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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 HE 79-89-609

HERMAN DIAMOND COMPANY  
36 WEST 47th STREET  
NEW YORK, NEW YORK 10036

FILE COPY

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I. TOXICITY DETERMINATION

The National Institute for Occupational Safety and Health (NIOSH) conducted a Health Hazard Evaluation on May 1-2, 1979, at the Herman Diamond Company in New York City. The evaluation was concerned with assessment of employee exposures to asbestos. Methodology used in the evaluation included environmental sampling, observation of work practices, and review of the workplace and materials used.

The potential health hazard due to asbestos exposure during diamond cutting operations appeared minimal. Four area air samples collected near the work areas were found not to contain asbestos fibers. It is recommended, though, that if some less hazardous material cannot be substituted for asbestos, the asbestos-containing material be wetted during the cutting process to reduce the potential for airborne emissions.

II. 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 Service (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:

- a) Herman Diamond Company, N.Y., N.Y.
- b) NIOSH - Region II
- c) U.S. Department of Labor - Region II

For the purpose of informing the 5 "affected employees" the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place near where exposed employees work.

### III. INTRODUCTION

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.

The National Institute for Occupational Safety and Health received such a request from an authorized representative of the employer of the Herman Diamond Company to evaluate employee exposures to asbestos during diamond cutting operations.

### IV. HEALTH HAZARD EVALUATION

#### A. Process Description

This company employs 3-4 diamond cutters who take raw, uncut diamonds and turn them into finished products. Each cutter sits at a bench behind a spinning polishing wheel. Regularly shaped diamonds can be clamped into holders with long arms and either manually placed against the spinning wheel, or held in a vise-like unit. Since fancy, irregularly shaped diamonds will not set in this holder, the cutters make a sticky paste to hold the stone.

A cutter will tear off a piece of asbestos paper-approximately a square inch-from a roll and mix it with sugar and water in a jar. The cutter will remove this mixture as needed; one cutter remarked that he would normally use the paste five times per week for a total time of 10 minutes. The shop has a window air conditioner and an exhaust fan to provide general ventilation.

## B. Evaluation Design and Methods

### 1. Air Sampling

Atmospheric samples for asbestos were collected on mixed cellulose ester filters with a 0.8 micron pore size. The filters were encased in three piece plastic field cassettes with the face cap removed and filters completely exposed. The air samples were collected in the general area of the polishing wheels and in the adjacent main office. Air was pulled through the filters at a flow rate of 1.5 liters per minute using battery powered gravimetric pumps. The samples were analyzed in the NIOSH Cincinnati laboratory.

## C. Evaluation Study Criteria

### 1. Toxic Effects<sup>1</sup>

Asbestos is a generic term which applies to a number of naturally occurring silicates of variable composition, but basically is of a form of hydrous magnesium silicate. Their chief characteristic is a structure composed of long, parallel, flexible fibers, capable of repeated longitudinal subdivision. The most widely used form in the United States is chrysotile, a fibrous form of serpentine. Other types include amosite, crocidolite, tremolite, anthophyllite and actinolite.

One of the potential health hazards associated with exposure to asbestos is that of inhalation of airborne fibers, resulting in a type of pneumoconiosis referred to as asbestosis. Asbestos fibers are capable of passing through the upper respiratory tract and depositing in the terminal bronchioles of the lungs. The fibers, upon deposition in the terminal bronchioles, initiate a tissue response which results in the coating of the fiber with the ultimate production of what is known as the asbestos "body". If large quantities of the fibers are inhaled over a prolonged period, the tissue reaction progresses until a generalized, diffuse fibrosis becomes evident. This fibrosis is first seen in the lower lobes of the lungs, but eventually if exposure continues, appears in the other lobes as well. The fibrosis can impair breathing and the transfer of oxygen across the alveolar membrane and result in respiratory insufficiency, or cardiac failure.

Along with asbestosis, studies have provided conclusive evidence that exposure to asbestos fibers causes cancer in man. The frequency of bronchiogenic cancer is greater in occupationally exposed persons, as well as an increased occurrence in development of mesotheliomas of the pleura and peritoneum. These asbestos associated neoplasms may occur without radiological evidence of asbestosis. The effects of inhaled asbestos fibers are potentiated by smoking and possibly other environmental agents.

2. Environmental Evaluation Criteria

Airborne exposure limits for the protection of the health of workers have been recommended or promulgated by several sources. These limits are established at levels designed to protect workers occupationally exposed to a substance on an 8-hour per day, 40-hour per week basis over a normal working lifetime. For this investigation, the criteria used to assess the degree of health hazards to workers from asbestos were selected from three sources:

1. NIOSH: Revised Recommended Asbestos Standard, December, 1976.<sup>1</sup>
2. Threshold Limit Value (TLV): Guidelines for Airborne Exposures Recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) for 1978.
3. OSHA Standard: The air contaminant standard enforced by the U.S. Department of Labor - Occupational Safety and Health Administration - as found in the Federal Register - 29 CFR 1910.1001.

	<u>SOURCE</u>		
	<u>NIOSH</u>	<u>ACGIH (TLV)</u>	<u>OSHA</u>
Asbestos	0.1 fibers*/cc	5 fibers/cc	2 fibers/cc

The NIOSH recommended standard for asbestos is given prominence in this evaluation since it is considered by the Institute to be the most appropriate health criteria. The OSHA Standard is provided only as a reference to determine the state of compliance or non-compliance with Federal Regulations. The Federal Standard is enforced by the U.S. Department of Labor, OSHA.

D. Environmental Evaluation Results

Results of air sampling for asbestos are illustrated in Table 1. No asbestos fibers were detected on any of the samples collected in the cutting or office areas. These results are not surprising since none of the paste was prepared during the survey, although some was used. Analysis of a bulk sample of the material used for making the paste confirmed it was asbestos, containing an estimated 50 to 70% chrysotile (asbestos) fibers having a range of diameters up to 3.0 um (microns). A bulk sample of settled dust collected near Bench #2 contained an estimated 1 to 5% chrysotile (asbestos) fibers, having diameters ranging from approximately 0.05 to 1 um and from 1 to 40 um in length.

\*Fibers per cubic centimeter, greater than 5 microns in length.

E. Conclusions

The potential health hazard due to airborne asbestos at the Herman Diamond Company is minimal based on environmental air samples collected on May 2, 1979.

V. RECOMMENDATIONS

1. A less hazardous substance should be substituted for asbestos if possible.
2. If not possible, the asbestos paper should be cut wet to keep fibers from becoming airborne.

VI. REFERENCES

1. Revised Recommended Asbestos Standard, USDHEW, PHS, CDC, National Institute for Occupational Safety and Health, Cincinnati, Ohio, DHEW Publication No. 77-169, December, 1976.

VII. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared By:

William A. Evans  
Industrial Hygienist  
Industrial Hygiene Section  
Hazard Evaluations and  
Technical Assistance Branch  
Cincinnati, Ohio

Originating Office:

Jerome P. Flesch  
Acting Chief  
Hazard Evaluations and  
Technical Assistance Branch  
Cincinnati, Ohio

Analytical Laboratory Evaluation:

Walter S. Kim  
Chemist  
Jay W. Carter  
Physical Scientist  
Measurements Services Section  
Measurements Support Branch  
Division of Physical Sciences  
and Engineering  
Cincinnati, Ohio

Reported Typed By:

Linda Morris  
Clerk-Typist  
Industrial Hygiene Section  
Hazard Evaluations and  
Technical Assistance Branch  
Cincinnati, Ohio

Table 1

## Results of Area Air Sampling for Asbestos

Herman Diamond Company  
New York, New York

May 2, 1979

<u>Sample Number</u>	<u>Location</u>	<u>Sample Period</u>	<u>Sample Volume</u> (liters)	<u>Asbestos Concentration</u> <sup>1</sup> (fibers/cc)
AA 2	Bench #1 near window to outer office	8:47a-3:45p	680	N.D. <sup>2</sup>
AA 1	Bench #2 near refrigerator	8:49a-3:45p	680	N.D.
AA 3	Bench #3 near outside window	8:50a-3:45p	680	N.D.
AA 4	On desk in main office	10:30a-3:50p	480	N.D.

1 - fibers of asbestos per cubic centimeter of air

2 - Non-detectible; The analytical limit of detection is 4500 fibers/filter

Evaluation Criteria (fibers/cc):

NIOSH  
ACGIH  
OSHA0.1  
5  
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