

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE  
CENTER FOR DISEASE CONTROL  
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION  
REPORT NO. 79-151-657

DEARBORN RUBBER CORPORATION  
WESTMONT, ILLINOIS

JANUARY, 1980

I. SUMMARY

On September 17, 1979, the National Institute for Occupational Safety and Health (NIOSH) received a request from the Dearborn Rubber Corporation of Westmont, Illinois, to evaluate the exposure of warehouse workers to asbestos. An industrial hygiene survey was conducted by NIOSH investigators on October 30, 1979. Personal and area samples for determination of airborne asbestos fibers were collected and confidential employee interviews were conducted.

Asbestos concentrations in two of four personal breathing zone air samples exceeded the NIOSH recommended standard of 100,000 fibers over 5 microns in length per cubic meter for an eight hour time weighted average (TWA). No work related or general health problems were reported by the four workers interviewed.

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II. TOXICITY DETERMINATION

On the basis of environmental air samples collected, evaluation of work procedures, engineering and personal protective controls, and available toxicity information, it has been determined that employees involved in asbestos operations in the warehouse area of the Dearborn Rubber Corporation are subjected to asbestos above the NIOSH recommended criteria of 100,000 fibers over 5 microns in length per cubic meter on a TWA basis.<sup>1</sup> Recommendations for alleviation and control of this hazard are incorporated on page 5 of this report.

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### III. INTRODUCTION

NIOSH received a request to evaluate the potential effects upon workers of operations utilizing asbestos in the warehouse area of the Dearborn Rubber Corporation.\* The operations involving the use of asbestos are carried out on an infrequent basis dependent upon product demand, and may involve from two to four employees. The request was submitted by the employer and was prompted at the suggestion of an insurance representative.

### IV. HEALTH HAZARD EVALUATION

#### A. Background

The Dearborn Rubber Corporation is involved in the warehousing of industrial rubber products. These items include rubber hose, metal hose, and conveyor belts. Many of these products require some special modification before shipment e.g.; welding or asbestos covering. These special operations are carried out in accordance with the demand for a specific product.

There are two major operations which involve the use of asbestos. The first involves the wrapping of rubber hose with sheets of asbestos cloth. This process occurs on the average of once every three months, and its duration is dependent upon the length of hose being prepared.

The second such operation involves the manufacture of a furnace door hose, and occurs on the average of once every two months. In this operation a length of asbestos sleeve is hand stretched, and gathered onto the outer surface of a section of pipe. A smaller diameter rubber hose is then passed through the core of the pipe. As the hose is pulled through the end of the pipe, the asbestos sleeve is drawn over it. Upon completion, the hose is pushed back into the pipe again so as to provide for a double layer of the asbestos coating. The hose is then connected to a machine which spins it, enabling the workers to wrap it with a heavy gauge wire that secures the asbestos layers. The duration of this procedure also may vary with the length of the hose being prepared.

\* Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by an employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

## B. Evaluation Design and Methods

On October 30, 1979, two NIOSH investigators visited the Dearborn Rubber Corporation to conduct an initial survey and to collect environmental samples. At this time the company was prepared to manufacture a furnace door hose which involved the use of asbestos material.

Personal and area samples were used to evaluate employee exposure. Personal samples were collected at the workers breathing zone. Area samples were collected midway through the area of the operation.

The samples were collected using a sampling train with a three piece cassette. The collecting media were 37-mm diameter/0.8 um pore size mixed cellulose membrane filters (type AA). The filters were sampled open face in order to assure even dispersal of fibers. The pump flow rates are recorded on Table 1. The samples were later analyzed by NIOSH method P&CAM #239 utilizing phase contrast microscopy.<sup>2</sup>

## C. Evaluation Criteria and Toxicity Data

### 1. Toxicity Data

Asbestosis is a chronic lung disease due to inhalation of asbestos fibers and is characterized by diffuse interstitial fibrosis frequently associated with thickening of the pleura (fibrosis) and/or pleural calcification. If large quantities of fibers are inhaled over a prolonged period, the tissue reaction progresses until a generalized, diffuse fibrosis becomes evident. The fibrosis can impair the transfer of oxygen across the aveolar membrane and results in respiratory insufficiency, or cardiac failure.

Along with asbestosis, studies have provided conclusive evidence that exposure to asbestos fibers causes cancer in man. Increased frequencies of bronchogenic carcinoma and of mesothelioma occur in occupationally exposed workers. There is a marked enhancement of the risk of bronchogenic carcinoma (lung cancer) in those exposed to asbestos who also smoke cigarettes. Mesothelioma is a cancer of the lining of the lungs (pleura) or the abdominal cavity (peritoneum). Other types of cancer associated with asbestos exposure are those of the larynx and gastro-intestinal tract. All these cancers have a lengthy induction period, i.e. a long time must elapse between the onset of exposure and the development of the carcinoma, usually more than twenty years. There are data that

show that the lower the exposure, the lower the risk of developing cancer, and the longer the induction period. Excessive cancer risks have been demonstrated at all fiber concentrations studied to date. Evaluation of all available human data provides no evidence for a threshold or for a "safe" level of asbestos exposure.<sup>1</sup>

## 2. Environmental Criteria

In view of these health data, the standard for exposure to asbestos should be set at the lowest level detectable by available analytical techniques. The NIOSH recommendation for environmental exposure limit is 100,000 fibers greater than 5  $\mu\text{m}$  in length / $\text{M}^3$  on an 8-hour-TWA basis, with peak concentrations not to exceed 500,000 fibers greater than 5  $\mu\text{m}$  in length/ $\text{M}^3$  based on a 15 minute sampling period.

This recommended standard is designed to (1) protect against noncarcinogenic effects of asbestos, (2) reduce the risk of asbestos-induced cancer, and (3) be measured by techniques that are valid, reproducible, and available to industry and official agencies.<sup>1</sup>

The present OSHA standard states that exposure to airborne concentrations of asbestos fibers shall not exceed 2,000,000 fibers over 5  $\mu\text{m}$  in length/ $\text{m}^3$  on an 8 hour TWA basis, with ceiling concentrations not to exceed 10,000,000 fibers over 5  $\mu\text{m}$  in length/ $\text{m}^3$ . The OSHA standard is the current legal limit.<sup>3</sup>

## D. RESULTS AND DISCUSSION

Of the three workers who were involved in the asbestos operation in its entirety, two were exposed to asbestos fibers in excess of the NIOSH recommended 8 hour TWA concentration. A majority of the visible fiber emission occurred as a direct result of the actual handling of the asbestos material by the workers. This consisted of the stretching and gathering of the asbestos sleeve on the pipe, and subsequently drawing it back over the rubber hose. Therefore, as the workers moved up and down the pipe in the course of the operation, they were constantly present in the area of the highest exposure. Area samples that remained stationary at mid-process (the middle of the pipe) showed significant exposure, but not in excess of the NIOSH recommended 8 hour TWA concentration. The fourth worker was not involved in this phase of the operation, thus his exposure was less than the sensitivity of the NIOSH analytical methods.



NIOSH/MSHA approved respirators were available to the workers, however the three workers involved in the operation in its entirety chose to wear a lighter weight non-approved respirator. The absence of an adequate respirator program was noted.

Personal protective clothing was not worn, and visible accumulations of fibers were noted on the workers clothing. This accumulation could lead to further exposures of both the workers and of persons who may come into contact with the contaminated clothing.

Dilution ventilation was the primary means of ventilation. A visible dispersion of fibers randomly about the warehouse was noted. This dispersal could possibly lead to an accumulation of asbestos fibers upon materials and equipment that were being stored nearby. Subsequent use of these materials or equipment could lead to repeated exposures by the workers, or exposure of other individuals coming in contact with these items.

#### V RECOMMENDATIONS

In view of the infrequent use of asbestos in warehouse operations (approximately once every two months) the use of less toxic materials as a substitute appears to be the most practical means of protecting the workers' health. Discussions with plant management and personnel indicate that in the past asbestos was used at a greater frequency. However, alternative materials made available in recent years (vinyls and silicones) have dramatically reduced the need for the use of asbestos.

The use of engineering controls would prove costly and are considered a less desirable method of limiting employee exposure. The use of respirators, protective clothing, and other personal protective devices, are considered by NIOSH as the least desirable means of limiting exposure and should only be implemented as an interim measure. Therefore, the substitution of the asbestos with less toxic materials would not only prove to be the most economically feasible solution, but also would be the best method of protecting the employees.

It is also recommended that the company implement a medical surveillance program for all employees who have regularly worked with asbestos. These employees should be given medical examinations annually, as well as an exam to be given at the termination of their employment. Such examinations should include, as a minimum, a chest roentgenogram, a history to elicit symptomology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV<sub>1.0</sub>).<sup>5</sup>

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VII. REFERENCES

1. Revised Recommended Asbestos Standard 1976  
DHEW(NIOSH) Publication No. 77-169
2. NIOSH Manual of Analytical Methods, Volume 1  
2nd Edition DHEW(NIOSH) Publication No. 77-157A
3. Summary of NIOSH Recommendations for Occupational Safety and Health Standards - October 1978 U. S. Department of Health, Education, and Welfare, NIOSH
4. Carcinogens - Working with Carcinogens, A Guide to Good Health Practices DHEW Publication No. (NIOSH) 77-206
5. General Industry Safety and Health Standards (29 CFR 1910)  
U. S. Department of Labor, Occupational Safety and Health Administration Revised January 1976)

VIII. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Services (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH publications office at the Cincinnati address. Copies of this report have been sent to the following:

- A. Warehouse - Dearborn Rubber Corporation, Westmont, Illinois
- B. NIOSH - Region V
- C. U. S. Department of Labor, OSHA - Region V
- D. Director of Public Health - Springfield, Illinois

For the purpose of informing the 4 "affected employees" the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place(s) near where exposed employees work.

HHE 79-151  
 WAREHOUSE  
 Westmont, Illinois

TABLE 1  
 RESULTS OF ENVIRONMENTAL SAMPLES  
 COLLECTED ON OCTOBER 30, 1979  
 FOR AIRBORNE ASBESTOS

<u>SAMPLE TYPE AND LOCATION</u>	<u>DURATION OF SAMPLE/MIN.</u>	<u>FLOW RATE LITERS/MIN.</u>	<u>SAMPLE VOLUME LITERS</u>	<u>TOTAL FIBERS** PER CUBIC METER</u>	<u>CALCULATED 8 HOUR TWA IN FIBERS** PER CUBIC METER</u>
Personal Worker #1	62	1.8	110	1,000,000	130,000
Personal Worker #2	61	2.2	130	1,100,000	140,000
Personal Worker #3	56	2.0	110	650,000	76,000
Personal Worker #4	32	2.0	64	less than LOD*	less than LOD*
Area Mid-process	60	2.2	130	130,000	16,000
Area Mid-process	61	2.0	120	350,000	44,000
Area Outdoors	60	2.2	130	less than LOD*	less than LOD*

\* Limit of detection = 4500 fibers per filter

\*\*Fibers counted exceed 5 microns in length

Current OSHA 8-HR TWA (not to be exceeded) 2,000,000 fibers/m<sup>3</sup>

Recommended NIOSH 8-HR TWA (not to be exceeded) 100,000 fibers/m<sup>3</sup>