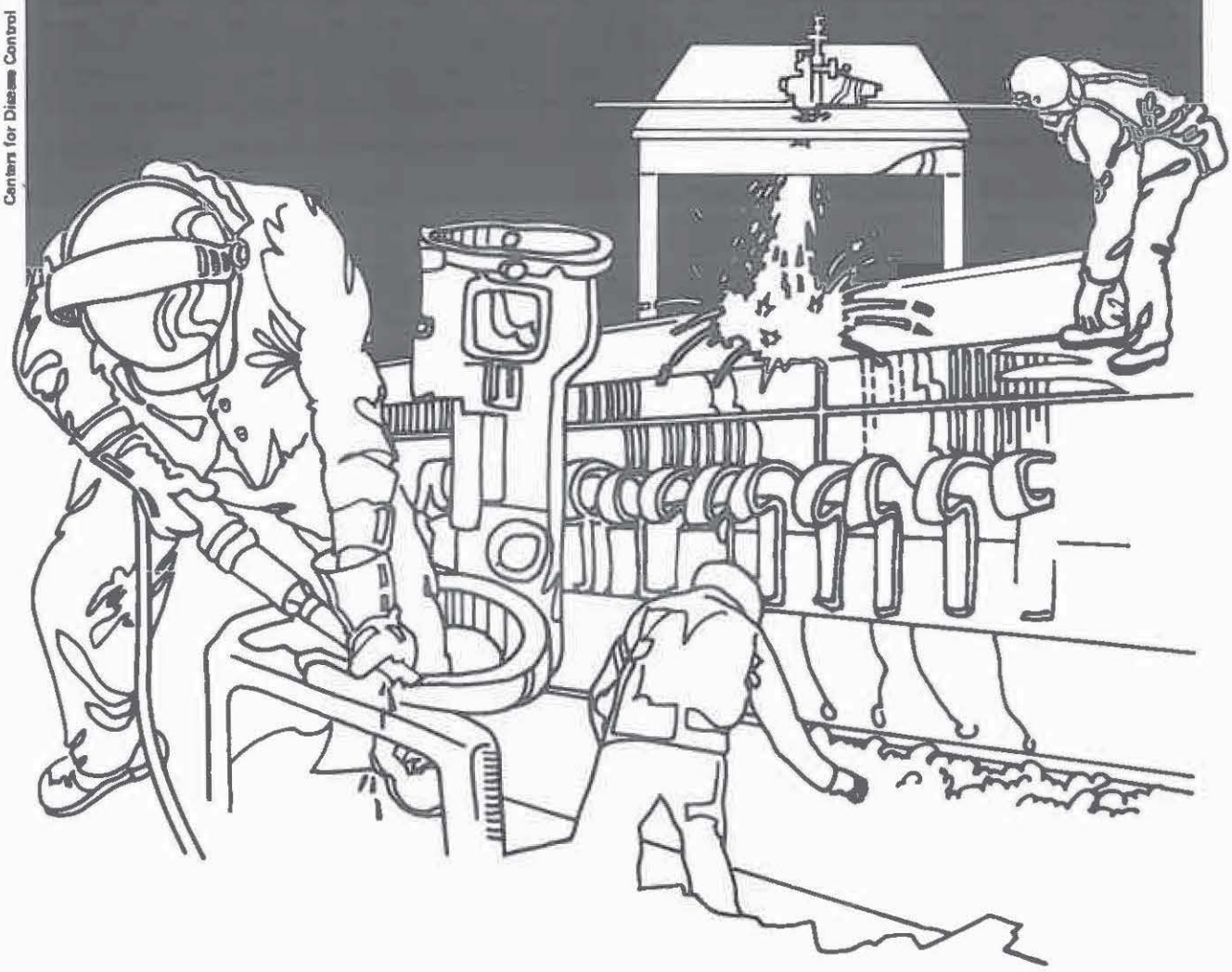
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



Health Hazard Evaluation Report

HETA 81-293-983
BULK MAIL CENTER
PITTSBURGH, 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.

HETA 81-293-983
October 1981
Bulk Mail Center
Pittsburgh, Pennsylvania

NIOSH INVESTIGATOR:
Steven A. Lee, IH

I. SUMMARY

In May 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate potential noise and asbestos exposures at the Bulk Mail Center, Pittsburgh, Pennsylvania. At the time of the study, about 650 clerks and mail handlers were employed at the facility.

NIOSH conducted an industrial hygiene survey on July 28-30, 1981. Six bulk samples of brake, clutch, and sheet rock materials from the mail center were found to contain 20-75% chrysotile asbestos. Twenty-two personal breathing zone air samples were collected on clerks, mail handlers, and welders throughout the facility and analyzed for asbestos by phase contrast microscopy. No asbestos fibers were detected in any of the samples. The analytical limit of detection was 0.01 fibers/cubic centimeter (fibers/cc).

Eight-hour average noise exposures ranged from 83.8 - 89.6 dB (A-weighted scale, slow response) in conveyor work locations. The NIOSH recommended 8-hour average noise limit is 85 dBA. The OSHA permissible exposure limit is 90 dBA.

NIOSH has determined that a hazard from overexposure to noise existed during the time of the NIOSH survey. No exposure to asbestos was detected during routine operations. Recommended guidelines for controlling noise are discussed in Section VIII of this report.

KEYWORDS: SIC 4311 (U.S. Postal Service), conveyor machinery, brake shoes, asbestos, noise.

II. INTRODUCTION

In May 1981, NIOSH received a request for a health hazard evaluation from the management of the Bulk Mail Center, Pittsburgh, Pennsylvania. Potential overexposures to noise and asbestos among clerks and mail handlers were the primary concern. An industrial hygiene survey was conducted by NIOSH on July 28-30, 1981. Recommendations for controlling excessive noise and instituting a hearing conservation program were submitted to the Mail Center's management on July 30, 1981.

III. BACKGROUND

The Pittsburgh Bulk Mail Center employs about 650 clerks and mail handlers over two shifts who sort and handle mass quantities of packages and third class mail. The facility was built in 1975 and covers about eight acres in area. Mail is transported by nearly 100 automated conveyor systems throughout the building. The moving parts of these conveyors generate a considerable amount of noise in some areas. Control of the conveyors requires the use of many clutch and brake systems which contain asbestos. The welding room is lined with sheet rock that contains asbestos.

IV. EVALUATION DESIGN AND METHODS

Asbestos

Six bulk samples of differing types of brake, clutch, and sheet rock materials were collected and one "rafter" dust sample was collected from the center of the building about 30 feet above the floor. Samples were analyzed for asbestos by polarized light microscopy and dispersion staining techniques.

Twenty-two personal breathing zone air samples for asbestos were collected on workers dispersed throughout the facility on cellulose-ester membrane filters mounted in open-faced cassettes. These were drawn by battery-powered sampling pumps at 1.7 liters per minute for about seven hours. Two area samples were drawn within one foot of brake shoe assemblies. Samples were analysed by phase contrast microscopy according to NIOSH Method P&CAM 239.

Noise

A noise survey was conducted using a General Radio 1982 Precision Sound Level Meter. Seven workers in the noisiest locations were selected for eight hour average measurements using Metrosonics 301 dosimeters.

V. EVALUATION CRITERIA

Asbestos

Available studies provide conclusive evidence that exposure to any of the commercial forms of asbestos causes cancer in man. Mesotheliomas, lung and gastrointestinal cancers have all been shown to be excessive in occupationally exposed people. In 1976, NIOSH recommended an 8-hour - TWA standard to be set at the lowest level detectable by available analytical techniques, which at that time was 0.1 fibers greater than 5 microns in length/cc.

Noise

Hearing is accomplished when sound waves cause vibrations of the ear drum, the middle ear bones, and the fluids of the inner ear. The resulting movement of delicate hair cells in the inner ear produces electrical impulses that are transmitted to the brain via the auditory nerve.

During long-term hazardous noise exposure, some of the hair cells of the inner ear may gradually be destroyed. Hair cells do not regenerate. Thus, noise-induced hearing loss, although slow, painless, and insidious at its onset, becomes permanent. Depending on the extent of hearing loss, the resulting communication disability can have serious repercussions on the person's occupational, social, and emotional well-being.

Due to wide variations in individual susceptability to noise, compliance with the present OSHA permissable exposure limit of 90 dB(A) has been estimated [by the American Conference of Governmental Industrial Hygienists (ACGIH), Committee on Physical Agents] to protect about 90% of the working population exposed to this level for a normal working lifetime from any significant noise-induced hearing loss. "Significant" hearing loss is that which would impair one's ability to understand everyday speech. NIOSH recommends an 8-hour average noise limit of 85 dB(A) so that a larger percentage of workers can be better protected.

VI. RESULTS

Asbestos

All of the clutch, brake shoe, and sheet rock materials were found to contain 20-75% crysotile asbestos (see Table I). However, since no asbestos fibers could be detected on any of the personal breathing zone, or area, or rafter samples (see Table II), the clutch and brake units appeared to be sufficiently well enclosed to prevent any measurable airborne asbestos exposure under the conditions of this investigation. Likewise, unless mechanically disturbed (cutting, sawing, breaking, etc.), no detectable airborne asbestos exposure would be expected from the sheet rock in the welding room, and none was detected in two welder's breathing zones. The analytical limit of detection was 0.01 fibers/cc.

Noise

Noise levels at most locations were fairly constant and ranged from 83-88 dBA (slow) near conveyor work areas during the walkthrough noise measurements. Much of the spectral distribution of the sound energy lay in the lower frequency range, particularly in the 250 and 500 Hz octave bands.

Similar results were obtained with the 8-hour average dosimeter measurements (see Table I). The highest noise levels in conveyor work areas were found in location 6311 - "Tray Dumping" where two workers were exposed to 88.4 dB(A) and 89.6 dB(A). The total of 20 workers in this area would be expected to be exposed to similar noise levels. Noise levels in other conveyor locations ranged from 83.8-88.2 dB(A).

VII. CONCLUSIONS

Asbestos

The results indicate that airborne exposure to asbestos is unlikely during routine operations, at least with respect to concentrations that are detectable by current analytical techniques. It should be remembered, however, that the brake, clutch, and sheet rock materials to contain substantial amounts of asbestos and great care should be taken to prevent asbestos fibers from becoming airborne when handling these materials during maintenance, repair, or construction work.

Noise

The major limitation of this noise survey was the shortage of noise dosimeters, thus the inability to precisely document 8-hour average noise exposures in more work locations in the available time period. However, the data are sufficient to suspect that a large number of the 650 clerks and mail handlers are exposed to 8-hour average noise levels of 85 $\pm$ 3 dB(A). Exposures this close to the NIOSH recommended limit indicate the need for a noise monitoring and hearing conservation program as discussed in the NIOSH Recommendations for a Noise Standard [chapter 1 of Criteria for a Recommended Standard - Occupational Exposure to Noise, (HSM) document no. 73-11001]. Procedures for taking noise measurements, audiometric testing, work practices, and personal ear protection are thoroughly discussed in the Recommended Standard.

VIII. RECOMMENDATIONS

A. Asbestos

During "blow-out" procedures for brake shoe maintenance, particulate emissions should be avoided. Compressed air hoses should never be used for this job. Dust and debris in the brake assemblies should be removed by vacuum methods. Placing the assemblies in partial enclosures lined with disposable wet paper or cloth during maintenance may also help prevent fiber emissions. Likewise, any workers involved with removing, cutting, sawing, or otherwise disturbing asbestos sheet rock should first have knowledge of the potential asbestos hazard and the importance of avoiding dust generation. Water is commonly used for dust suppression. Respiratory protection should also be used.

B. Noise Control

The hearing conservation program should be continued until noise levels in all conveyor work locations are reduced below 85 dBA. Such reductions may be feasible after consulting the following recommended guidelines and references.

Maintenance

Most of the machinery presently operating in the Bulk Mail Center is only five or six years old. As the equipment ages, noise levels can be expected to increase. A continuing noise monitoring program is necessary to detect subtle intensity changes in noise-emitting machinery. Machine noise can be increased by wear, erosion, corrosion, solidifying of grease or packing, loss of adhesion or bonding, inelastic behavior, bent parts, increased tolerances, loosening of fastenings, broken parts, incorrect or inadequate lubrication, foreign matter or dirt, unbalanced rotor, misalignment, eccentric shafts, slipping clutches, mechanical looseness, loose foundation bolts, oil whirl or whip, worn belts, belts and pulleys out of adjustment, defective bearings, poor gears, and air or hydraulic leaks.[1]

Noise Reduction at the Source

If noise levels are still too high after all necessary maintenance is checked, it is usually most productive to see first if the noise can be reduced at the source. Sometimes a noisy machine can be replaced by a quieter one, or mufflers or vibration isolation mounts can be installed. Various methods of reducing the noise energy or changing the noise directivity pattern sould be investigated. Response to the driving force of vibration can sometimes be reduced by inserting isolating members, damping vibrating elements, detuning resonant systems, increasing mass of stationary elements, reducing mass of moving elements, changing stiffness or adding auxillary mass damping or resonant absorbers.[1]

Noise Reduction by Controlling the Path of Sound

Simply changing the relative position of machine and worker is often a practical method of noise control. Where nearly free-field conditions exist, increasing the distance between noise source and listener or rotating a directional noise source can be effective.

The installation of acoustical absorbing material in a noisy room is often used to reduce noise levels but the limitations should be realized. For instance, very little reduction is achieved if the distance between operator and machine in only a few feet, as commonly seen in many industrial processes.

Many types of attenuating structures can be used to isolate noise from a worker. Walls, barriers, and total enclosures are commonly used. In fact, there is almost no limit to the amount of attenuation that can be achieved with total enclosures as the size, weight, complexity, and cost increases.

Ear protectors, such as ear plugs, waxed cotton, or earmuffs are types of attenuating structures but their use is risky. Consequently, the exorbitant increase in worker supervision and medical surveillance that is necessary to insure that ear protection is effective should logically make it the last resort as a long-term solution to noise.

IX. RECOMMENDED REFERENCES FOR NOISE CONTROL ENGINEERING

1. A.P. Peterson and E. Gross, Jr. (1974), Handbook of Noise Measurement, GenRad, Inc., Concord, Massachusetts.

2. AIMA (1972), Performance Data, Architectural Acoustical Materials, Bull. #31, Acoustical and Insulating Materials Association, 206 West Touhy Avenue, Park Ridge, Illinois 60068.

3. AIHA (1966), Industrial Noise Manual, American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311.

4. L.L. Beranek, ed. (1971), Noise and Vibration Control, McGraw-Hill, New York.

5. C.E. Crede (1951), Vibration and Shock Isolation, John Wiley and Sons, Inc., New York.

6. C. Duerden (1970), Noise Abatement, Butterworths, London.

7. C.M. Harris and C.E. Crede (1961), Shock and Vibration Handbook, McGraw-Hill, New York.

8. D. Muster and W.I. Senger (1961), "Balancing of Rotating Machinery," Vol. 3, Chapter 39 of Harris and Crede (1961).

9. J.E. Ruzicka (1971), "Fundamental Concepts of Vibration Control," Sound and Vibration, Vol. 5, #7, July 1971, pp 16-23.

10. L.F. Yerges (1969), Sound, Noise, and Vibration Control, Van Nostrand Reinhold Company, New York.

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

Evaluation Conducted and Report Prepared by	Steven A. Lee, M.S. Industrial Hygienist Industrial Hygiene Section
Field Assistance:	Ray Ruhe Industrial Hygienist Industrial Hygiene Section
Originating Office:	Hazard Evaluations and Technical Assistance Branch Division of Surveillance, Hazard Evaluations and Field Studies Cincinnati, Ohio
Report Typed by:	Jackie Woodruff Clerk/Typist Industrial Hygiene Section

XI. DISTRIBUTION AND ACKNOWLEDGEMENTS

Copies of this report are currently available, upon request, from NIOSH, Division of Standards Development and Technology Transfer, Publications Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Services (NTIS), Springfield, Virginia 22161.

Copies of the report have been sent to:

1. Pittsburgh Bulk Mail Center
2. Mail Handler's Union
3. American Postal Workers Union
4. U.S. Department of Labor, Region III
5. NIOSH, Region III

TABLE I

BULK SAMPLE ANALYSES FOR ASBESTOS

BULK MAIL CENTER
PITTSBURGH, PENNSYLVANIA

HETA 81-293

July 29-30, 1981

Sample Source	Percent and Type Asbestos
Rafter Sample	No Asbestos Detected
Welding Room Sheet Rock	50-75% Chrysotile
Small Clutch Brake Disk	20-30% Chrysotile
Large Clutch Brake Disk	20-30% Chrysotile
Small Brake Shoe	40% Chrysotile
Large Brake Shoe	20-30% Chrysotile
Back Stop Brake Shoe	40% Chrysotile

TABLE II

AIR SAMPLING RESULTS FOR ASBESTOS

BULK MAIL CENTER
PITTSBURGH, PENNSYLVANIA

HETA 81-293

July 29-30, 1981

Location	Job Title	Sample Type	Sampling Period	Result
6112	Mail Handler	PBZ*	0743-1501	ND**
6112	Mail Handler	PBZ	0740-1503	ND
6116	Mail Handler	PBZ	0825-1505	ND
6116	Mail Handler	PBZ	0825-1505	ND
6312	Mail Handler	PBZ	0728-1449	ND
6311	Mail Handler	PBZ	0710-1448	ND
Welding Shop	Welder	PBZ	0818-1514	ND
Welding Shop	Asst. Welder	PBZ	0820-1514	ND
6112	Mail Handler	PBZ	0748-1459	ND
115	Clerk	PBZ	0700-1442	ND
115	Clerk	PBZ	0700-1442	ND
115	Clerk	PBZ	0700-1440	ND
6312	Mail Handler	PBZ	0735-1450	ND
6312	Mail Handler	PBZ	0729-1445	ND
6116	Clerk	PBZ	0732-1458	ND
6114	Clerk	PBZ	0745-1503	ND
6111	Mail Handler	PBZ	0721-1450	ND
6314	Clerk	PBZ	0718-1102	ND
6111	Mail Handler	PBZ	0727-1455	ND
6315	Clerk	PBZ	0700-1445	ND
6114	Clerk	PBZ	0746-1501	ND
6115	Clerk	PBZ	0716-1445	ND
B-13	-	area near brake shoe	0804-1525	ND
B-25	-	area near brake shoe	0756-1510	ND

* PBZ - Personal Breathing Zone
** ND - Non Detectable. The analytical limit of detection was approximately 0.01 fibers/cc for seven hour samples. In 1976, NIOSH recommended an 8-hour - TWA standard set at the lowest level detectable by available analytical techniques (0.1 fibers/cc).

TABLE III

TIME-WEIGHTED AVERAGE*
NOISE EXPOSURES IN dB(A-weighted scale)
IN CONVEYOR WORK LOCATIONS

BULK MAIL CENTER
PITTSBURGH, PENNSYLVANIA

HETA 81-293

July 29-30, 1981

Location	Job Title	Sampling Period	dB(A)
6311	Mail Handler	0740-1510	89.6
6311	Mail Handler	0710-1510	88.4
6312	Mail Handler	0730-1450	88.2
6115	Clerk	0715-1450	87.9
6111	Mail Handler	0730-1500	87.0
6114	Mail Handler	0750-1510	83.8

* NIOSH Recommended Standard 85.0

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