may be regarded as one of the most serious types of exposures, closely paralleling quartz rock and quartz sand grinding. Several years ago cases of silicosis were reported among New Jersey workers engaged in grinding and pulverizing sand. This pulverized material is almost identical with that used in the making of scouring powder and the sand pulverizers were found to develop silicosis after about two years' exposure.

According to the best available studies, approximately one to two years represents the shortest time required for the development of silicosis. It is conceivable for the disease to develop in a shorter period when exposure to pure quartz dust is encountered but clear cut evidence on this question is lacking.

In 1922 F. L. Hoffman in cooperation with the National Tuberculosis Association published the first study of the dust hazard among Barre granite workers. In 1929 after several years of study the U. S. Public Health Service brought out an exhaustive report on the same problem. This study includes determinations of the atmosphere, as determined for workers at different tasks, morbidity and mortality statistics of workers engaged

at various occupations and X-ray studies of the lungs of workers.

Barre, Vt. is the center of granite stone industry. Blocks of granite are taken from the quarries, cut to dimensions, surfaced, carved and lettered. This material is used for building purposes and for tombstones. The average quartz content of Barre granite is 35 percent. The Public Health Service study showed that the dust content of the air varied from five to forty-eight million particles per cubic foot, depending on the particular industrial process studied.

Tabulated Findings

In the following table which presents the findings of this study the workers are grouped in four classes according to dust exposure. The table presents average dust exposures, the period of time in years required to produce early and advanced silicosis and the tuberculosis deathrate for each group. The relationship between the amount of dust, the time required for the production of silicosis and tuberculosis is obvious.

Group	Average Dust Count	Years to Develop Silicosis Early	Advanced	Tuberculosis Deathrate per-100,000
A	48	2	5	1950
B	35	4	7	1280
C	20	4	9	230
D	5	10	—	—

The silverware manufacturing industry was selected for study by the U. S. Public Health Service in order to obtain knowledge of an occupation for which the dust content of the air was lower than in the granite stone industry, and in which the quartz content was low. In silverware manufacturing the average dust content of the air is about five million particles per cubic foot of air and the quartz content 1.7 percent. This dust is produced in polishing the product.

The study failed to reveal any cases of silicosis. It is interesting to note that a similar study conducted in textile manufacturing corroborated the silverware manufacturing study in revealing no cases of this disease.

From the foregoing it becomes apparent that silicosis is an insidious disease, its victim often completely unaware of its gradual onset until the final stages have been reached. This slow and unperceived development complicates workmen's compensation. In many states compensation claims must be filed within one year after the onset of disease. Clearly this is impossible in most cases of silicosis, where the date of onset is not known. Further, the unsuspected cases of silicosis make it difficult to set up an insurance scheme covering this occupational hazard because at the inauguration of the program they constitute an accrued liability for which no financial reserves have been set aside.

The labor turnover in certain dusty trades is high. After working in one plant long enough to develop early silicosis, of which they are not aware, workers often transfer to another establishment where, after a relatively brief interval, they are stricken with disabling silicosis. Should the first employer, the second employer or both jointly pay this compensation bill?

A just compensation plan for silicosis victims can only be drawn and administered after careful study of the problem and its many factors. Hasty legislation may produce far-reaching evils.

Incurable

In view of the fact that silicosis cannot be cured and that the advanced stages are practically always complicated by a terminal tuberculosis, the importance of prevention is apparent. The improved techniques of modern industry were developed in response to a demand for a greater output of fabricated goods and materials. It is important to realize, however, that these production methods have in certain instances increased old health hazards and brought about new ones. Studies demonstrate that dust production in granite stone cutting and in rock drilling has been increased tremendously since the introduction of pneumatic tools.

The first method of preventing silicosis is to substitute harmless materials for those known to be harmful. Obviously if we could remove quartz from all industrial

operations we could at one stroke eliminate the silicosis hazard. This is, of course, impossible. But it is possible to substitute other materials for quartz in certain industrial operations. Many foundries employ sand (practically pure quartz) in cleaning castings by sand blasting. It has been shown that the substitution of small fragments of steel, known as steel grit or shot may in many cases be used with equal efficiency. This substitution does not completely eradicate the health hazard, since a certain quantity of sand adheres to the surface of castings made in sand models and it is this sand which the cleaning process is designed to remove. Studies reported by Dr. C.-E. A. Winslow of Yale University and the writer made in sandblast rooms showed a dust concentration of 970 million particles per cubic foot of air when using sand as the abrasive as compared with 155 million particles when using steel grit.

A second example is the substitution of abrasive wheels made from synthetic abrasives (practically no quartz) for those made from natural sandstone (about 95 per cent quartz), practically eliminating the hazard.

Another method of dust control is by the use of water. This has been done with considerable success in anthracite coal mining, as demonstrated in the following table:

Operation	Dust concentration Millions per cubic foot		Control measure
	Controlled	Uncontrolled	
Drilling.....	33	568	Wet drilling.
Loading coal or rock..	32	636	Material wetted while loading.
Preparation of coal...	24	380	Wet breakers.
Handling coal.....	1.2	17	Wetting coal and cars.

(Data from the U. S. Public Health Service)

The results are obvious—in each case a very real reduction in dustiness by simple, inexpensive means.

A third method of preventing silicosis is to enclose the process as completely as is possible without interfering with work, the worker being outside the enclosure and so removed from the dusty zone.

A fourth method of dust control is to withdraw the dust laden air from the workplace. This is done by providing exhaust hoods or enclosures equipped with suction ventilation.

In certain industrial processes it is impossible to protect the worker by any of these methods. In such cases the workers must wear masks or respirators which filter the dust from the air before it enters the respiratory tract, or use helmets which cover the head and are supplied with clean air through a hose line. But such equipment, while highly efficient when properly maintained, is cumbersome and the worker is apt to find its use a burden. It should only be employed where other methods do not adequately clear the air.

Education Necessary

If every industry today utilized the known engineering means to control dust hazards in shops and workrooms, our problem would not be completely met but certainly we should be a long way toward its practical solution. There is need for a program of education and guidance which will help industry understand the silicosis problem and the most efficient means of solving it. Common law-suits for damages, the passage of compensation acts, the Gauley Bridge water tunnel and other tragic experiences have served to make employers silicosis conscious. Industry shows an increasing readiness to cooperate in eliminating the dust hazard from its work places.

Progress in the field of public health is, as a rule, not achieved until those vitally concerned become aware of the bearing of a suggested program on their own well being. Publicity and educational effort have thus become vital to the public health movement. Frequently the public is convinced of the importance of public health measures without being aware of educational propaganda. A small epidemic may achieve wide educational results.

It is characteristic of the public health movement that the transfer of information from physicians and research workers to the general public marks the final stage in the conquest of disease. There is great likelihood that this will be proved true once again and that the attack on silicosis which is now developing marks the real beginning of the eradication of dust hazards in American industry.

HEARING ON PROPOSED RULES

The Industrial Board on January 4 and 18 will publish in the newspapers of the State the legal notice of a public hearing to be conducted by the Board on January 28 on proposed rules relating to the control of silica dust in rock drilling operations.

The notice will read:

PUBLIC HEARING INDUSTRIAL CODE STATE OF NEW YORK DEPARTMENT OF LABOR

Pursuant to Section 29 of the Labor Law, the Industrial Board will hold a public hearing on Proposed Rules Relating to the Control of Silica Dust in Rock Drilling at:

NEW YORK CITY

Thursday, January 28, 1937, at 10:00 A. M.

Office of Department of Labor

Room 419, 80 Centre St.

A copy of the Proposed Rules may be obtained from the Division of Industrial Code, 80 Centre Street, New York City.

THE INDUSTRIAL BOARD

ELMER F. ANDREWS,
INDUSTRIAL COMMISSIONER.

"BAKELITE"

In the October issue of *The Industrial Bulletin* appeared an article on "Bakelite" which was the second of a series on "Health Hazards in the Plastics Industry." Since there appears to be some question as to the meaning of the term "Bakelite," a few words of explanation may be desirable.

The word "Bakelite" is the trade-mark of Bakelite Corporation registered in the United States Patent Office as well as with the Secretary of the State of New York and many other States. The trade-mark "Bakelite" is applied to some 2,000 different products produced by Bakelite Corporation, a number of which contain no phenol-formaldehyde resin. Bakelite Corporation maintains no factories in the State of New York, and the studies upon which Dr. Mayer of the Division of Industrial Hygiene, based her article were not made in any factory of the Bakelite Corporation. In her article, Dr. Mayer used the term "Bakelite" in a generic sense to differentiate the material under study from "Catalin" which was the subject of a previous article. "Bakelite" is one of the best known of trade names used to denote the sources of similar products, and the familiarity of the public with the term prompted Dr. Mayer to use this term to denote phenol-formaldehyde resins of a certain type.

PLAN EXAMINATION

Summary of plans for ventilation and exhaust equipment systems acted upon by the
Plan Examination of the Division of Industrial Hygiene during
the month of November 1936

Ventilation of	Industry	Substance	No. plans	No. Mach.	Persons affected
Acid-handling.....	Retail-chemicals....	Misc. chemicals....	1	1	1
Blocking-table.....	Hats.....	Humidity.....	1	4	3
Buffing-metal.....	Miscellaneous.....	Misc. dust.....	12	94	104
Casters-linotype.....	Printing.....	Lead dust.....	2	9	5
Dust-misc.....	Miscellaneous.....	Misc. dust.....	10	26	45
Grinders-metal.....	Miscellaneous.....	Misc. dust.....	10	52	80
Humidity.....	Hats.....	Steam.....	1	4	3
Novelty-presses.....	Novelties.....	Carbon-monoxide..	1	8	2
Ovens.....	Miscellaneous.....	Heat.....	2	5	50
Pots-lead.....	Printing.....	Lead-dust.....	4	10	14
Post-misc.....	Miscellaneous.....	Misc. dust.....	8	21	339
Shoe-machines.....	Shoes.....	Leather-dust.....	5	66	644
Sprayers.....	Automobiles.....	Lacquer-fumes.....	6	6	13
Sprayers.....	Metal.....	Lacquer-fumes.....	5	8	19
Sprayers.....	Miscellaneous.....	Lacquer-fumes.....	3	11	10
Tanks-acid.....	Miscellaneous-metal..	Chromic-acid.....	2	3	34
Tanks-washing.....	Ice-boxes.....	Kerosene-fumes.....	1	4	6
Woodworking.....	Furniture.....	Wood-dust.....	2	24	16
Woodworking.....	Miscellaneous.....	Wood-dust.....	3	21	13
			79	377	1,401

DIRECTORY OF STATE DEPARTMENT OF LABOR

ALBANY OFFICE
STATE OFFICE BLDG.
Phone: 3-5511

NEW YORK OFFICE
80 CENTRE STREET
Phone: Cortlandt 7-9800

INDUSTRIAL COMMISSIONER

ELMER F. ANDREWS, Flushing

DEPUTY COMMISSIONER

WILLIAM J. PICARD, Albany

SECRETARY

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INDUSTRIAL BOARD

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Offices of the Chairman and Members of the Industrial Board: State Office Building,
80 Centre Street, New York City; Phone: Cortlandt 7-9800.

ALBANY

State Office Bldg., Ninth Floor—Phone: 3-5511
Office of the Industrial Commissioner.
Office of the Deputy Commissioner.
Division of Statistics and Information.
Division of Inspection: Bureau of Factory and Mercantile Inspection; Supervising Inspector of District No. 6;
Bureau of Boiler Inspection, Chief Boiler Inspector.
Bureau of Mines, Tunnels, Quarries and Explosives.
Division of Industrial Relations: Bureau of Mediation and Arbitration.
Division of Engineering.
Division of Workmen's Compensation.
Division of Bedding—Inspector at office 9 to 12 A.M. Saturdays.
100 State Street, Eighth Floor—Phone: 4-7107
The State Insurance Fund.
Arcade Bldg., Broadway, Fifth Floor—Phone: 3-3218
Division of Unemployment Insurance—Main Office.
11 North Pearl Street—Phone: 4-8108
Division of Employment.*

NEW YORK CITY

State Office Bldg., 80 Centre Street—Phone: Cortlandt 7-9800
Office of the Industrial Commissioner.
Office of the Deputy Commissioner.
Office of Secretary.
Offices of the Chairman and Members of the Industrial Board.
Bureau of Accounts.
Bureau of Cashier.
Division of Self Insurance and Bureau of Finance—Office of Director.
Bureau of Publications.
Division of Inspection—Office of Director; Bureau of Factory Inspection—Supervising Factory Inspectors, Districts 1, 2, 3, 4 and 5;—Chief Factory Inspector, Bureau of Mercantile Inspection—Chief Mercantile Inspector; Bureau of Building Inspection—Supervising Inspector.
Division of Industrial Codes—Industrial Codes Referees.
Division of Industrial Hygiene—Office of Director.
Division of Industrial Relations—Office of Director; Bureau of Mediation and Arbitration—Chief Mediator; Bureau of Labor Welfare.
Division of Statistics and Information—Office of Director.
Division of Women in Industry and Minimum Wage—Office of Director; Bureau of Homework Inspection; Bureau of Enforcement of Women and Child Labor Laws.
State Office Bldg., 150 Leonard Street entrance—Phone: Cortlandt 7-9800
Division of Workmen's Compensation—Office of Director; Bureau of Claims; Medical Bureau; After Care Bureau.
625 Madison Avenue—Phone: Wickersham 2-1900
The State Insurance Fund—Office of Manager.
124 East 28th Street—Phone: ASHland 4-2650
Division of Bedding—Office of Director.
342 Madison Avenue—Eleventh Floor—Phone: MURray Hill 2-9560
Division of Placement and Unemployment Insurance—Metropolitan Office—Office of Executive Director.
Division of Employment—Administrative Office.
Employment Offices in Greater New York
Manhattan Industrial Office—124 East 28th Street—Phone: LEXington 2-0900.*
Manhattan Service Office—40 East 40th Street—Phone: ASHland 4-8960.
Professional and Commercial Office—363 Lexington Avenue—Phone: ASHland 4-5010.
Brooklyn Office—214 Duffield Street—Phone: TRIangle 5-6400.*
Bronx Office—332 East 149th Street—Phone: MOtT Haven 9-1735.*
Harlem Office—200 West 135th Street—Phone: EDGecomb 4-6211.*

Queens Office—25-07 Bridge Plaza North, Long Island City—Phone: STillwell 4-8411.*
Day Work Branch—46-11 Skillman Avenue, Sunnyside, LIC. Phone: STillwell 4-8411.

BUFFALO

State Office Bldg.—Phone: Washington 4720
Branch Office of the Industrial Commissioner.
Division of Workmen's Compensation.
Division of Statistics and Information.
Division of Industrial Relations—Office of Investigator.
Bureau of Factory and Mercantile Inspection; Supervising Inspector of District No. 9.
Division of Bedding—Inspector at office 9 to 12 A.M. Saturdays
369 Main Street—Phone: Cleveland 1011
The State Insurance Fund.
80 West Genesee Street—Phone: Washington 4242
Division of Employment—Industrial, Labor and Service Office.
43 Court Street—Phone: Washington 4242
Division of Employment—Commercial and Professional Office.*

ROCHESTER

70 Exchange Street—Phone: Main 1487
Branch Office of the Industrial Commissioner.
Division of Workmen's Compensation.
Division of Statistics and Information.
Division of Industrial Relations—Office of Investigator.
Bureau of Factory and Mercantile Inspection; Supervising Inspector of District No. 8—Phone: Main 2729.
Division of Bedding—Inspector at office 9 to 12 A.M. Saturdays.
65 Broad Street—Phone: Main 4876
The State Insurance Fund.
154 Broad Street—Phone: Main 9060
Division of Employment—Construction and Farm Office.
34 State Street—Phone: Main 9060
Division of Employment—Industrial and Service Office.
65 Broad Street—Phone: Main 9060
Division of Employment—Commercial and Professional Office.*

SYRACUSE

214 South Warren Street—Phone: 2-2241
Branch Office of the Industrial Commissioner.
Division of Workmen's Compensation.
Division of Statistics and Information.
Bureau of Factory and Mercantile Inspection; Branch Office of Supervising Inspector of District No. 7.
Division of Bedding—Inspector at office 9 to 12 A.M. Saturdays.*
232 West Genesee Street—Phone: 2-4344
The State Insurance Fund.
410 East Genesee Street—Phone: 5-4131
Division of Employment—Industrial, Labor and Service Office.
109 West Onondaga Street—Phone: 5-4131
Division of Employment—Commercial and Professional Office.*

UTICA

131 Genesee Street—Phone: 2-4313
Division of Industrial Relations—Office of Investigator.
Bureau of Factory and Mercantile Inspection; Supervising Inspector of District No. 7.
Division of Bedding—Inspector at office 9 to 12 A.M. Saturdays.
210 Columbia Street—Phone: 4-2161
Division of Employment.*

BINGHAMTON

34 Chenango Street—Phone: Binghamton 2-7258
Division of Employment.

ELMIRA

410 East Market Street—Phone: Elmira-5274
Division of Employment.

ROME

204 North James Street—Phone: Rome 756
Division of Employment.*

* A Junior Division serving boys and girls, 16-21 years of age, is located in this office.