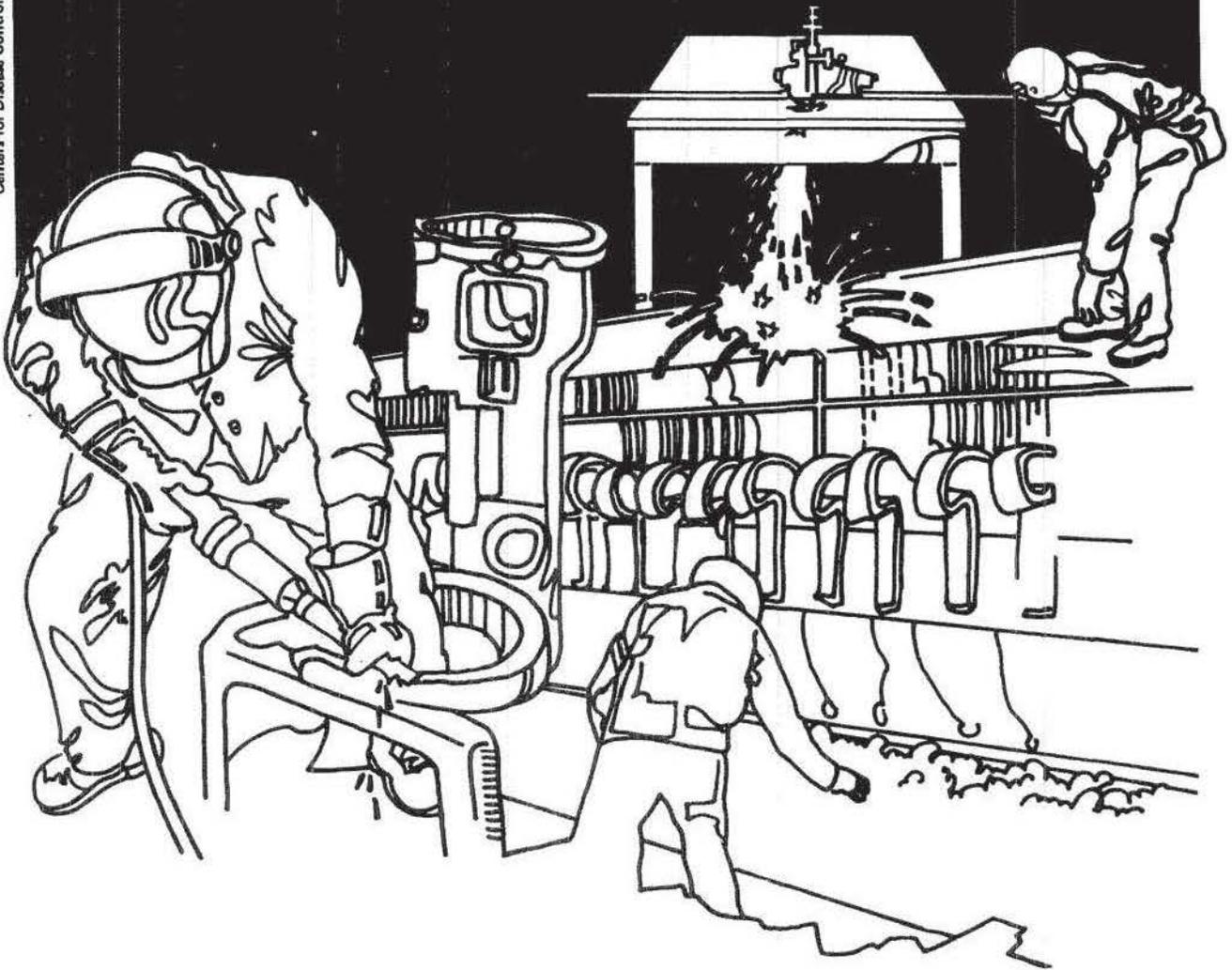


# NIOSH



## Health Hazard Evaluation Report

HETA 81-477-1192  
GRUNDY INDUSTRIES, INC.  
JOLIET, ILLINOIS

## 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 81-477-1192  
SEPTEMBER 1982  
GRUNDY INDUSTRIES, INC.  
JOLIET, ILLINOIS

NIOSH INVESTIGATORS:  
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## I SUMMARY

On September 28, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from Grundy Industries, Inc., Joliet, Illinois, to evaluate a potential health hazard to asbestos during the manufacture of an asphalt roofing compound.

In November 1981, an initial walk-through survey was conducted. Later that month an environmental survey was conducted during which three of the seven employees involved in the operation were monitored for exposure to asbestos fibers. In May 1982, another follow-up environmental survey was conducted to further evaluate the local exhaust ventilation system at the asbestos bag opening operation.

During the first environmental survey, three general area samples and three personal breathing zone samples were collected for airborne asbestos fibers. Personal breathing zone samples revealed concentrations of 0.15, 0.32, and 0.73 fibers greater than 5 microns in length per cubic centimeter (fibers/cc). All personal breathing zone air samples and general area air samples exceeded the NIOSH 8-hour Time-Weighted Average (TWA) recommended level of 0.10 fibers/cc. However; none of these samples exceeded the Occupational Safety and Health Administration (OSHA) standard of 2 fibers/cc.

Results of the follow-up environmental survey revealed airborne concentrations of 0.55 and 0.72 fibers/cc at the asbestos bag opening operation. Local exhaust ventilation measurements taken at the asbestos bag opening operation indicated that the system was operating at approximately 20% of the duct velocity recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) in the "Industrial Ventilation - A Manual of Recommended Practice". Additionally, the design of the ventilation hood does not provide capture velocities sufficient to overcome opposing air currents and to capture the asbestos fibers at the source of generation.

On the basis of the environmental data collected NIOSH has determined that a health hazard from exposure to asbestos did exist at the time of this survey. Recommendations for maintaining a clean work site and improving the local exhaust ventilation system are contained in the body of this report.

KEYWORDS: SIC 2952 (Paving and Roofing Materials/Asphalt Felts and Coatings), asbestos, roofing compounds.

## II. INTRODUCTION

On September 28, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request from the owner and manager of Grundy Industries, Inc., Joliet, Illinois, to determine if there was a health hazard from asbestos during the manufacture of an asphalt/asbestos roofing compound. NIOSH visited the facility on November 4, 1981. This initial visit consisted of an opening conference and a walk-through inspection. After the walk-through inspection, it was decided that a follow-up survey should be conducted to evaluate employee exposures to airborne asbestos fibers during the addition of asbestos to the asphalt mixture.

An environmental survey was conducted on November 19, 1981. During this survey environmental air samples were collected to evaluate employee exposures to asbestos. A follow-up environmental survey was conducted on May 17, 1982. During this survey, environmental air samples were collected and local exhaust ventilation measurements were taken at the asbestos bag opening operation.

## III. BACKGROUND

This company has been at its present location since approximately January 1975 and is involved in the production of an asphalt/asbestos roofing compound consisting primarily of asphalt, mineral spirits, and asbestos with an annual production of approximately 3 million gallons. Asphalt, contained in a storage tank outside the building, is pumped through an enclosed system to an enclosed mixing tank inside the building. Bags of asbestos are opened and fed onto an enclosed conveyor system which leads directly into the mixing tank with approximately 1.3 pounds of asbestos added per gallon of asphalt. After mixing has occurred, the asphalt and asbestos mixture is dispensed into containers, capped, labeled, and palletized for transport.

At the time of the initial survey seven employees were involved in the operation. Only one of these workers comes into direct contact with asbestos, his job consisting of opening and feeding 50 kilogram cakes of asbestos onto the conveyor system. The empty asbestos bags were placed in boxes within plastic bags and properly disposed of. Local exhaust ventilation is provided in this area and the employee is required to wear a single use disposable mask as additional protection. The next step in the process involves one employee who is responsible for monitoring the control panel which controls the amounts of the various ingredients in the mixture. The remainder of the employees are involved in the dispensing, capping, labeling, palletizing, and transport of the containers to storage areas within the facility.

## IV. ENVIRONMENTAL METHODS AND MATERIALS

During the survey of November 1981, environmental sampling was conducted to determine employee exposures to airborne asbestos fibers. Three personal breathing zone samples and three general area air samples for asbestos were collected on AA filters connected via tygon tubing to battery powered sampling pumps operating at 2.0 liters per minute. All samples collected were analyzed according to NIOSH Method P&CAM 239 utilizing Phase Contrast Microscopy.

During the survey of May 1982, two environmental air samples were collected above the bag opening operation, six feet above floor level. These samples

were collected and analyzed according to the same method and procedures used for the previous survey. Additionally, ventilation measurements were taken utilizing a battery powered air velocity meter.

## V. EVALUATION CRITERIA

### A. Environmental

The three sources of criteria used to assess the workroom concentration of asbestos were the (1) Occupational Safety and Health Administration (OSHA) standard (29 CFR 1910.1001); (2) The NIOSH criteria for a recommended standard; and (3) the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) for Chemical Substances in the Workroom Environment.

NIOSH recommends that occupational exposure to asbestos be controlled so that workers are not exposed to a workroom air concentration for an 8-hour time-weighted average (TWA) exposure of 0.10 fibers greater than 5 microns in length per cubic centimeter (fibers/cc) and 0.5 fibers/cc for a 15-minute ceiling concentration. The U.S. Department of Labor/Occupational Safety and Health Administration (OSHA) standard for asbestos for an 8-hour TWA exposure is 2 fibers/cc and a ceiling concentration of 10 fibers/cc. The ACGIH recommends a TLV of 0.10 fibers/cc.

### B. Toxicological<sup>1</sup>

Asbestos is a generic term applied to a number of hydrated mineral silicates, including chrysotile, amosite, crocidolite, tremolite, and anthophyllite. Asbestos consists of fibers of varying size, color, and texture. The uses of asbestos are numerous and include thermal and electrical insulation, fire blankets, safety garments, filler for plastics, and roofing materials. The most toxic route of entry is inhalation. The most widely recognized diseases caused by asbestos are asbestosis, cancer of the lungs and digestive tract, and mesothelioma.

Asbestosis is a lung disorder characterized by a diffuse interstitial fibrosis, including pleural changes of fibrosis and calcification. Asbestos bodies may be found in the sputum, and the worker exhibits restrictive pulmonary function. Accompanying clinical changes may include fine rales, finger clubbing, dyspnea, dry cough, and cyanosis. These findings may be delayed in onset 10 - 15 years following cessation of exposure.

Bronchogenic carcinoma and mesothelioma of the pleura and peritoneum are also caused by asbestos exposure. Excesses of cancer of the stomach, colon, and rectum have been found among asbestos workers. These cancers may occur following a very limited exposure 20 to 30 years earlier.

The NIOSH recommendation and the ACGIH TLV of 0.10 fibers greater than 5 microns in length per cubic centimeter were established to protect against asbestosis and reduce to an acceptably low risk the possibility of the development of neoplasms.

## VI. RESULTS AND DISCUSSION

Results of the first follow-up environmental survey showed personal breathing zone concentrations of 0.15, 0.32, and 0.73 fibers per cubic centimeter (fibers/cc). Two general work area samples collected within the facility showed concentrations of 0.16 and 0.17 fibers/cc, and one outdoor area sample for background showed no detectable quantity of asbestos. All work area samples collected exceeded the NIOSH 8-hour time-weighted average recommended level of 0.10 fibers/cc, however; all samples collected were below the Occupational Safety and Health Administration (OSHA) standard of 2 fibers/cc for an 8-hour TWA. A complete listing of the results is given in Table I.

Results of the second follow-up environmental survey showed concentrations of 0.55 and 0.72 fibers/cc, for the time period sampled. These samples were collected at the asbestos bag opening operation, six feet above floor level. Ventilation measurements showed that the local exhaust ventilation system at this operation was operating at approximately 20% of the 3500 feet per minute duct velocity, for asbestos bag opening operations, recommended by the American Conference of Governmental Industrial Hygienists in the "Industrial Ventilation - A Manual of Recommended Practice"<sup>2</sup>.

It should be noted that the asbestos bag opener exercised a great deal of caution in the handling and opening of the asbestos bags and wore a single use disposable respirator. The levels of asbestos fibers generated at this operation could easily exceed the levels detected if the bags were not handled with as much care and caution. Recommendations to further reduce the amount of asbestos fibers generated are contained in that section of this report

An additional source of asbestos contamination is the handling of the empty asbestos bags. The bags were placed into cardboard boxes, when these boxes became full the bags were then compressed within the box to make space for additional bags. This action lead to the upward displacement of air which was contaminated with asbestos fibers as a result. The air patterns within the plant drifted toward the control panel operator, thus accounting for the fact that the control panel operator had a higher asbestos fiber count than the asbestos bag opener. Although good work practices were used in the handling of the asbestos cakes the airborne levels of asbestos fibers within the plant could be lowered by not compressing the empty asbestos bags.

## VII. CONCLUSIONS

Based on the environmental samples and data collected, a hazardous situation did exist from exposure to asbestos during this evaluation. All samples collected exceeded the NIOSH recommended levels, however; all samples were below the OSHA permissible exposure limits specified by law. Ventilation measurements showed that the present system is not drawing the recommended air flow nor is the system properly designed to adequately capture any fibers escaping during the bag opening operation.

## VIII. RECOMMENDATIONS

1. Improvements in the local exhaust ventilation system should be made according to recommendations suggested by the NIOSH investigators during the survey visits and through subsequent correspondence to assure that airborne asbestos fibers are maintained at the lowest possible levels.

2. Environmental sampling should be conducted following installation of ventilation system to determine the effectiveness of the new system.
3. Empty asbestos bags should be placed in boxes for disposal but, should not be compressed to make space for additional bags, as this is a source of air contamination.
4. Workers should be trained on the potential dangers from exposure to asbestos.
5. Employees should not carry their cigarettes on the work site when working with asbestos.
6. Eating, drinking, and smoking should be prohibited in rooms where processing or handling of asbestos is taking place.
7. Medical monitoring of asbestos workers should be continued and should include preplacement and annual physical examinations with emphasis on the pulmonary system.

#### IX. REFERENCES

1. Proctor, N.H. and Hughes, J.P., Chemical Hazards of the Workplace, J.P. Lippincott Company, Philadelphia, 1978, pp. 112-113.
2. Industrial Ventilation, A Manual of Recommended Practice, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.

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IX. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

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, 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. Grundy Industries, Inc.
- B. U.S. Department of Labor, OSHA - Region V
- C. NIOSH Regional Offices/Divisions

For the purposes of informing the affected employees, copies of the report should be posted in a prominent place accessible to the employees, for a period of 30 calendar days.

TABLE I

## Breathing Zone and General Area Air Concentrations of Asbestos Fibers

Grundy Industries, Inc.  
Joliet, Illinois

November 19, 1981

Job Classification/Location	Sampling Time (Minutes)	Fibers/cc*
Blank	-----	**
Area Sample (across aisle from bag opening)	7 hour, 41 min. (461)	0.17
Control Panel Operator	7 hour, 49 min. (469)	0.73
Environmental Sample (outside)	7 hour, 26 min. (446)	**
Forklift Driver	7 hour, 42 min. (462)	0.15
Asbestos bag opener	6 hour, 42 min. (402)	0.32
Area Sample (dispensing area)	7 hour, 41 min. (461)	0.16

\* - fibers greater than 5 microns in length per cubic centimeter (fibers/cc)

\*\* - below laboratory limit of detection

## EVALUATION CRITERIA:

OSHA - 2.0 fibers/cc

NIOSH - 0.10 fibers/cc

ACGIH TLV - 0.10 fibers/cc

LABORATORY LIMIT OF DETECTION: 0.03 fibers per field or 4500 fibers per filter

TABLE II

## General Area Air Concentrations of Asbestos Fibers

Grundy Industries, Inc.  
Joliet, Illinois

May 17, 1982

Location	Sampling Time (Minutes)	Fibers/cc*
Blank	-----	**
Area Sample (asbestos hood, six feet above floor, front of hood)	2 hour, 20 min. (140)	0.55
Area Sample (asbestos hood, six feet above floor, back of hood)	2 hour, 16 min. (136)	0.72

\* - fibers greater than 5 microns in length per cubic centimeter (fibers/cc)

\*\* - below laboratory limit of detection

## EVALUATION CRITERIA:

OSHA - 2.0 fibers/cc

NIOSH - 0.10 fibers/cc

ACGIH TLV - 0.10 fibers/cc

LABORATORY LIMIT OF DETECTION: 0.03 fibers per field or 4500 fibers per filter

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