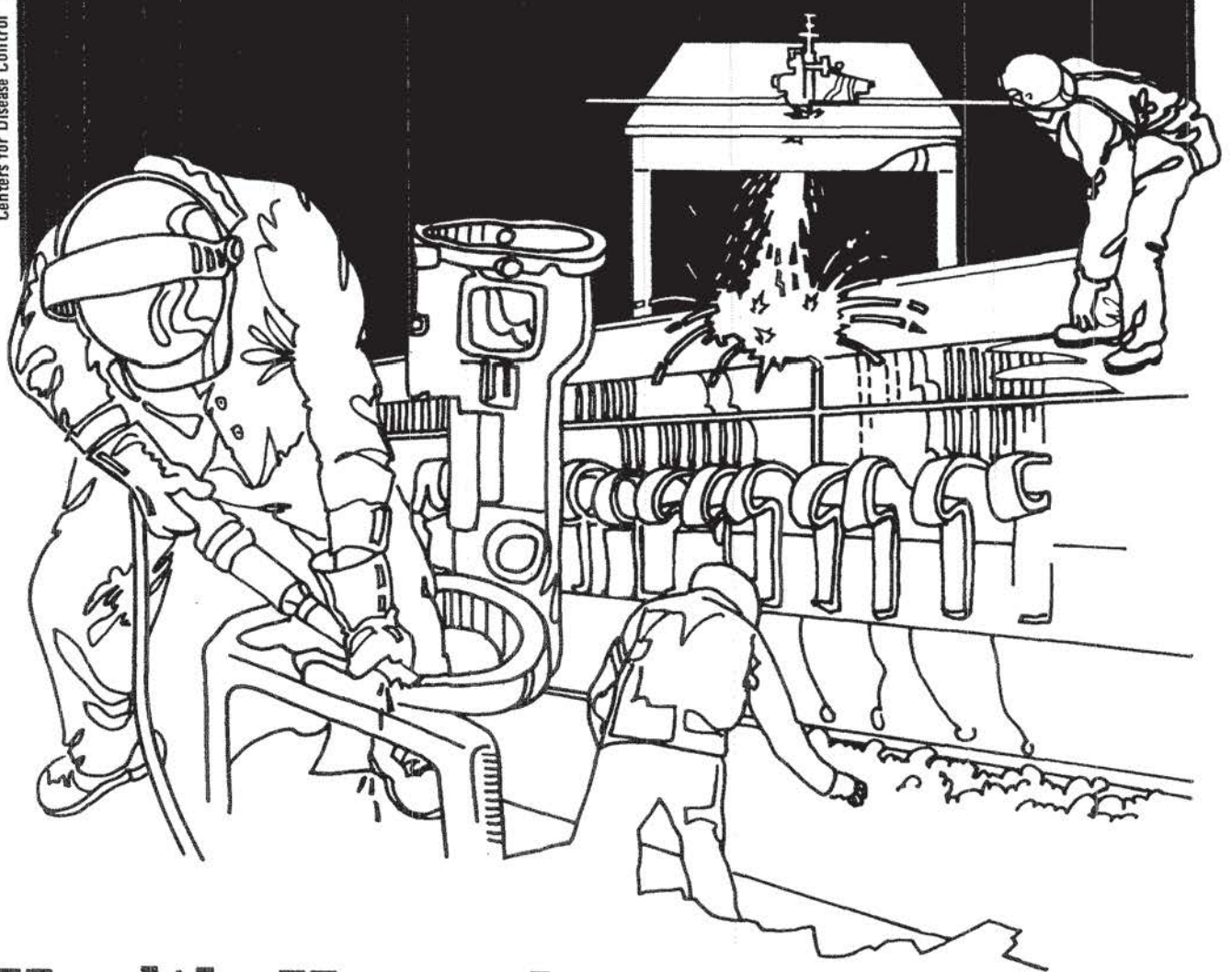


U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service  
Centers for Disease Control ■ National Institute for Occupational Safety and Health

# NIOSH



## Health Hazard Evaluation Report

HETA 81-005-834  
PUBLIC EMPLOYEES'  
RETIREMENT ASSOCIATION  
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 81-005-834  
MARCH 1981  
PUBLIC EMPLOYEES' RETIREMENT ASSOCIATION  
DENVER, COLORADO

NIOSH INVESTIGATOR:  
Theodore W. Thoburn, M.D.

I. SUMMARY

In September 1980 the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate employee complaints of burning and tearing of eyes, throat irritation, shortness of breath, and a burning sensation of the skin when entering the vault at the Public Employees' Retirement Association offices, Denver, Colorado.

On November 24, 1980, a NIOSH medical investigator visited the offices, examined the vault, interviewed employees, and obtained information on past attempts to characterize the problem. The company which prints the checks and the company manufacturing the ink used to print the checks were also contacted.

The complaints were worse when a batch of freshly printed checks were stored in the vault and were consistent with symptoms expected from vapors of the ink solvents. Complaints lessened with time and ventilation. It is concluded that solvent vapors from the freshly printed checks caused the problems. Concentrations of vapors were able to reach levels causing symptoms because the vault, by design, has no regular ventilation.

NIOSH has determined on the basis of employee interviews, personal observation, and information obtained from the printing company and the ink manufacturer that the irritation experienced by workers was due to solvent vapors from the fresh ink on checks confined in a poorly ventilated vault.

KEYWORDS: SIC 8321 (Individual and Family Services) printing ink, fireproof vault, mucous membrane irritation.

## II. INTRODUCTION

In September 1980 NIOSH received a request pursuant to Section 20(a)(6) of the Occupational Safety and Health Act of 1970 from a representative of the Public Employees' Retirement Association, Denver, Colorado. The request was to evaluate employee complaints of burning and tearing of eyes, throat irritation, shortness of breath, and a burning sensation of the skin when entering the basement vault where important files, microfilms, and blank checks are stored.

## III. BACKGROUND

The vault is fireproof, unventilated, and has an internal automatic fire suppression system utilizing Bromotrifluoromethane ( $\text{CBrF}_3$ ). The fire suppression system had been checked for leaks about two months prior to NIOSH's visit and none were found. By the door there are two small ports that can be opened from the inside turning on a small fan to supply air in an emergency if someone should be locked in the vault.

Blank checks were first stored in the vault two years ago, but the problem did not start until a new printer was utilized starting one year ago. As the first batch of checks would not go through the sorters well, a fresh batch was printed on an emergency basis and delivered about five months prior to the visit. This made the problem worse. Since then the problem has been getting better.

Normally workers only enter the vault two to three times per month and only stay for about ten minutes. The irritation of eyes, nose, and throat would begin immediately on entering the vault and clear promptly on leaving. Positioning a large floor fan to blow into the vault while open has helped some.

## IV. INVESTIGATION

On November 24, 1980, a NIOSH medical investigator visited the offices and vault, talked to affected employees, and obtained pertinent information on the checks and the fire suppression system. At the time of the visit there was a slightly musty smell in the vault which was said to be about usual at that time but was less than it had been several months earlier.

Following the visit a representative of the check printing company was contacted to obtain information on the inks used in printing the checks. She identified the odor in the vault as being the same as the odor of the ink at the printers.

The ink company identified the solvent of the ink as a hydrocarbon mixture (predominantly aliphatic) with a high boiling point and a low vapor pressure.

Vapors from high boiling aliphatic hydrocarbons can cause irritation of the mucous membranes of eyes, nose, and throat. Excessive inhalation can lead to systemic effects of headaches and drowsiness. Unconsciousness is unlikely at vapor levels obtainable at room temperatures.

V. CONCLUSION

It appears that the irritative problem was due to solvent vapors from the fresh ink on the checks. Because the vault is by its nature poorly ventilated, vapors were able to build up to noticeable levels.

VI. RECOMMENDATION

If it is necessary to store freshly printed checks in this vault, a ventilation system drawing fresh air in through the vault door when open and directing it into the depths of the vault should reduce or alleviate the problem.

VII. AUTHORSHIP AND ACKNOWLEDGMENTS

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VIII. DISTRIBUTION AND AVAILABILITY

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. 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. Public Employees' Retirement Association.
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.

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
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