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. 75-121-281

Penn Central Transporation Company
Philadelphia, Pennsylvania

APRIL 1976

I. TOXICITY DETERMINATION

It has been determined that exposure of clerks to asbestos and fibrous glass was not toxic at the concentrations measured during the National Institute for Occupational Safety and Health (NIOSH) evaluation. This determination is based on: 1) environmental air sampling, 2) medical consultation and 3) a review of available literature concerning the toxicity of the substances under consideration.

While it has been determined that the workplace exposures to airborne dust were not toxic, a number of cases dermatitis were reported. No judgement has been made as the cause or causes of dermatitis, however, it does not appear to be related to asbestos or fibrous glass exposure.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this health hazard evaluation determination are available upon request from NIOSH, Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Copies have been sent to:

a) Penn Central Transportation Company
b) NIOSH - Region III
c) U. S. Department of Labor - Region III
d) Authorized Representative of Employees

For the purpose of informing the approximately 600 "affected employees," the employer will promptly "post" the Determination Report for a period of 30 calendar days in a prominent place where "affected employees" work.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U. S. Code 669(a)(6) authorizes the Secretary of Health, Education, and Welfare, following the written request by an employer or athorized 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 (NIOSH) received such a request from the employees' authorized representative of Penn Central Transportation Company regarding the Food Fair Building.

IV. HEALTH HAZARD EVALUATION

a) Description of the Process - Condition of Use

Penn Central Tranpsortation Company provides railroad services throughout the northeastern United States. Much of the recordkeeping information for the company is maintained either manually or by computer at the location in question by over 1800 clerks. Work involves updating ledgers or computers to reflect current status of transactions.

After a number of employees developed dermatitis, a request was submitted to evaluate office areas regarding exposure to fibrous glass. An initial visit to the office areas in question indicated the heating and cooling air handling systems presented the only potential fibrous glass exposure. Each floor was equipped with a separate air handling unit rated at 31,000 cubic feet of air per minute. Air was moved through ductwork and discharged into the work area through diffusers. The cyclic air flow was completed by drawing air for filtering and tempering from a space between a suspended ceiling and true ceiling. Air flow was provided to this space by way of grates spaced throughout the false ceiling thus allowing air to be drawn from the office area itself.

As air moves through the space above the false ceiling, an abrasion of the false ceiling will occur, increasing as the velocity increases approaching the air handling unit.

Due to the age of the tiles in use (approximately 15 years), no definite identification could be made as to their composition. Building maintenance workers, however, were of the opinion that the tiles were fibrous glass.

b) Evaluation Design

In an effort to evaluate exposures to fibrous glass and the effectiveness of filtration in the air handling system, a return visit was made. Environmental air samples were collected at various locations throughout the interior and exterior of the building. Samples collected were evaluated for: a) total weight; b) total fibers and c) the presence of asbestos and fibrous glass.

Medical review was requested regarding the reported cases of dermatitis and provided by Dr. Robert Rostand, M.D. of NIOSH's Medical Services Branch. Discussions were held with the company physician, however, attempts to review case information with the affected employees' private physician was unsuccessful.

c) Evaluation Methods

Airborne particulate samples were collected on 0.8 micron pore size cellulose membranes using MSA Model G battery powered vacuum pumps operating at 1.7 liters per minute. Samples were subsequently counted by phase contrast and electron microscopy.

d) Evaluation Criteria

The primary source of environmental criteria considered in this report are: 1) NIOSH criteria Documents recommending occupational health standards and 2) U.S. Department of Labor/OSHA occupational health standards.

Fibrous Glass

Clinically, fibrous glass produces a miliarial eruption with tiny red papules. Generally, the itching is intense and is usually entirely out of proportion with the objective findings. Secondary lesions from scratching are usually evident. Fortunately, superficial infections are rarely observed. In the vast majority of employees exposed to fibrous glass, the discomfort or dermatitis is relatively mild and quickly abates as "hardening" occurs. "Hardening" to fibrous glass will occur in almost all employees who have any degree of continuous exposure. This phenomenon, however, is not seen where only an intermittent or episodic type exposure occurs. Glass fibers, once airborne, may also result in eye and upper respiratory tract irritation.

Toxicological data concerning long-term exposure to fibrous glass is very limited and nonconclusive. Recent animal studies in which small diameter glass fibers were introduced into the pleural cavity of rats have shown these fibers to be carcinogenic. A retrospective mortality study[1] conducted by the National Institute of Occupational Safety and Health (NIOSH) among a large cohort (1448 white males) of fibrous glass production workers followed from 1940 to 1960 did not reveal any excess risk of malignant lung disease. However, this study did demonstrate a significantly increased risk of nonmalignant respiratory disease (excluding influenza and pneumonia). In addition, a case-control study of the respiratory disease cases (malignant and non-malignant) detected during this study demonstrated an association of borderline significance between respiratory disease and worker employment in pilot plant operations, some of which had produced small diameter glass fibers (103 micrometers) during the period 1941 through 1949.

In view of the findings of the NIOSH mortality study, it is recommended that exposure to airborne glass fibers be kept at an absolute minimum, especially when long term exposures are expected.

Asbestos

At the time of this evaluation, the U. S. Department of Labor, Occupational Safety and Health Administration (OSHA) asbestos standard (29 CFR, Part 1910.10001) was five fibers greater than five microns in

length per cubic centimeter of air (5 fibers/cc greather than 5 microns) based on an eight-hour time-weighted average exposure (TWA). This limit was to be lowered, effective July 1, 1976, to 2 fibers/cc greater than 5 microns based on an eight-hour TWA. However, on October 9, 1975, OSHA proposed reducing the asbestos limit to 0.5 fibers/cc (or 500,000 fibers per cubic meter) greater than 5 microns.

e) Evaluation Results

Ten air samples were collected and evaluated by phase contrast microscopy for fibers greater than five microns in length. The results ranged from 0.002 fibers per cubic centimeter of air (fibers/cc) (or 2.0 fibers per liter) to 0.011 fibers/cc with seven of nine samples resulting in counts of 0.002 fibers/cc or less. Three samples were collected and evaluated by electron microscopy for total fibers and composition. The same three samples were then evaluated for fibers greather than five microns by phase contrast microscopy. The total fiber counts ranged from 0.007 to 0.060 fibers/cc. While most fibers were found to be counted by asbestos, very low quantities of fiber were noted. When samples were counted by phase contrast microscopy, however, fiber counts (greater than five microns in length) were found to range from less than 0.002 fibers/cc to 0.013 fibers/cc. Two samples collected for total dust and evaluated gravimetrically resulted in concentrations of 0.02 milligrams per cubic meter of air (mg/m^3) and 0.11 mg/m^3.

f) Discussion of Results and Conclusions

Detectable levels of fibers were found in all samples collected during this evaluation. In all cases, the sample results were a factor of one hundred less than the present OSHA health standard for asbestos. (five fibers/cc). When the interior and exterior sample results were compared, interior samples were consistently lower than exterior results, indicating effective operation of existing filtration mechanism. Results of exterior and interior samples examined by both electron and phase contrast microscopy indicate the presence of both asbestos and fibrous glass. It does not appear, however, that samples taken within the building contain signficant difference of fibers than may be found in ambient air outside the building. Although fibrous glass was noted in some samples, concentrations were too low to be validly reported.

When total dust was evaluated on a mass basis, levels found (0.11 mg/m^3 and 0.2 mg/m^3) represented extremely low concentrations which is again consistent with the very low fiber counts (0.002 fibers/cc and 2,000 $fibers/m^3$ found.

Two employees were reported to have been affected by a rash which covered the face, arms and trunk. In classic cases, fibrous glass dermatitis usually occurs in exposed areas of the body (not the trunk

or area normally covered by clothing). Detailed reports on these cases were not made available; however, in view of the extremely low levels of fibrous glass found and the areas effected, it does not appear that these cases are occupationally related. A third case in which an employee was reported to have a mild rash on the arms appeared to be contact dermatitis. Although no determination was made as to the cause of this dermatitis, it would not be unusual to find one person in a group this size who would give a positive response to fibrous glass exposure.

In conclusion, interpretation of data developed indicates dust present in the office areas in question is mostly nonfibrous in nature, while fibers that were present represent a background level normally found throughout the area and should not constitute a health hazard.

In view of these findings, no recommendations other than urging workers to report initial signs of any developing dermatitis allowing prompt medical attention are considered necessary at this time.

V. REFERENCES

1. Mortality Patterns among Fibrous Glass Production Workers, D. L. Bayliss, et. al. Paper presented at N. Y. Academy of Science, March, 1975.

VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

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