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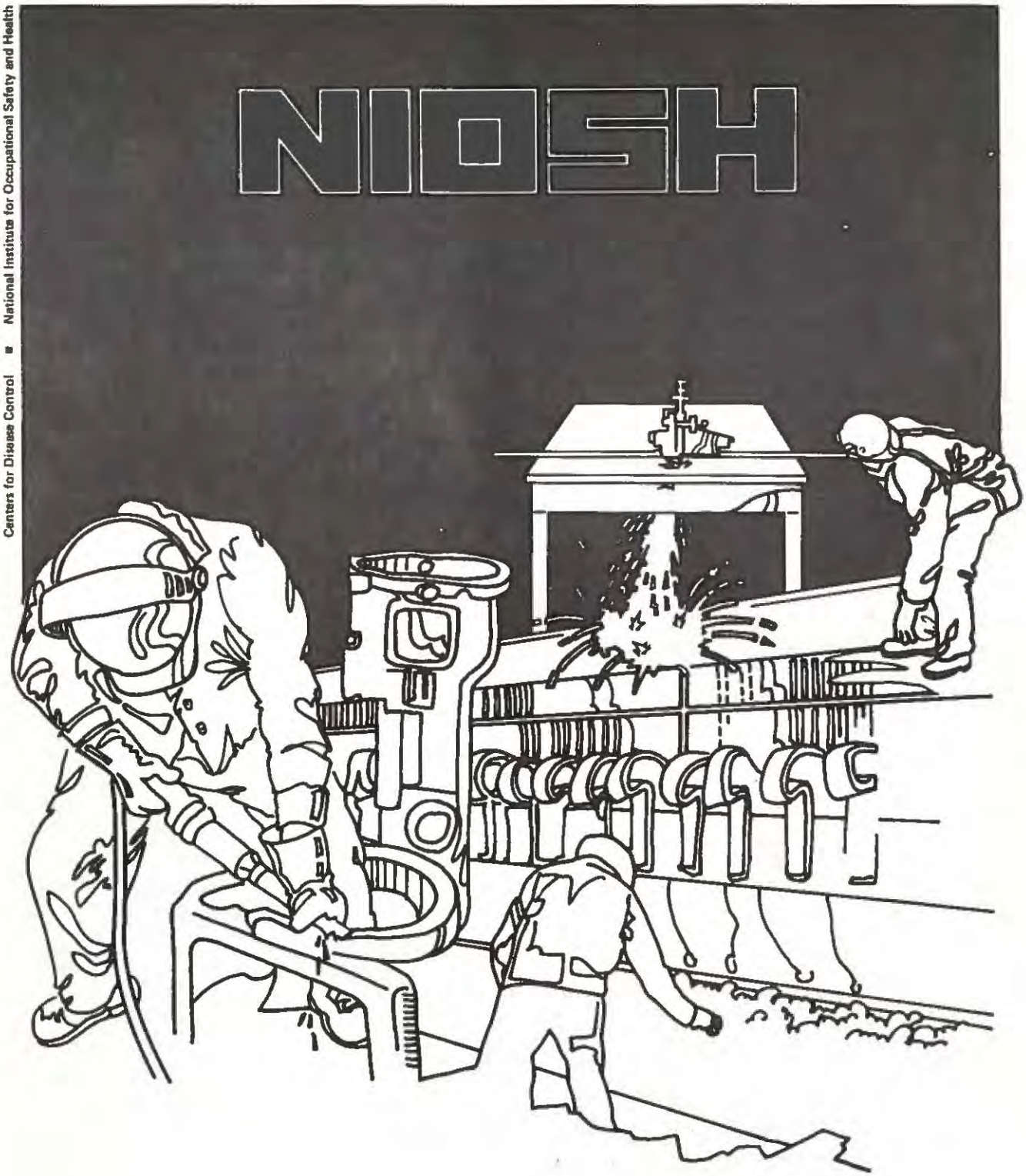

Health Hazard Evaluation Report

HETA 81-108-383
TRI VALLEY FEDERAL CREDIT UNION
EAST HELENA, MONTANA

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.

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TRI VALLEY FEDERAL CREDIT UNION
EAST HELENA, MONTANA

NIOSH INVESTIGATORS:
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I. SUMMARY

In December 1980 the National Institute for Occupational Safety and Health (NIOSH) received a request from an employee of the Tri Valley Federal Credit Union in East Helena, Montana, to evaluate a potential health hazard to emissions from urea formaldehyde foam insulation at the credit union office building (which houses only the four employees of the credit union). This building had been foam insulated in February 1979. Since the insulation was installed, all four employees of the credit union have developed symptoms such as asthma, burning and tearing of the eyes, and shortness of breath.

Eleven general room air samples were taken for measurement of formaldehyde concentrations. All values were below the laboratory limit of detection of 8 micrograms per sample. Trace quantities less than 0.10 parts per million (ppm) were found using direct reading tubes. A previous study conducted by the Montana State Department of Health and Environmental Sciences showed a level of formaldehyde of 0.10 ppm. This study was conducted in December 1980.

Employee symptoms and illnesses were most likely due to trace quantities of formaldehyde. It is possible that these workers became sensitized to formaldehyde just after the building was insulated when air concentrations of formaldehyde would probably have been much higher. Therefore, trace quantities could initiate the asthma-type symptoms now affecting the employees. Review of worker interviews strongly suggest that their problems relate to the work environment, probably the formaldehyde. All workers undoubtedly received an initial higher exposure by returning to work in the building only seven days after the urea formaldehyde foam insulation was installed. The exposure to formaldehyde subsequently decreased. Not all workers reacted to the formaldehyde with equal intensity. The time of onset of symptoms was not the same for all workers. It is not unusual for sensitivity reactions to vary.

On the basis of the environmental data and personal interviews, NIOSH concluded that a health hazard did exist at the time of this survey from trace quantities of formaldehyde. The workers who are probably sensitized to formaldehyde should no longer work in this building. Individuals who are not sensitized to formaldehyde could perhaps work in this building without experiencing health effects. Recommendations on preventing a health hazard at this work site are included in this report.

KEYWORDS: SIC 6142 (Federal Credit Unions), formaldehyde, foam insulation.

II. INTRODUCTION

NIOSH received a request in December 1980 from an employee of Tri Valley Federal Credit Union in East Helena, Montana, to determine if there was a health hazard from formaldehyde at the credit union building. An environmental survey was conducted on March 10, 1981, to evaluate potential exposure to formaldehyde.

III. BACKGROUND

The Tri Valley Federal Credit Union is located in a small, three room, adobe dwelling with a full basement. In February 1979 this building was completely insulated by drilling holes in the outside about one foot apart and spraying urea formaldehyde foam into the air space between the outside and inside walls. It was perhaps at this time workers in the building received the highest exposure to formaldehyde and may have become sensitized.

IV. ENVIRONMENTAL DESIGN AND METHODS

Workers had moved to another location and the credit union building was vacant. Therefore, only general room air samples were taken in the building. Environmental general room air samples for formaldehyde were collected on organic vapor charcoal sampling tubes and analyzed according to NIOSH P&CAM Method No. 318.

In addition to air sampling, all workers were interviewed.

V. EVALUATION CRITERIA

A. Environmental

The source of criteria used to assess the workroom concentration of formaldehyde was the NIOSH criteria for a recommended standard.

	Permissible Exposure Limit
Formaldehyde.....	1.2 mg/M^3 (C, 30 minutes) (1 ppm)

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mg/M^3 = milligrams of substance per cubic meter of air

C = ceiling level and should never be exceeded.

B. Toxicological

Formaldehyde is a colorless gas with pungent odor. Studies of industrial exposures show it is highly toxic either by inhalation or ingestion. Formaldehyde is an irritant, produces local necrosis, and is a strong sensitizer. Formaldehyde dermatitis is often seen among workers who assist pathologists. Formaldehyde may also

cause discoloration of the skin. Inhalation of formaldehyde may cause pulmonary edema, chest constriction, headaches, and asthmatic-type symptoms among sensitized individuals.[1] More recently exposure to much lower levels of formaldehyde released from common household products have been found to cause problems in sensitive individuals.[2,3] Although symptoms may include the same symptoms reported for higher concentrations, they may also include vague symptoms such as feelings of ill health, drowsiness, or lapses of memory with no demonstrable physical basis.

Common sources of low level formaldehyde exposure in buildings come from the use of urea formaldehyde resins in particle board, chipboard, plywood, and urea formaldehyde foam insulation. Formaldehyde can be released both from trapped, unreacted formaldehyde and from a gradual deterioration of the resin due to warmth and humidity.[2,3] Reduced fresh air exchanges in an effort to save energy would allow the indoor concentrations of formaldehyde to increase from these sources.

Other sources of formaldehyde exposures can be cigarette smoke and automobile exhaust[3] and as a preservative[4] in some shampoos, lotions, cosmetics, and household cleaning solutions. Skin contact with wash and wear apparel and some paper finishes can be a source of formaldehyde exposure causing skin problems.[4]

The NIOSH Current Intelligence Bulletin No. 34 dated April 15, 1981, states that there is evidence showing that formaldehyde is a carcinogenic agent. This has only been observed in rats and mice.[5]

VI. ENVIRONMENTAL RESULTS

Eleven general area air samples were taken to measure formaldehyde concentrations. All values were below laboratory detection limits. One direct reading sample showed trace quantities of formaldehyde less than 0.10 ppm. Refer to Table 1 for location of sampling stations.

On December 1980, the Montana Department of Health and Environmental Sciences reported airborne level of formaldehyde of 0.10 ppm in the credit union manager's office.

VII. DISCUSSION AND CONCLUSIONS

Based on the environmental sampling and personal interviews, a hazardous situation existed during this evaluation to all workers that had been working in the credit union building.

Even though formaldehyde concentrations were in trace quantitites less than 0.10 ppm, workers who had become sensitized to formaldehyde should not return to work in this facility. Workers were advised of this at the time of the survey.

Review of worker interviews strongly suggest that their problems relate to the work environment, probably the formaldehyde. All workers undoubtedly received an initial higher exposure by returning to work in the building only seven days after the urea formaldehyde foam insulation was installed. The exposure to formaldehyde subsequently decreased. Not all workers reacted to the formaldehyde with equal intensity. The time of onset of symptoms was not the same for all workers. It is not unusual for sensitivity reactions to vary. Major symptoms were respiratory irritation, irritability, and memory loss or difficulty concentrating. All workers related the symptoms to working in the office and beginning in the last two years. All workers' health improves on their days off or when they are out of the building. One worker said the symptoms started in the summer after the insulation had been installed; one not until fall the following year; one mentioned the symptoms started shortly after beginning work in the office; and the last worker could not give a definite onset of symptoms. The two more affected workers also noted decreased tolerance for cigarette smoke and other fumes and odors.

The fact that the four workers continue to work together in temporary quarters without problems strongly points to a problem with the indoor environment in the credit union building as the source of the problem. The variable onset, associated intolerances, and generally non-measurable levels of formaldehyde all suggest sensitization.

VIII. RECOMMENDATIONS

1. Workers should be informed of the potential dangers from exposure to formaldehyde.

2. Employees should only smoke in a designated, well ventilated area.

IX. REFERENCES

1. Plunkett, E.R., Handbook of Industrial Toxicology, Chemical Publishing Company, New York, 1976, pp. 190-191.

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3. Breysse, P.A. (ed.). "Formaldehyde in Mobil and Conventional Homes," Envir. Health and Safety News, University of Washington., Vol. 26, #1-6 (January-June, 1977).

4. Fisher, A.A., Contact Dermatitis, 2nd Edition, Lea & Febiger, Philadelphia (1973), pp. 47-48.

5. Formaldehyde: Evidence of Carcinogenicity, NIOSH Current Intelligence Bulletin 34, April 15, 1981, DHHS (NIOSH) Publication No. 81-111.

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XI. 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. Tri Valley Federal Credit Union.
2. U.S. Department of Labor/OSHA - Region VIII.
3. NIOSH - Region VIII.
4. Montana Department of Health and Environmental Sciences.
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

General Room Air Concentrations of Formaldehyde

Tri Valley Federal Credit Union
East Helena, Montana

March 10, 1981

Sample Location	Sampling Time	mg/M^3 Formaldehyde
Center of Room (front office)	8:05 AM - 10:40 AM	*
Electrical Outlet (front office)	8:07 AM - 10:40 AM	*
Electrical Outlet (front office)	8:10 AM - 10:45 AM	*
Center of Room (Deadmond's office)	8:15 AM - 10:45 AM	*
Electrical Outlet (conference room)	8:20 AM - 11:00 AM	*
Center of Room (conference room)	8:24 AM - 11:00 AM	*
Electrical Outlet (front office)	10:40 AM - 2:01 PM	*
Center of Room (Deadmond's office)	10:40 AM - 2:00 PM	*
Electrical Outlet (conference room)	10:45 AM - 1:55 PM	*
Center of Room (conference room)	10:47 AM - 2:20 PM	*
Center of Room (conference room)	10:50 AM - 2:20 PM	*

EVALUATION CRITERIA: 1.2 mg/M^3

LABORATORY LIMIT OF DETECTION: 8 micrograms per sample

* = below laboratory limit of detection

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