

REGION-5

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Center for Disease Control  
National Institute for Occupational Safety and Health

HEALTH HAZARD EVALUATION DETERMINATION REPORT

M-HHE 80-104-101

MSHA Mine I.D. No. 11-02632

FREEMAN COAL COMPANY  
FARMERSVILLE, ILLINOIS

December 1980

I. SUMMARY

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at Freeman Coal Company, Crown III mine - Coal Preparation Plant in Farmersville, Illinois, on February 19, 1980, to evaluate reported exposure to asbestos dust. The request indicated a release of asbestos fibers after manipulation of a monolithic asbestos cement sheet (trade name - Flat Transite). The workers involved were employees of the coal preparation plant construction contractor, Roberts & Schaffer. This material was used as a fire wall in the control area of the coal preparation plant under construction at the time of the investigation.

Seven employees were evaluated for airborne asbestos exposure (1). Additional areas (lunch room and heat room) were evaluated for airborne concentrations, as well as the vacuum exhaust on the dust collection system for the circular hand saw used to cut the board. Bulk samples and settled dust samples were collected for analysis by analytical Transmission Electron Microscope (TEM) (2).

Analytical TEM confirmed the presence of chrysotile asbestos in the personal and bulk samples. Personal exposure levels varied from 0.74 fibers/cc to less than the limit of detection. Twenty (20) percent of all airborne samples taken were above the NIOSH recommended criteria of 0.1 fiber/cc (3). All samples were below the MSHA permissible exposure level of 2.0 fibers/cc.

NIOSH determined that a potential hazard of exposure to asbestos dust may exist at Freeman Coal Company, Crown III Mine, Coal Preparation Plant, based upon a comparison of the data obtained in this investigation to the NIOSH recommended criteria for asbestos exposure. Therefore, all exposure to the asbestos board should be controlled, proper protective clothing should be worn, and medical surveillance instituted.

Recommendations for improved conditions and work practices are contained in the body of this report under the section "Conclusions and Recommendations".

## II. INTRODUCTION

Under Public Law 91-173, as amended by Public Law 95-164 (Federal Mine Safety and Health Act of 1977), the National Institute for Occupational Safety and Health has been delegated responsibility for evaluating the potential hazard of any substance found in the workplace.

During January, 1980, NIOSH received a request to conduct an investigation at Freeman Coal Company, Crown III mine, Farmersville, Illinois. The employer at the site was Roberts and Schaffer, a construction company building the coal preparation plant at this mine. The investigation submitted by an authorized representative of the United Mine Workers of America requested NIOSH investigate the use of Flat Transite. Flat Transite was being installed at this facility as a fire wall around the main control room, as well as the exterior walls of the coal preparation plant under construction.

## III. BACKGROUND

Roberts and Schaffer is a construction company who was under contract to build the coal preparation plant at Crown III mine for Freeman Coal Company. Flat Transite, the material under investigation, is a monolithic asbestos cement sheet manufactured by Johns Manville and contains forty (40) percent chrysotile asbestos. Flat Transite has been used by Roberts and Schaffer for some time as a fire wall material in several coal preparation plants. At this particular job site, five (5) men, one (1) foreman, were required to cut and install the Transite.

In December, 1979, Roberts and Schaffer was involved in another construction site, Inland Steel Coal Company, #2 mine. An MSHA inspector from the Benton, Illinois, subdistrict office conducted environmental sampling while the Transite was being cut. Following termination of that construction contract, Roberts and Schaffer equipped the circular saw, used to cut the Transite, with a dust collection system. This dust collection system was used at the site under investigation.

## IV. METHODS AND MATERIALS

Personal breathing zone samples were collected on all employees cutting and installing the Transite board. Personal samples were also collected on the foreman in charge and the UMWA local safety committee members present. General area samples were collected near the worksite, in the lunch room, the heat room (an enclosed area containing a heater allowing the workers to "warm-up" a bit), and the vacuum exhaust of the dust collection system. Personal breathing zone samples were collected at several intervals throughout the shift in order to calculate time weighted average exposures.

All airborne samples were collected and analyzed in accordance with NIOSH method P&CAM Method 239.

Bulk samples were collected from settled dust and the material itself.

Confirmation of the presence of chrysotile asbestos was accomplished using analytical Transmission Electron Microscopy.

#### V. EVALUATION CRITERIA

Occupational exposure to chrysotile asbestos has been shown in numerous studies to be associated with asbestosis, lung cancer, mesothelioma, and gastro-intestinal cancer. The current MSHA Standard for asbestos is 2.0 fibers/cc; however, NIOSH has recommended an 8 hour exposure limit of 0.1 fibers/cc as measured by the phase contrast microscopic method.

<u>Substance</u>	<u>Proposed NIOSH Standard</u>	<u>MSHA standard</u>
Asbestos Dust	0.1 fibers/cc	2.0 fibers/cc (4)

#### VI. RESULTS/DISCUSSION

All personal breathing zone samples for asbestos dust were below the current MSHA standard of 2.0 fibers/cc. Twenty (20) percent of all samples collected were above the proposed NIOSH standard of 0.1 fibers/cc. Individual fiber levels are given in Table I as well as Time Weighted Averages (TWA) for each individual. For comparative purposes the TWA exposures are illustrated in Diagram I.

Time weighted averages were calculated as follows:

Example: 1.0 fiber/cc for 2 hours  
3.0 fibers/cc for 3 hours  
0.9 fibers/cc for 3 hours

$$\text{TWA} = \frac{1.0 (2) + 3.0 (3) + 0.9 (3)}{8}$$

$$= \frac{2.0 + 9.0 + 2.7}{8}$$

$$= \frac{13.7}{8}$$

$$= 1.71 \text{ fibers/cc for an 8-hour shift}$$

The workers involved with manipulation of the Transite board wore NIOSH approved respirators. Each worker also wore safety glasses and shoes. Disposable clothing was not worn, nor was it provided. Each worker was responsible for cleaning his work clothes, potentially increasing household contact (5). General personal hygiene was not strictly practiced at lunch time or during smoking breaks; therefore, increasing the likelihood of ingestion.

## VII. CONCLUSIONS AND RECOMMENDATIONS

Installation of a vacuum system on the circular saw did reduce the airborne asbestos dust level. The attachment of the saw to the vacuum system was not adequate to completely eliminate exposure to asbestos dust however. Design modification in the vacuum attachment would be necessary to further reduce the dust. The following recommendations are made:

1. The vacuum system should be equipped with a high efficiency particulate absolute (HEPA) filter on the vacuum exhaust. While fibers were not detected at the vacuum exhaust by the phase contrast method, submicroscopic fibrils are likely to escape collection.
2. Asbestos dust on floors, ledges, equipment and other plant surfaces should be removed by vacuum cleaning.
3. The dust and waste materials, such as rejects, scraps or shavings, should be collected in clearly marked bags and disposed of in an EPA approved site (6).
4. Warning signs should be posted alerting all workers to the potential hazard.
5. Workers in direct contact with the asbestos containing board should be provided with disposable protective clothing to eliminate household contact.
6. Workers should be provided with NIOSH approved respirators for asbestos containing dusts. Each worker should be evaluated by a physician for ability to wear a respirator and instructed in the proper fitting, maintenance and cleaning of his respirator.
7. Eating, drinking, or smoking should be restricted to a designated, clean location visited only after established decontamination procedures, i.e. removal of disposable clothing and washing of hands and face.
8. Workers should be instructed in the hazards associated with asbestos exposure, engineering controls, use and limits of respirators and the purpose of medical surveillance.
9. Medical surveillance to consist of preplacement, annual, and termination chest x-rays (PA 14" X 17"), respiratory disease history and pulmonary function tests including FVC and FEV<sub>1.0</sub>. Medical records should be retained a minimum of 20 years (7).

VIII. REFERENCES

1. National Institute for Occupational Safety and Health - Manual of Analytical Methods. Asbestos Fibers in Air P&CA Method No. 239 (NIOSH Publication No. 77-157-A). U.S. Department of Health, Education and Welfare, Cincinnati, Ohio, 1977.
2. National Institute for Occupational Safety and Health - Review and Evaluation of Analytical Methods for Environmental Studies of Fibrous Particulate Exposures (NIOSH Publication No. 77-204). U.S. Department of Health Education and Welfare, Cincinnati, Ohio, 1977.
3. National Institute for Occupational Safety and Health - Revised Recommended Asbestos Standard (NIOSH Publication No. 77-169). U.S. Department of Health, Education and Welfare, Cincinnati, Ohio, 1976.
4. Code of Federal Regulations, Title 30, Mineral Resources, Chapter I, Part 71.202.
5. Anderson, Henry A., R. Lillis; S. Daum, A. Fischbein; I. Solik: Household Contact Asbestos Neoplastic Risk. Annals New York Academy of Sciences, 330:311-323, 1979.
6. Code of Federal Regulations, Title 40, Part 61, Subparts A and B.
7. Code of Federal Regulations, Title 29, Part 1910.1001

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Copies of this report are currently available upon request from National Institute for Occupational Safety and Health, Health Hazard Evaluations, Environmental Investigations Branch, Morgantown, West Virginia.

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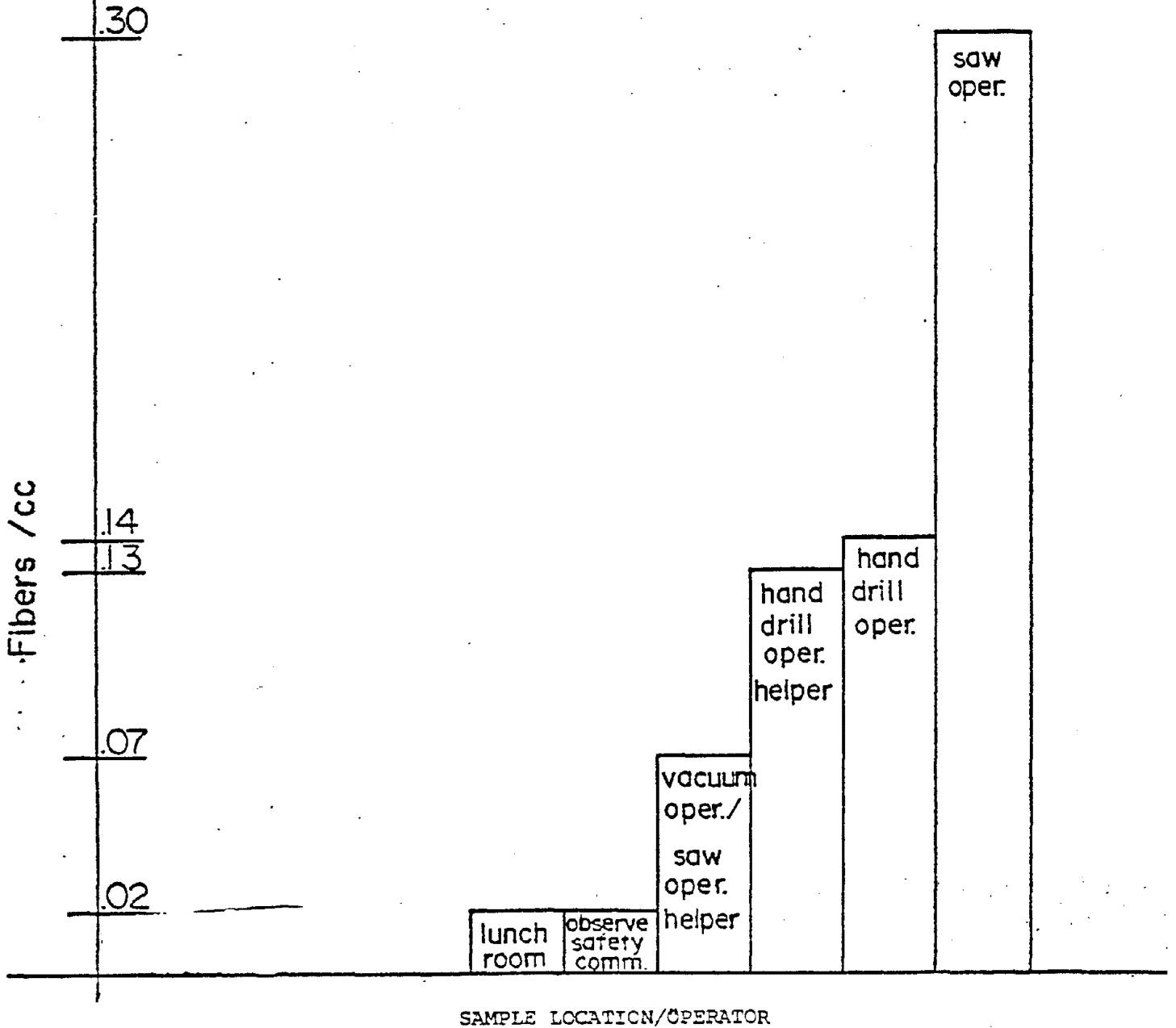
1. Roberts & Schaffer
2. United Mine Workers of America
3. United Mine Workers of America, Local Safety Committee
4. U.S. Department of Labor, Region V
5. NIOSH Region V

TABLE I

Job	Fibers/cc	TWA (fibers/cc)
Observer/Safety Committee	<.03*	.02
	<.03*	
	.04	
Saw Operator	<.15*	.30
	.74	
	.04	
Vacuum Operator/ Saw Operator Helper	.03	.07
	.19	
	.06	
Hand Drill Operator	.07	.14
	.41	
	.09	
Hand Drill Operator/Helper	.18	.13
	.32	
	.05	
Foreman	<.04*	<.04*
	<.04*	
	<.04*	
Lunch Room	<.04*	.02
	.07	
Heat Room	<.06*	<.01*
	<.01*	
Vacuum Motor Exhaust	<.17*	<.16*
	<.15*	
Clean Vacuum	<.73*	<.73*

\*Each value designated < indicates the value shown is less than the limit of detection for that sample. The lower limit of detection (LLD) for each sample was derived empirically through a combination of counting efficiency, fibers collected on each filter and sample times.

DIAGRAM I - WORKER TIME WEIGHTED  
AVERAGE (TWA) CONCENTRATIONS  
TO ASBESTOS FIBERS



The TWA concentrations for the heat room clean vacuum, vacuum motor exhaust and foreman are not shown because they were below the limit of detection.