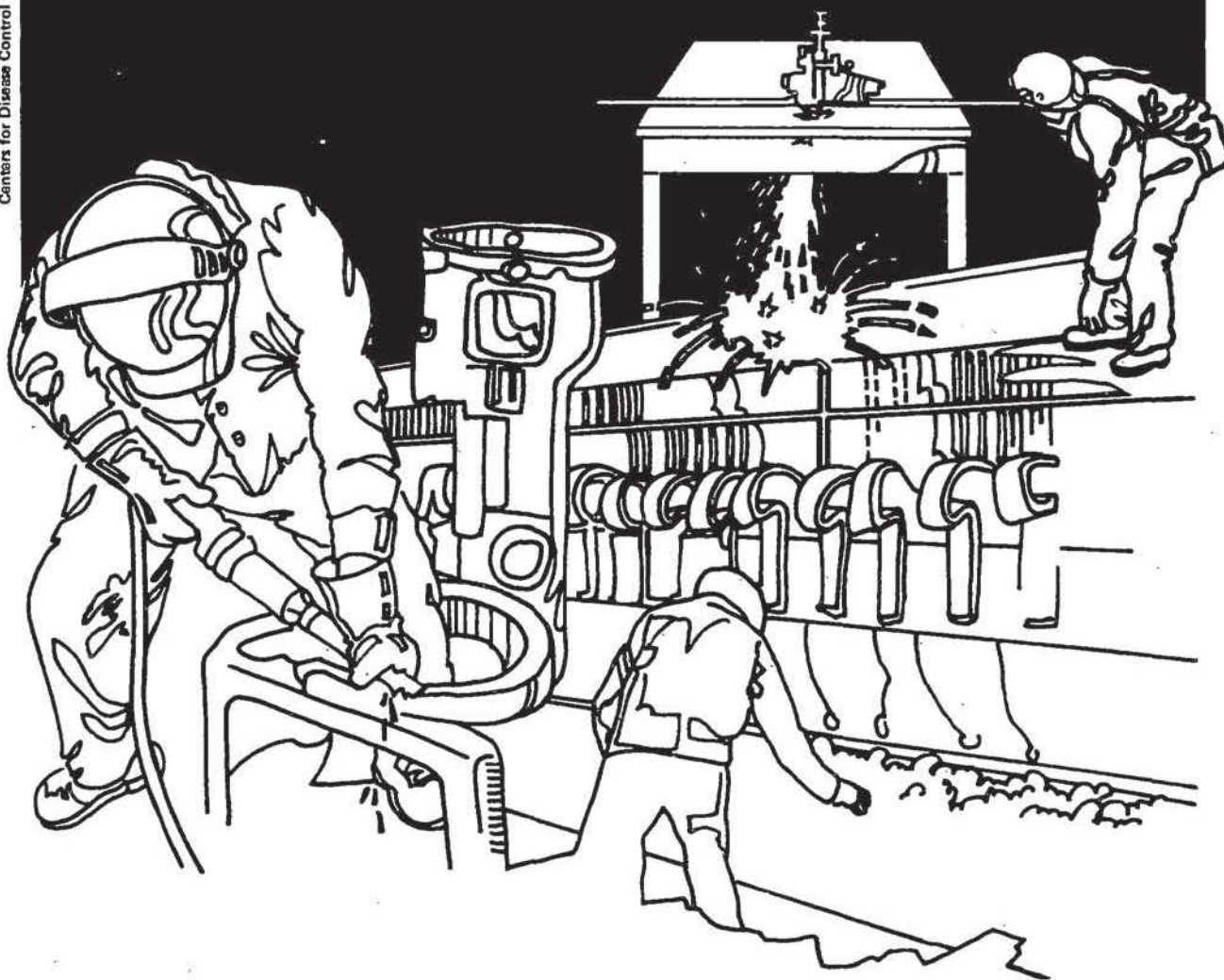


NIOSH



Health Hazard Evaluation Report

HETA 82-271-1198
COLORADO FOOT CLINIC
DENVER, COLORADO

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 82-271-1198
COLORADO FOOT CLINIC
DENVER, COLORADO
OCTOBER 1982

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I. SUMMARY

In May 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from employees at the Colorado Foot Clinic, Denver, Colorado, to evaluate a potential health hazard from exposures to methyl methacrylate used in the preparation of shoe inserts.

On July 13, 1982, NIOSH investigators conducted an environmental evaluation. Three breathing zone and three general room air samples for measurement of methyl methacrylate were collected for a 45 minute sampling period (the duration of the process that day). Values ranged from 17 to 417 mg/M³. The evaluation criteria for an 8 hour time-weighted average (TWA) for methyl methacrylate is 410 mg/M³. The average time spent preparing the inserts is approximately 45 minutes to three hours per day. Therefore, on a TWA basis workers were not overexposed. If this was an 8 hour job, overexposures could occur.

NIOSH investigators also interviewed the three employees working with methyl methacrylate on the day of the survey. None of the workers reported health problems which they thought were related to their work. However, all three complained that they periodically had headaches and one complained of nausea when working with methyl methacrylate.

There was an exhaust hood that was exhausting approximately 100 cubic feet per minute. This would not offer sufficient protection for all three workers since there was only room for one worker to work in close proximity to the exhaust hood. A larger hood with slot ventilation at a larger work table would eliminate drawing the methyl methacrylate vapors through the worker's breathing zone and would permit all three workers to work in a ventilated area.

On the basis of the environmental data and employee interviews, NIOSH concluded that a potential health hazard did exist from exposure to methyl methacrylate at the time of this survey. Recommendations for improving the workplace environment are included in this report.

KEYWORDS: SIC 8049 (Offices of Health Practitioners, Not Elsewhere Classified), methyl methacrylate, podiatry.

II. INTRODUCTION

In May 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from employees at the Colorado Foot Clinic, Denver, Colorado, to evaluate a potential health hazard from exposures to methyl methacrylate used in the preparation of inserts that fit into shoes permitting the equal distribution of body weight and stress.

On July 13, 1982, NIOSH conducted an environmental evaluation. Results of the environmental sampling were discussed with the requestor on August 13, 1982.

III. BACKGROUND

The Colorado Foot Clinic prepares inserts to fit inside shoes for the correction of stress points, distribution of body weight, posture, etc. These inserts are made using methyl methacrylate. Methyl methacrylate comes as a liquid. This liquid is used to dissolve an inert powdered compound. This compound once mixed is poured into a mold which forms the insert. It is during this process that overexposure to methyl methacrylate would most likely occur. The odor of methyl methacrylate and several reoccurring health complaints initiated this request.

IV. EVALUATION DESIGN AND METHODS

Three breathing zone and three general room air samples were collected for measurement of methyl methacrylate on porous aromatic polymer sampling tubes using vacuum pumps operated at 50 centimeters per minute and analyzed according to NIOSH Method No. S-43.

All three employees were interviewed using a brief questionnaire which was directed towards eye, nose, and skin irritation.

V. EVALUATION CRITERIA

A. Environmental

Two sources of criteria used to assess the workroom concentrations of the chemicals were (1) recommended Threshold Limit Values (TLVs) and their supporting documentation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH), 1981, and (2) the Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1000), July 1980.

	Environmental Limits 8-Hour Time-Weighted Exposure Basis
Methyl methacrylate.....	410 mg/M ³ (OSHA) (ACGIH)

mg/M³ = approximate milligrams of substance per cubic meter of air

Occupational health standards are established at levels designed to protect individuals occupationally exposed to toxic substances on an 8-hour per day, 40-hour per week basis over a normal working lifetime.

B. Toxicological

Methyl Methacrylate¹ is a colorless liquid used almost exclusively in the manufacturing of methacrylate resins and plastics. This compound is irritating to the eyes, mucous membranes, and skin. Human exposures to concentrations of 800 to 1600 mg/M³ has caused irritation to eyes and nose. Dermatitis has occurred from skin contact with the liquid. The OSHA Standard and the current Threshold Limit Value (TLV) were set to prevent irritation.

VI. RESULTS AND DISCUSSION

On July 13, 1982, NIOSH investigators conducted an environmental evaluation. Three breathing zone and three general room air samples for measurement of methyl methacrylate were collected for a 45 minute sampling period (the duration of the process that day). Values ranged from 17 to 417 mg/M³. The evaluation criteria for an 8 hour time-weighted average (TWA) for methyl methacrylate is 410 mg/M³. The average time spent preparing the inserts is approximately 45 minutes to three hours per day. Therefore, on a TWA basis workers were not overexposed. If this was an 8 hour job, overexposures could occur.

All three employees working with the methyl methacrylate on the day of the survey were interviewed. None of the workers had health problems which they thought were related to their work. However, all complained that they periodically had headaches and one complained of nausea when working with methyl methacrylate.

There was an exhaust hood that was exhausting approximately 100 cubic feet per minute. This would not offer sufficient protection for all three workers since there was only room for one worker to work in close proximity to the exhaust hood. A larger hood with slot ventilation at a larger work table would eliminate drawing the methyl methacrylate vapors through the worker's breathing zone and would permit all three workers to work in a ventilated area.

VII. CONCLUSION

Based on the environmental sampling and employee interviews, a potential for overexposures to methyl methacrylate was demonstrated during this evaluation at Colorado Foot Clinic.

VIII. RECOMMENDATION

Additional local exhaust ventilation should be installed to reduce employee exposures.

IX. REFERENCES

1. Proctor, NH, Huges, JP. Chemical Hazards of the Workplace. Philadelphia: J.B. Lippincott Company, 1978, p. 350.

X. AUTHORSHIP AND ACKNOWLEDGMENTS

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XI. DISTRIBUTION AND AVAILABILITY

Copies of this 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 Service (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:

1. Colorado Foot Clinic.
2. U.S. Department of Labor/OSHA - Region VIII.
3. NIOSH - Region VIII.
4. Colorado Department of Health.
5. State Designated Agency.

For the purpose of informing affected employees, a copy of this report shall be posted in a prominent place accessible to the employees for a period of 30 calendar days.

TABLE 1

Breathing Zone and General Room Air Concentrations of Methyl Methacrylate

Colorado Foot Clinic
Denver, Colorado

July 13, 1982

Sample Number	Job Classification/Location	Sampling Time	mg/M ³ Methyl Methacrylate
1000	Floor Assistant	9:02 AM - 9:47 AM	17
1001	Floor Assistant	9:02 AM - 9:47 AM	110
1002	Floor Assistant	9:03 AM - 9:47 AM	75
1003	Adjacent to Exhaust Hood	9:04 AM - 9:47 AM	417
1004	At Work Station	9:05 AM - 9:47 AM	320
1005	Right Side of Hood	9:07 AM - 9:47 AM	23
EVALUATION CRITERIA			410
LABORATORY LIMIT OF DETECTION mg/sample			0.01

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