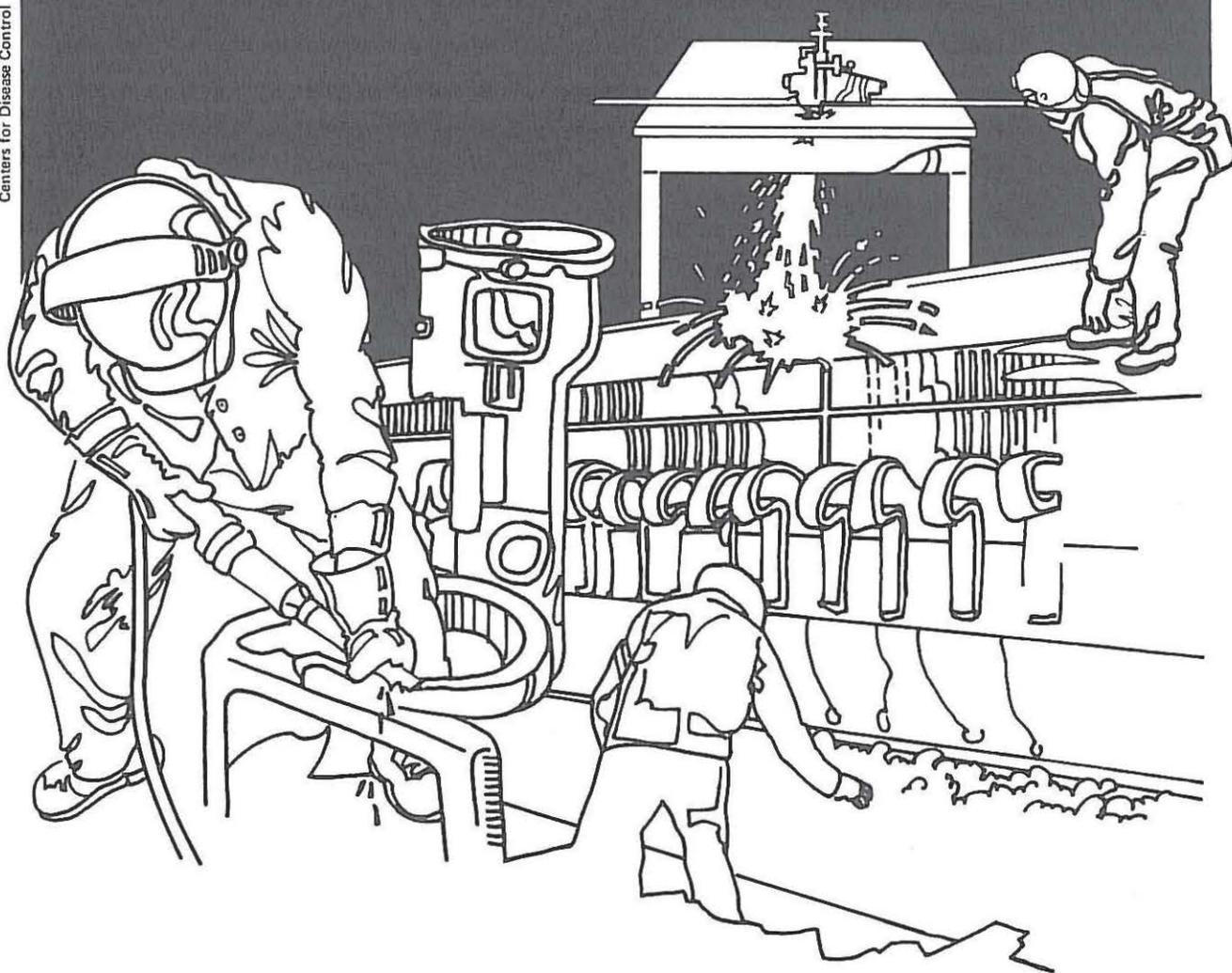


NIOSH



Health Hazard Evaluation Report

HETA 81-167-953
ALLEGHENY LUDLUM STEEL CORPORATION
WEST LEECHBURG, 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.

2

HETA 81-167-953
September 1981
Allegheny Ludlum Steel Corporation
West Leechburg, Pennsylvania

NIOSH INVESTIGATOR:
John R. Kominsky, IH

I. SUMMARY

On January 26, 1981, the National Institute for Occupational Safety and Health (NIOSH) was requested by Local 1138 of the United Steelworkers of America at Allegheny Ludlum Steel Corporation, to evaluate exposures of maintenance personnel to 1,1,1-trichloroethane used as a general degreasing solvent. On March 6, 1981, NIOSH conducted an industrial hygiene survey to determine breathing zone concentrations of 1,1,1-trichloroethane and interview exposed workers for past and present symptoms associated with exposures to 1,1,1-trichloroethane. Air measurements were limited to degreaser operations because other maintenance workers used only minimal quantities of the solvent. Air concentrations of 1,1,1-trichloroethane measured during peak exposure periods ranged from 50 to 200 ppm (mean = 120; S.D.±76); NIOSH recommends a short-term exposure limit not to exceed 350 ppm in any 15-minute period. Interviews completed for 15 of the approximately 35 workers showed five workers reporting periodic skin dryness. No other work-related health effects were reported.

Based on these results, NIOSH concluded that there was not a health hazard from airborne exposure to 1,1,1-trichloroethane at Allegheny Ludlum Steel Corporation under the conditions evaluated. Recommendations for worker safety when using 1,1,1-trichloroethane in confined spaces and for the use of protective gloves are found in Section IX of this report.

KEYWORDS: SIC 3310 (Primary Metal Industries), degreasing operations, 1,1,1-trichloroethane, A-50 solvent.

II. INTRODUCTION

On January 26, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from an authorized representative of Local Union 1138, United Steel Workers of America, at the Allegheny Ludlum Steel Corporation in West Leechburg, Pennsylvania. The request was made to evaluate exposures of maintenance department personnel to (a) cleaning solvent A-50 (hereafter referred to as 1,1,1-trichloroethane), and (b) the potential health risk associated with storage of a 55-gallon drum containing less than a gallon of waste polychlorinated biphenyl (PCB) dielectric fluid. The concern for PCB's resulted because the drum was stored in an area of the maintenance department where it could be damaged by an overhead crane with resultant spillage of the PCB into the area. Prior to NIOSH visiting the facility on March 6, 1981, the PCB material was relocated for temporary storage in another building for ultimate disposal at a chemical waste site. The 55-gallon drum was secured in an eight inch thick steel plate box having adequate volume to contain the PCB liquid in the event that the drum developed a leak.

III. BACKGROUND

The West Leechburg plant of Allegheny Ludlum Steel takes hot rolled specialty steels and reduces them to lighter gauge and/or slits the coils to narrow widths. The specialty steels include stainless, electrical, magnetic, high-temperature resistant, tool and die steels. The plant employs approximately 2000 persons.

The maintenance department is responsible for both mechanical and electrical maintenance and repair of the steel handling equipment and associated instrumentation for the entire West Leechburg facility. The department employs approximately 35 persons of varied job classifications including millwrights, electricians, welders, and instrument repairmen. The 1,1,1-trichloroethane is used as a general degreasing solvent. The volume of 1,1,1-trichloroethane used varies depending on application. The millwrights may use a few ounces to lubricate a drill bit while drilling a hole. The solvent is primarily used for periodic cleaning of motors in the electric shop and miscellaneous parts in the instrument shop. Both are cold degreasers.

IV. METHODS AND MATERIALS

NIOSH conducted an industrial hygiene survey on March 6, 1981, to evaluate worker exposure to 1,1,1-trichloroethane. Air concentration measurements were only made at the instrument shop degreaser. Measurements were not made at the electric shop degreaser because of insufficient use of the degreaser during the survey. However, airflow measurements were made of the degreaser's lateral exhaust hood. The minimal quantities of the solvent used by the other maintenance personnel did not warrant any air measurements. Vaporous 1,1,1-trichloroethane concentrations were measured using direct-reading colorimetric detector tubes. Ventilation air velocities were measured using a constant-temperature thermal anemometer.

The workers were questioned on past and present occurrences of skin, eye, nose and throat irritation, and other general symptoms associated with exposures to 1,1,1-trichloroethane.

V. EVALUATION CRITERIA

Acute exposure to 1,1,1-trichloroethane is known to cause drowsiness, dizziness, weakness, and loss of coordination.¹ Irritation of the eyes, nose and throat has been experienced at 400 ppm. There is a wide variability in odor threshold values. The perceived range of odor detection is between 16 and 400 ppm.

NIOSH currently recommends that exposures to 1,1,1-trichloroethane be limited to 200 ppm for an 8-hour time-weighted average (TWA), 350 ppm as 15-minute ceiling concentration. The current OSHA standard is 350 ppm for an 8-hour TWA.

VI. RESULTS AND DISCUSSION

1,1,1-trichloroethane air concentrations were measured during degreasing of a valve drive for a furnace control. Five measurements obtained in the worker's breathing zone during the 10-minute degreasing period showed that the exposure concentrations ranged from 50 to 200 ppm (mean = 120; S.D.±76). The NIOSH recommend ceiling for short-term 1,1,1-trichloroethane exposure is 350 ppm. The degreaser operator indicated that the operation sampled was representative of normal conditions of exposure, and that during a typical workday a person may degrease several different parts, each requiring approximately the same amount of time.

The lateral exhaust hood for the electric shop degreaser had an average face velocity of 175 feet per minute, well above the recommended minimum face velocity of 100 feet per minute for this type of hood design.

Medical interviews were completed on 15 maintenance department employees. Included were one millwright, two instrument repairmen, three electricians, four welders and five machinists. One instrument repairman and five machinists reported periodic skin dryness. No other work-related health effects were reported.

VII. CONCLUSIONS

Based on the results of the industrial hygiene survey conducted on March 6, 1981, NIOSH has determined that a health hazard from airborne exposure to 1,1,1-trichloroethane did not exist at Allegheny Ludlum Steel Corporation under the conditions evaluated. Air concentrations of 1,1,1-trichloroethane measured during a peak exposure period were less than the NIOSH short-term exposure limit. Interviews showed that some of the instrument repairmen and machinists were experiencing periodic skin dryness, which is characteristic of skin contact with 1,1,1-trichloroethane and other organic solvents.

VIII. RECOMMENDATIONS

1. Skin contact with the 1,1,1-trichloroethane solvent should be minimized or avoided. The workers involved with parts degreasing should be provided with and encouraged to wear protective gloves. To most effectively prevent permeation of 1,1,1-trichloroethane through the protective glove, the garment material should be viton elastomer, butyl rubber, neoprene rubber latex or nitrile rubber latex.³ Natural rubber should not be used since the 1,1,1-trichloroethane attacks it.
2. Worker interviews indicated that 1,1,1-trichloroethane is used for degreasing large motors and other equipment prior to scheduled and non-scheduled maintenance. The workers are required to wear air line supplied respirators because degreasing of the equipment is usually done in a confined space. The following is recommended:
 - a. A formal respiratory protection program should be established in accordance with Federal OSHA Standard 29 CFR Part 1910.134. NIOSH publication No. 76-189, "A Guide to Industrial Respiratory Protection," is a reference source with information for establishing and maintaining a respiratory protection program which meets the eleven criteria specified by 29 CFR Part 1910.134.
 - b. All respirators used should be those certified under the NIOSH respirators standards, 30 CFR Part 11. (The air line supplied respirator currently used is not NIOSH approved.)
 - c. The existing worker safety program should be thoroughly reviewed and amended according to Part I, Sections 1 through 9, of the NIOSH Criteria for a Recommended Standard - Working in Confined Spaces.² Particular attention should be directed at Section 6, entitled Testing and Monitoring, concerning the potential flammability and explosibility characteristics of the atmosphere.

IX. REFERENCES

1. The National Institute for Occupational Safety and Health. Criteria for a Recommended Standard - 1,1,1-trichloroethane. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1976. (DHEW Publication No. NIOSH 76-184).
2. National Institute for Occupational Safety and Health. Criteria for a Recommended Standard - Working in Confined Spaces. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1980. (DHEW Publication No. NIOSH 80-106).
3. Weeks, R.W. and M.J. McLeod. Permeation of Protective Garment Material by Liquid Halogenated Ethanes and a Polychlorinated Biphenyl, DHHS (NIOSH) Publication No. 81-110 (1981).

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

Evaluation Conducted and
Report Prepared by:

John R. Kominsky
Industrial Hygienist
Industrial Hygiene Section

Originating Office:

Hazard Evaluations and Technical
Assistance Branch
Division of Surveillance, Hazard
Evaluations and Field Studies
Cincinnati, Ohio

Report Prepared by:

Jackie Woodruff
Clerk/Typist
Industrial Hygiene Section

XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Technical Services, 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 22161.

1. Allegheny Ludlum Steel Corporation, Leechburg, Pennsylvania
2. United Steelworkers of America, Local 1138
3. U.S. Department of Labor - OSHA, Region III
4. NIOSH, Region III

For the purposes of informing the 35 exposed employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees, for a period of 30 calendar days.

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

8