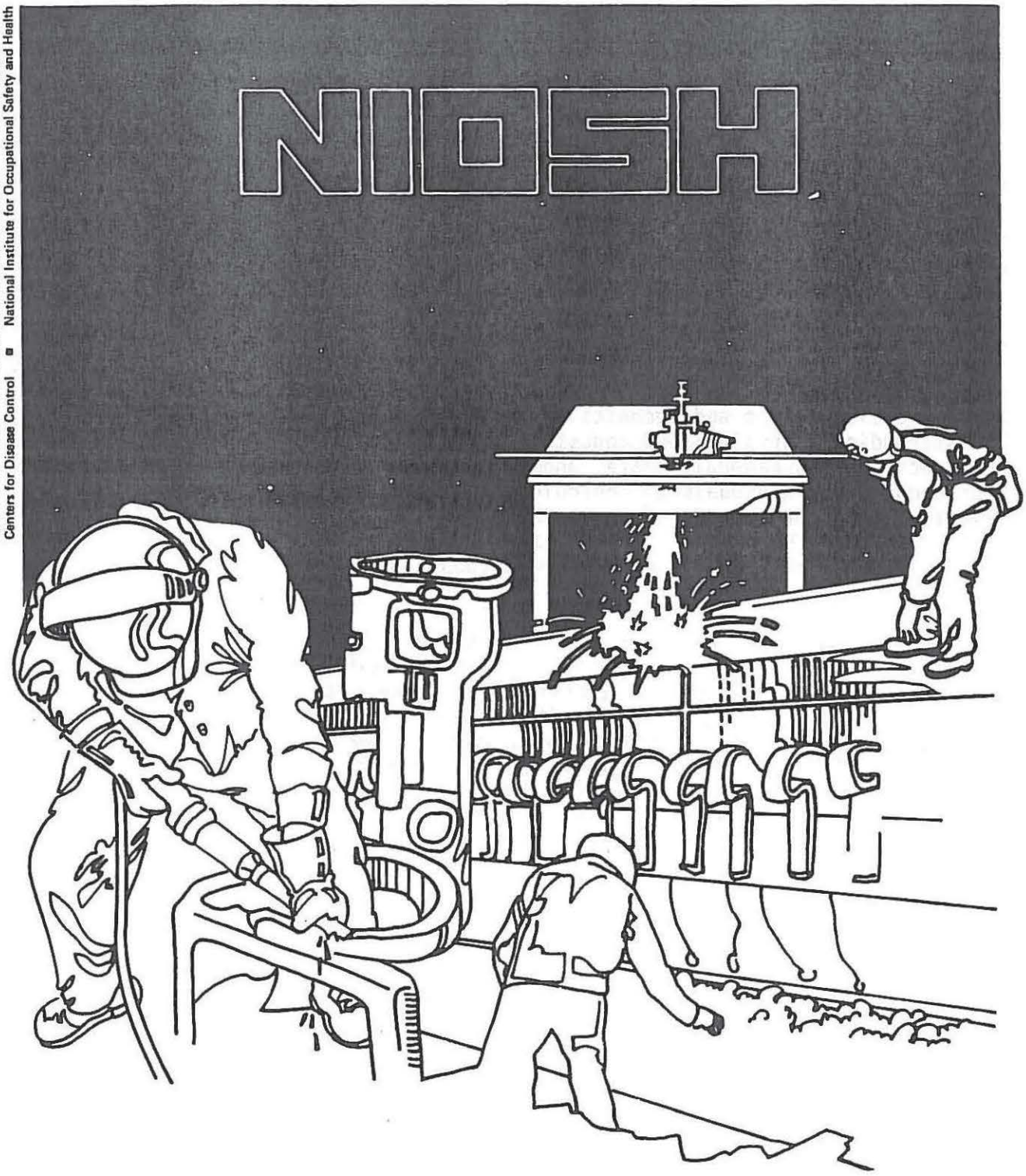
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health




# Health Hazard Evaluation Report

HETA 83-089-1329
MILK'S CAMP INDUSTRY
BONESTEEL, SOUTH DAKOTA

## 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.

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MILK'S CAMP INDUSTRY
BONESTEEL, SOUTH DAKOTA

NIOSH INVESTIGATORS:
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## I. SUMMARY

In December 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from management at Milk's Camp Industry, Bonesteel, South Dakota, to evaluate a potential health hazard from exposure to Freon TF in a vapor degreasing operation.

On March 16-17, 1983, a NIOSH investigator performed a health hazard evaluation at Milk's Camp Industry. The only chemical used in this facility is Freon TF which is a cleaning agent in a vapor degreasing unit. Several workers had complaints which appeared to be caused by overexposures to Freon TF. Twenty breathing zone and three general room air samples were collected for an entire work shift on March 16. Concentrations ranged from 12 to 1328 mg/$M^3$. The average concentration was 159 mg/$M^3$. None of these concentrations approached the evaluation criterion of 7600 mg/M3 which is the current American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) and the Occupational Safety and Health Administration (OSHA) standard.

All ten workers were interviewed. This included three management and seven assembly employees. Only one worker had complaints which consisted of chest pains, respiratory irritation, dizziness, and headaches. This worker had the job of cleaning the vapor degreaser approximately once each month. During the process of cleaning the degreaser excessive exposures could occur. Cleaning of the degreaser was not performed during this evaluation. A respirator was available to wear during the cleaning of the degreaser; however, this respirator was in poor maintenance, dirty, and not adequate for protection.

Although the environmental samples collected during this survey did not demonstrate overexposures, the one employee reporting symptoms could be overexposed during the maintenance of the vapor degreaser. Recommendations on preventing a health hazard at this work site are included in this report.

KEYWORDS: SIC 3674 (Computer Logic Modules), trichlorotrifluoroethane, Freon TF.

## II. INTRODUCTION

In December 1982 the National Institute for Occupational Safety and Health (NIOSH) received a request from management at Milk's Camp Industry, Bonesteel, South Dakota, to evaluate a potential health hazard from exposure to Freons in a vapor degreasing operation. An environmental evaluation was conducted on March 16-17, 1983. Results of the survey were discussed with management in April 1983.

## III. BACKGROUND

Milk's Camp Industry is involved in contract assembly of intense hand labor operations (such as hand cleansing of detail computer parts) in the electronics field. All the computer parts are cleaned in a degreaser machine containing liquid and vaporized Freon. The odor of Freon in all areas and medical complaints from the worker who routinely cleans the degreaser initiated this hazard evaluation.

## IV. ENVIRONMENTAL DESIGN AND METHODS

Twenty breathing zone and three general room air samples for Freon TF were collected on organic vapor charcoal sampling tubes and analyzed according to NIOSH P&CAM Method No. 129.

All ten workers were interviewed.

## V. EVALUATION CRITERIA

### A. Environmental

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: (1) NIOSH Criteria Documents and recommendations; (2) the American Conference of Governmental Industrial Hygienists'

(ACGIH) Threshold Limit Values (TLV's); and (3) the U.S. Department of Labor (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based solely on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

| | Permissible Exposure Limits 8-Hour Time-Weighted Exposure Basis |
|---|---|
| Trichlorotrifluoroethane (Freon TF).... | 7600 $mg/M^3$ (OSHA, ACGIH) |

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

B. Toxicological

Trichlorotrifluoroethane (Freon TF) is a central nervous system depressant and a mild mucous membrane irritant. Overexposures include throat irritation, drowsiness, loss of concentration and coordination, cardiac arrhythmias may also occur. Removal from exposure will usually enable complete recovery within 15-20 minutes.[1]

## VI. ENVIRONMENTAL RESULTS

Twenty breathing zone and three general room air samples for Freon TF were collected for an entire work shift on March 16. Concentrations ranged from 12 to 1328 $mg/M^3$. The average concentration was 159 $mg/M^3$. None of these concentrations approached the evaluation criterion of 7600 mg/M3 which is the current American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) and the Occupational Safety and Health Administration (OSHA) standard.

All ten workers were interviewed. This included three management and seven assembly employees. Only one worker had complaints which consisted of dizziness, chest pains, respiratory irritation, and headaches. All these symptoms disappeared after the worker was away from the work place for several hours. This worker had the job of cleaning the vapor degreaser approximately once each month. During the process

of cleaning the degreaser excessive exposures could occur. Cleaning of the degreaser was not performed during this evaluation. A respirator was available to wear during the cleaning of the degreaser; however, this respirator was in poor maintenance, dirty, and not adequate for protection.

## VII. DISCUSSION AND CONCLUSIONS

Based on the environmental sampling and employee interviews, it was determined that a potentially hazardous situation existed at this facility. The levels of Freon were below the evaluation criteria. However, during the cleaning procedure it is possible that the employee may become overexposed. This employee was not provided adequate respiratory protection to be used during the cleaning of the degreaser. Providing the worker with a respirator with organic cartridges, properly maintaining this respirator, and making sure the worker wears the respirator during the cleaning process would eliminate the possibility of overexposure.

## VIII. RECOMMENDATIONS

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

2. A properly fitted half-face respirator with organic vapor cartridges should be provided to the worker who cleans the vapor degreaser to prevent excessive exposure.

## IX. REFERENCES

1. Proctor, N.H. and Hughes, J.P. Chemical Hazards of the Workplace, J.P. Lippincott Company, Philadelphia, 1978, pp. 494-495.

## 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. Milk's Camp Industry.
2. Indian Health Service Field Station, Sioux City, Iowa.
3. U.S. Department of Labor/OSHA - Region VIII.
4. NIOSH - Region VIII.
5. South Dakota Department of Health.
6. 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
Freon TF (Trichlorotrifluoroethane)

Milk's Camp Industry
Bonesteel, South Dakota

March 16, 1983

| Sample Number | Location | Type of Sample | Sampling Time | $mg/M^3$ Freon |
|---|---|---|---|---|
| 1 | N.W. Bell | BZ | 8:03 AM - 11:34 AM | 88 |
| 2 | IBM Rochester | BZ | 8:03 AM - 11:38 AM | 119 |
| 3 | IBM Boulder | BZ | 8:05 AM - 11:44 AM | 67 |
| 4 | IBM Boulder | BZ | 8:06 AM - 11:40 AM | 65 |
| 5 | IBM Boulder | BZ | 8:07 AM - 10:06 AM | 145 |
| 6 | IBM Boulder | BZ | 8:08 AM - 10:02 AM | 675 |
| 7 | All Areas | BZ | 8:08 AM - 10:32 AM | 79 |
| 8 | Office | BZ | 8:08 AM - 10:32 AM | 73 |
| 9 | All Over Office | BZ | 8:14 AM - 11:32 AM | 110 |
| 10 | Hood Over Degreaser | GR | 9:08 AM - 9:55 AM | 207 |
| 1A | N.W. Bell | BZ | 12:39 PM - 3:24 PM | 22 |
| 2A | IBM Rochester | BZ | 12:39 PM - 3:42 PM | 28 |
| 3A | IBM Boulder | BZ | 12:42 PM - 3:45 PM | 12 |
| 4A | IBM Boulder | BZ | 12:40 PM - 3:42 PM | 18 |
| 5A | IBM Boulder | BZ | 10:08 AM - 11:43 AM | 59 |
| 6A | IBM Boulder | BZ | 10:06 AM - 11:42 AM | 145 |
| 7A | All Areas | BZ | 12:33 PM - 2:59 PM | 12 |
| 8A | Office | BZ | 12:32 PM - 3:01 PM | 59 |
| 9A | All Over Office | BZ | 12:32 PM - 2:59 PM | 16 |
| 10A | Hood Over Degreaser | GR | 10:01 AM - 11:45 AM | 140 |
| 5B | IBM Boulder | BZ | 12:41 PM - 3:44 PM | 28 |
| 6B | IBM Boulder | BZ | 12:41 PM - 3:44 PM | 1328 |
| 10B | Hood Over Degreaser | GR | 12:37 PM - 3:44 PM | 163 |
| EVALUATION CRITERIA: | | | | 7600 |
| LABORATORY LIMIT OF DETECTION mg/sample | | | | < 0.01 |

BZ = breathing zone
GR = general room