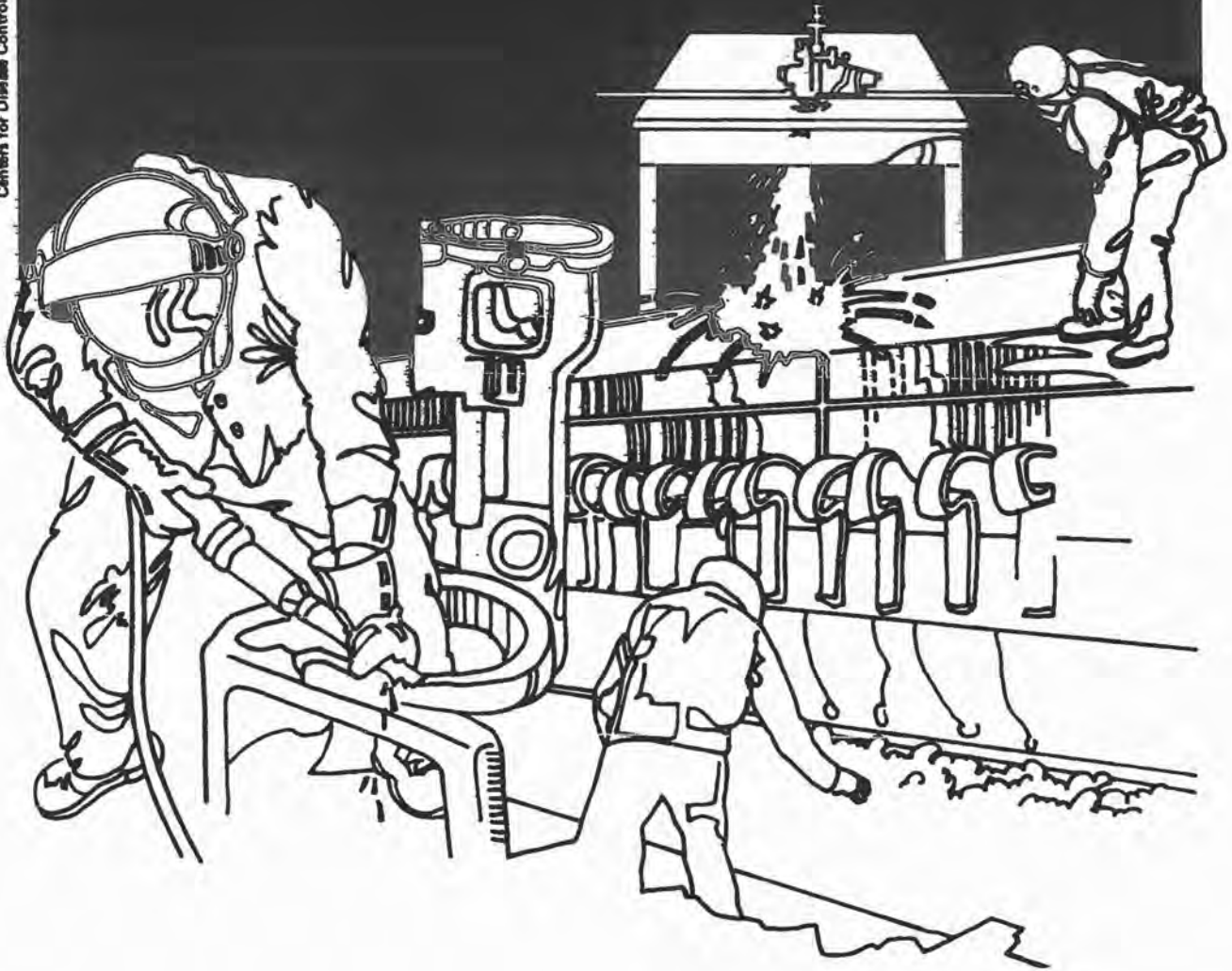


NIOSH



Health Hazard Evaluation Report

HETA 82-086-1126
PENNSYLVANIA DEPARTMENT
OF TRANSPORTATION
MONTROUSVILLE, PENNSYLVANIA

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 82-086-1126
June, 1982
Pennsylvania Department of Transportation
Montoursville, Pennsylvania

NIOSH Investigator:
Walter Chrostek

I. SUMMARY

On December 18, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request from AFSCME, AFL-CIO, Council 13 to evaluate asbestos exposures at the Pennsylvania Department of Transportation (PennDOT) District Office 3-0, Montoursville, Pennsylvania. The Union was concerned that an employee's illness had been diagnosed as lung cancer possibly due to asbestos exposures.

A NIOSH industrial hygienist conducted the initial visit and collected air samples for asbestos on February 2, 1982. Area sampling for asbestos was conducted in areas which had a false ceiling and where the ceiling was sealed with three coats of paint. Three bulk samples of settled dust were collected and analyzed for asbestos content. Five bulk samples of the ceiling tile and insulation were collected and analyzed for asbestos.

The five area air samples taken for asbestos were below the analytical limit of detection (< 4500 fibers/filter or < 0.01 fibers/cc of air). This is well below the current OSHA standard of 2 fibers/cc ($> 5u-8$ -hr. TWA) and 10 fibers/cc ($> 5u-15$ min. ceiling period) enforced by OSHA; and the NIOSH revised recommended standard of 0.1 fibers/cc ($> 5u-8$ hr. TWA) and 0.5 fibers/cc ($> 5u-15$ min. ceiling).

Of the three settled dust samples, only the sample collected in the equipment manager's office showed any asbestos, less than one percent chrysotile asbestos. Two of the five samples of ceiling tile insulation contained asbestos (Personnel office 1-2% chrysotile asbestos and Right of Way office 10-20% chrysotile asbestos).

Based on the findings of this evaluation, NIOSH has determined that environmentally no health hazard existed during normal working conditions. If the lung cancer was caused by asbestos, it may have been due to past exposure. There could be exposures to asbestos during housekeeping and maintenance. Recommended guidelines when performing the operations are contained in Section VII of this report.

KEYWORDS: SIC 9621: (Transportation departments - government), asbestos.

II. Introduction

On December 18, 1981, NIOSH received a request from AFSCME, AFL-CIO, Council 13 for a health hazard evaluation. The Union was concerned that an employee's illness had been diagnosed as lung cancer, possibly caused by asbestos ceiling tiles in the Pennsylvania Department of Transportation Office 3-0 located in Montoursville, Pennsylvania.

III. Background

The PennDOT Office 3-0 is responsible for the maintenance and construction of 4500 miles of highways in eight counties of the State. The personnel in the office are composed of draftsmen, engineers, technicians and clerks. This office has been in existence since 1952 and had a plaster-asbestos ceiling when it was built. Subsequently, the ceiling was coated with three coats of paint. The last painting was done in 1981. In certain areas a false ceiling which contains fibrous glass was installed in 1968.

The employee in question had been employed in the realty division assigned to acquisition of the right-of-way for road construction.

IV. Evaluation Design and Methods

Five area samples for asbestos fiber were collected on 0.8-micrometer pore size mixed cellulose membrane filters in a three-piece open faced filter holder. A personal sampling pump operating at 1.75 liters was used. The sampling time was approximately six hours. These samples were analyzed for asbestos fibers according to NIOSH Method P&CAM 239(1) utilizing phase contrast microscopy. The limit of detection had been determined to be 0.03 fibers per field or 4500 fibers/filter.

Three settled dust bulk samples collected in the equipment manager, right of way offices and in the draft room were analyzed for percent and type asbestos according to the method given below.

All samples were examined for homogeneity. Non-homogeneous samples were ground manually to insure homogeneity. Microscope slides were prepared from each sample using 1.55 refractive index liquid. The slides were then scanned for the presence of asbestos utilizing polarized light microscopy and dispersion staining techniques. A Leitz Dialux 20 microscope equipped with a 16x objective and a 10x eyepiece was used for the analysis.

The percentage of asbestos was estimated microscopically by a visual examination of the fibers with an aspect ratio of 3:1 or greater. If present, asbestos identities was confirmed with the appropriate refractive index liquids applying dispersion staining techniques.

All samples are examined by two separate analysts. Results were averaged and reported in percent by volume.

Five bulk samples of the ceiling tiles and insulation were collected at various locations (TABLE III). A portion from each of the bulk ceiling and insulation sample was suspended in ethanol by ultrasonic agitation. An aliquot of the suspension was then deposited on a TEM carbon coated grid and glass slide. The grid was then examined by transmission electron microscopy, and the glass slide was examined by polarized light microscopy for the presence of asbestos.

V. Evaluation Criteria

1. Environmental Criteria - The following environmental standards or criteria were considered in this report:

Source	8 Hr. - TWA (*fibers/cc > 5u)	15 Min. Ceiling (fibers/cc > 5u)
NIOSH 2 **	0.1 fibers/cc	0.5 fibers/cc
ACGIH 3	2.0	
OSHA	2.0	10.0 ***

*Fibers/cc of air greater than 5 microns (u) - a fiber being defined as "a fundamental form of solid, characterized by relatively high tenacity and an extremely high-ratio of length to diameter".

** The NIOSH criteria are intended to protect the average working population against the non-carcinogenic effects of asbestos and to reduce the risk of asbestos-induced cancer.

*** The OSHA Standard (Current) for short-term exposures requires a 15 minute sampling period to be legally enforceable.

2. Toxicological Data - Asbestos is the common name for a group of mineral fiber silicates known as chrysotile (white asbestos), actinolite, amosite (brown asbestos), anthophyllite, crocidolite (blue asbestos) and tremolite. Each contains varying amounts of iron, chromium, calcium, sodium, magnesium, nickel, silicon dioxide, and water.

The majority of asbestos is used in the construction industry as building products, insulation, friction materials, and textiles because of its excellent insulating properties.

Asbestos can cause a pneumoconiosis of the lung, ("dust in the lung") called asbestosis and certain forms of cancer. Asbestosis is a chronic lung disease in which is produced fibrous or scar tissue and through which over the years results in respiratory impairment and disability. Lung cancer, mesothelioma

(Cancer of the pleura or peritoneum), cancer of the esophagus, colon and rectum are thought to be associated with exposure to asbestos.

Cigarette smoking and possibly other "air contaminants" together with asbestos exposure have a synergistic effect upon the lung tissue and exponentially increase the risk of lung cancer.

NIOSH's latest evaluation of available data of human toxicity to asbestos provides no evidence for a threshold of carcinogenic response or for any so called "safe" level. Therefore, recommends that asbestos exposure should be set at the lowest level of detection using the latest analytical equipment and techniques.

VI. Results and Conclusions

All five general air samples were taken for longer than six hours. All samples were less than the analytical limit of detection, 4500 fibers/filter.

One bulk sample of the settled dust in the equipment manager's office contained less than 1 percent chrysotile. This may have been dust that had settled prior to the sealing of the tiles.

Two bulk samples of the ceiling tile contained asbestos. The tile in the personnel office contained 1-2% chrysotile asbestos and the tile in the right of way office contained 10-20% chrysotile asbestos.

On September 28, 1981, five bulk samples of tiles and insulation in PennDOT District 0-3 building were analyzed for asbestos content by Pennsylvania personnel. Three of the five samples showed 5-15% asbestos. No environmental air sampling was performed.

At the present time, one employee is out on disability whose illness has been diagnosed by his physician, who performed a biopsy, as lung cancer with possible asbestos causation.

This employee was employed for 22 years in the realty section. His duties included the acquisition of real estate properties which PennDOT needed to build new or expanded highways. This included the inspection and appraisal of the properties. His previous employment was in the U.S. Army (supplies) and in a Dairy (freezer). Information obtained alledged that he was a cigarette smoker.

No conclusions could be reached as to where his asbestos exposure occurred, except that there was a potential for exposure to asbestos prior to the ceiling being coated with paint.

VII Recommendations

1. All cleaning and dusting operations should be done by vacuum or wet methods. this will prevent exposure to asbestos containing dust which may still be present.
2. Workers performing any maintenance work that involves the asbestos containing ceiling tiles should be advised of the hazards of asbestos and supplied the proper protective equipment.

3. All employees who have had previous exposure to asbestos or who are performing maintenance with a potential for asbestos exposure should have medical surveillance.

Required components of a medical surveillance program include periodic measurements of pulmonary function (forced vital capacity (FVC)), and forced expiratory volume for one second (FEV), and periodic chest roentgenograms (postero-anterior 14 X 17'). Additional medical requirement components include a history to describe smoking habits and details on past exposures to asbestos and other dusts and to determine presence or absence of pulmonary, cardiovascular, and gastrointestinal symptoms, and a physical examination, with special attention to pulmonary rales, clubbing of fingers, and other signs related to cardio-pulmonary systems.

VIII Authorship and Acknowledgements

Report prepared by: Walter J. Chrostek
Regional Industrial Hygienist
Project Leader, HETAB, NIOSH

Originating office: Hazard Evaluations and Technical
Assistance Branch
Division of Surveillance, Hazard
Evaluations and Field Studies
Cincinnati, OH

Report typed by: Mary Tomassini, Secretary
NIOSH, Region III, Philadelphia, PA

Acknowledgments

Laboratory analysis: Utah Biomedical Test Laboratory
Salt Lake City, UT

NIOSH Measurement Development Section
Cincinnati, OH

IX. Distribution and Availability

Copies of this Determination Report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, OH 45226. After 90 days, this report will be available through the National Technical Information Service (NTIS), Springfield, VA. 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:

1. Pennsylvania Department of Transportation, District 3-0
2. Employee Representative
3. NIOSH, Region III

TABLE I

Results of Area Sampling for Asbestos Fibers

Pennsylvania Department of Transportation
Montoursville, Pennsylvania

HETA 82 086

February 2, 1982

Sample #	Sample Time	Location	Asbestos Concentration (Fibers/Filter)
1	10:25-14:40	Right of Way Office #4 File	< 4500*
2	10:28-14:44	Assistant Engineers Office	< 4500
3	10:30-14:40	Main Drafting North End	< 4500
4	10:30-14:41	Equipment Engineers Office	< 4500
5	10:27-14:43	Equipment Engineers Office	< 4500

*All samples and blanks were below the analytical limit of detection (4500 fibers/filter or 0.01 fibers/cc).

TABLE II

Results of Settled Dust for Asbestos Fibers

Pennsylvania Department of Transportation
Montoursville, Pennsylvania

HETA 82 086

February 2, 1982

Sample #	Location	Percentage	Type
1	Equipment Manager's Office	1	Chrysotile
2	Draft Room	No asbestos detected	
3	Right of Way Office	No asbestos detected	

TABLE III

Results of the Bulk Samples of Tile and Insulation Analyzed for Asbestos

Pennsylvania Department of Transportation
 Montoursville, Pennsylvania

HETA 82 086

February 2, 1982

Sample #	Location	Type	Comments
1	Personnel Office	Tile	1-2% Chrysotile Asbestos Gypsum and Mica
2	Right of Way Office	Tile	10-20% Chrysotile Asbestos Remainder Gypsum present
3	Boiler Room	Insulation	No Asbestos, Gypsum and Mineral Wool present
4	Basement Conference Rm.	Insulation	No asbestos 85% Mineral Wool Remainder Gypsum
5	Personnel Office	Insulation	100% Mineral Wool

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
ROBERT A. TAFT LABORATORIES
4676 COLUMBIA PARKWAY, CINCINNATI, OHIO 45226

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

Third Class Mail



POSTAGE AND FEES PAID
U.S. DEPARTMENT OF HHS
HHS 396