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FORTY-NINTH REPORT

(57th Year)

OF THE

STATE DEPARTMENT OF HEALTH

For the Year Ended June 30, 1934

STANLEY H. OSBORN, M.D., C.P.H., Commissioner

HARTFORD, CONNECTICUT

1934

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BUREAU OF OCCUPATIONAL DISEASES

To Stanley H. Osborn, M.D., C.P.H., State Commissioner of Health, Hartford, Connecticut:

Sir:—I have the honor to submit the report of the Bureau of Occupational Diseases for the fiscal year ending June 30, 1934.

PERSONNEL

The personnel has not changed during the past year:

Albert S. Gray, M.D., Director
Warren A. Cook, A.B., Chief Industrial Hygienist
Allan L. Coleman, B.S., Assistant Industrial Hygienist
Hilda Baltzer, Secretary

INTRODUCTION

With the constant accumulation of evidence on the injurious effects of unhealthful working environment and the steadily increasing costs of compensation for occupational disease, it is realized that the only answer to the occupational disease problem is prevention. Connecticut, itself, with so large a portion of its population engaged in manufacturing and mechanical industries had the foresight to recognize this fact and for the past several years the bureau has been conducting studies and surveys of working environment for the purpose of preventing occupational diseases. It is interesting to note that recent reports from various sources have shown that this appreciation of the importance of prevention is being recognized not only by health authorities but by many varied groups concerned with this problem, and there is a growing tendency toward enlarging the scope of activities associated with this subject.

So important and definitely recognized is this effect of industrial environment on health that health authorities have accepted the responsibility for occupational disease control as a public health problem of the first magnitude. Haven Emerson in his presidential address at the Annual Meeting of the American Public Health Association said:

> "Let us incorporate within the permanent functions of health departments, protection of employed persons against health handicaps inherent in the place and nature of their work."

At that meeting a resolution was passed by the membership of the American Public Health Association as follows:

> "Whereas it is the responsibility of the health authorities to protect the population from all preventable diseases, and
>
> Whereas unhealthful occupational environment constitutes an important and wide spread cause of increased morbidity and mortality among the large group of wage earners and among the general population, and
>
> Whereas control of health hazards in occupational environment is vital to the prevention of occupational diseases, therefore
>
> Be It Resolved, That it is a function of the department of health to include as an integral part of a complete public health program the protection of the

of workers in other industries were due to these causes. The results of these recent studies provide additional information that excessive dust exposures have a marked effect on morbidity and mortality rates and that every effort should be made to control this condition.

Although the cost of injury to health by dust in terms of compensation payments is staggering, this compensation cost is by no means acknowledged the greatest cost to be ascribed to dusty conditions. Annual losses from claims made in Massachusetts for disability from dust inhalation averaged about $117,000 for 1929, 1930 and 1931. On September 10, 1931, the Wisconsin Compensation Commission had $600,000 of silicosis claims outstanding. In 1932 in that state about $207,000 was actually paid for occupational disease cases. In New York state a reputable authority reports a total of 1,000 to 1,500 suits for a total of $50,000,000. Claims which have originated in the last few years in various areas of this country aggregate a total of at least $300,000,000 for silicosis alone.

These figures are presented here to call attention to the fact that the dust hazard is one that should not be forgotten or postponed until a more prosperous industrial era develops. It is in the first interest of economy that effective steps be taken at the present time for the control of the dust hazard. One of the important factors from a public health point of view in connection with pneumoconiosis is that once well established the condition is progressive. Accordingly, the only preventive method is the control of dust producing operations so that exposure to dust will be less than that necessary to cause this disease.

In conducting the dust control work, 41 surveys of 19 dust producing operations, and 10 technical studies were made of 6 types of dust hazards. The work in furthering dust control should be greatly expanded. All manufacturers operating dusty processes should be fully informed of the existing hazard and of the methods of control. Surveys of dusty operations should be supported by technical studies which have been found so effective in the experience of the bureau for instigating action on the part of the manufacturer for control of the occupational disease condition.

ASBESTOS DUST HAZARDS

Asbestos is handled in appreciable quantities in eight plants operated by six concerns in this state. At four of these plants asbestos is received in the raw state; at the remaining plants, the asbestos is received as yarn. The principal products manufactured are woven and molded brake linings and clutch facing, and insulated wire for which asbestos is used as the insulation.

In the manufacture of asbestos products, the raw asbestos must first undergo certain preliminary operations. These preliminary operations present the greatest problem in dust prevention. However, dust determinations have shown that even the preliminary operations can be conducted without exposing workers to excessive dust concentrations. Evidence of the extreme dustiness in these operations is afforded by dust counts showing concentrations as high as 82 million particles per cubic foot of air in the asbestos preparation room and 76 million particles per cubic foot of air in the carding room as against concentrations of only about one-half million particles per cubic foot of air in these two rooms in other plants where dust control measures have been successfully employed.

The necessity of providing dust control not only during normal operation but also during certain intermittent operations which may cause the liberation of excessive amount of dust into the air is well shown by the results of two dust samples collected in a preparation room of an asbestos products manufacturing plant. When the raw asbestos is fed into the opener too rapidly, the opener may become clogged at the outlet duct connected to the rear of the machine. A sample of air was being collected to show the dust exposure of the operator of the opener. During the collection of this sample the gate at the rear of the opener was removed to clean out the clogged duct. The opener was continued in operation during this time. It was found that the exposure of the operator during the collection of this sample was 16.7 million particles per cubic foot of air. The fact that the greater part of this dust resulted from the cleaning out operation was shown by a subsequent sample collected in this same room. During the collection of the second sample the duct at the rear of the opener remained closed. Not only was the opener itself being operated at this time, but also a screen which must have contributed some dust into the general room atmosphere on its own account. Even while both of these units were in operation, the exposure of the operator was found to be only 4.26 million particles per cubic foot of air. Although it is planned to reduce the dust content of this room even below this figure. this pair of determinations showed the advisability of impressing upon the operator the necessity of avoiding liberation of dust by removing the gate during operation of the opener.

Where scrap asbestos is to be used in molded products, it is necessary to send this scrap through a pulverizer. It was noted that dust escapes both at the pulverizer itself and also at the bag into which the pulverized asbestos is discharged. Here again unnecessary clouds of dust were given off in connection with an operation which was conducted intermittently. When the bag of pulverized asbestos became full, it was removed while asbestos continued to be discharged from the machine. The dust concentration at the breathing point of the operator as he conducted the entire cycle of operations in connection with the pulverizer including removal of the bag of pulverized material was found to be 10.3 million particles per cubic foot of air. As a result of these dust samples these conditions are to be taken care of and a further group of samples collected to show whether the control method has been effective.

TABLE NO. I. ASBESTOS DUST CONCENTRATIONS DURING PRELIMINARY OPERATIONS

Operation	*Dust Concentration in Million Particles per Cubic Foot of Air*
Plant No. 1	
Preparation Room (Dust condition well controlled)	½
Plant No. 2	
Preparation Room (Dust condition uncontrolled)	82
Plant No. 3	
Exposure of operator of opener (Duct in rear open for cleaning during collection of sample)	17
Plant No. 3	
(While screen in this same room was operating but duct in rear of opener was not open)	4

Dust conditions at carding machines, both feeders and finishers, tend to be severe excepting where particularly well designed exhaust ventilation is applied. Such ventilation must be close to the machine and so regulated that it does not pull the asbestos away from the machine. That this can be done successfully is shown by dust counts as low as one-half million particles per cubic foot of air in carding rooms. On the other hand where no ventilation or where poorly designed exhaust ventilation is used, dust counts as high as 76 million particles per cubic foot of air have been found.

The operations of spinning, twisting and weaving can be conducted without presenting excessive dust hazards as is shown by dust counts down to a third of a million particles per cubic foot of air in connection with each of these operations. However, it should be definitely determined by dust counts that such operations are being conducted without exposing the operator to a dust hazard in view of the fact that concentrations up to 10, 7 and 19 million particles, respectively, have been found.

In the manufacture of molded products, the raw opened asbestos or the pulverized scrap asbestos is first added to beaters of the type used in paper manufacturing. When the beaters are loaded by emptying the bags of material directly into them, an appreciable amount of dust is produced. A fifteen-minute air sample was collected at the breathing level of two men conducting this operation. During two minutes of this sampling period, bags of raw asbestos were being loaded into the beater. The rest of the load consisted of scrap asbestos which was being added during the greater part of the sampling period. Although higher dust concentrations were obviously being produced in loading the raw asbestos, a sample was collected throughout the loading of both these materials in order to be representative of this operation as it is usually conducted. The concentration of dust was found to be 13.6 million particles per cubic foot of air. It has been shown that this operation can be done without liberation of excessive amounts of dust. Until some method could be devised which does not involve escape of excessive amounts of dust at the plant where this high dust count was obtained, the expedient of providing the workers with respirators was suggested.

A sample of air was collected to show the exposure of workers cutting out and inspecting clutch disks. The average exposure was found to be 4.4 million particles per cubic foot of air. No exhaust ventilation was provided in connection with this operation.

One of the major operations in the manufacture of molded asbestos products is grinding. Where exhaust ventilation is well designed, the dust concentration in the vicinity of grinding operations can be kept remarkably low. A group of six samples was taken at one plant in connection with various grinding machines. With a single exception, the ventilation was found to be adequate as shown by the results given in Table No. II.

Samples collected to show the exposures of operators of a Blanchard grinding machine, a Cincinnati grinding machine, and an internal boring machine were found to be 0.6 million, 0.8 million, and 2.0 million particles per cubic foot of air respectively. (Samples No. 1, 2 and 3, Table No. II.) It was noted that a small visible dust cloud was produced when the clutch disks were stacked prior to placing in the grinding machine. The concentration of dust from this source is however apparently insignificant in view of the very low dust counts obtained in samples No. 1 and No. 2. The ventilation system at each of these machines was shown to be effective in the removal of dust in these operations.

The fallacy of depending upon a visible cloud of dust as a criterion of the dust concentration is well evidenced by a pair of samples collected at an internal and at an external brake grinder. At one of the grinding wheels a visible cloud was produced which was not entirely removed by the exhaust system but escaped into the general room air in such a manner that the operator appeared to be exposed to an excessive dust hazard. To be sure the material was pressed against the grinding wheel hard enough to produce partial carbonization of the material but just how much of this cloud was smoke and how much of it was dust certainly could not be ascertained by mere inspection. From an observation of the condition it appeared essential to make this exhaust hood very much more effective. At another grinding wheel similar operations were being conducted but the temperature did not become sufficiently elevated to produce carbonization. The exhaust hood appeared to be fairly effective in the removal of the dust produced.

Samples of air were taken to show the exposure of the operators of each of these grinding wheels. The first grinder was found to be exposed to a concentration of four million particles per cubic foot of air. This dust count showed that the visible cloud was made up chiefly of smoke and only to a lesser extent of asbestos dust particles. The second grinder, on the other hand, was found to be exposed to 17 million particles per cubic foot of air. The operation which required first attention was obviously the latter but this situation became obvious only when dust counts were available. Incidentally this machine was a particularly difficult one to ventilate. An improved type of enclosure has been devised and it is planned to determine whether this is sufficiently effective to eliminate the dust hazards from this operation as has been accomplished with the other grinding operations at this plant.

In the operation of a lathe type grinder the operator was found to be exposed to only 1.7 million particles of dust per cubic foot of air, here again the ventilation being shown to be effective.

TABLE NO. II. DUST EXPOSURES OF OPERATORS OF GRINDING MACHINES

Sample No.	*Machine being operated*	*Number of Million particles per cubic foot of air*
1.	Blanchard Machine	0.6
2.	Cincinnati Machine	0.8
3.	Internal Boring Machine	2.0
4.	Internal Brake Grinder	4.
5.	External Brake Grinder	17.
6.	Lathe Type Grinder	1.7

In braiding and winding asbestos yarn on wire for insulation purposes, it appears that the dust hazards are not as great as those which we have been studying. Dust counts should be made however to determine just what dust concentrations exist in connection with these operations.

SILICOSIS HAZARDS

Granite Quarrying and Rough Stone Production

Granite quarrying and production of rough stone by plug drilling and splitting operations are looked upon generally as operations in which no appreciable dust hazard exists where these operations are conducted out of doors and not in enclosed sheds. A dust study was conducted in a surface granite quarry where rough stone was produced in this manner. The management thoroughly believed that no hazard existed but wished to have this assumption verified by a dust study.

Samples of air were collected to show the concentration of dust to which the men were exposed during drilling operations, during operations other than drilling, and also to show their average dust exposure throughout the entire cycle of operations.

Samples No. 1 and No. 2 (Table No. III) were collected to show how much dust was produced by the plug drilling operations. Sample No. 1 represented the exposure of the worker operating a plug drill. This sample was collected over a four-minute period and showed a concentration of 640 million particles of dust per cubic foot of air. Sample No. 2, collected simultaneously with Sample No. 1, was located in the dust cloud at a point six feet away from the operation. The concentration of 206 million particles per cubic foot of air found at this point represents the exposure to which any worker in the vicinity of the plug drilling operations might be subjected.

Sample No. 3 was collected to determine the exposure of a worker while engaged in operations other than drilling. A plug drill was being operated at a distance of three feet from this worker during two and one-half minutes of the ten-minute sampling period. Although this worker was at no time standing in the dust cloud arising from this operation, his exposure was found to be 16.8 million particles per cubic foot of air. The result of this sample showed that even though the operations are conducted out doors, much fine dust does remain suspended in the working area.

Samples No. 4 and 5 were taken to determine the exposure of each of two workers while engaged in the entire cycle of operations. During the