# U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE CENTER FOR DISEASE CONTROL NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH CINCINNATI, OHIO 45226

# HEALTH HAZARD EVALUATION DETERMINATION. REPORT NO. 79-127-644

# DIGITAL EQUIPMENT CORPORATION COLORADO SPRINGS, COLORADO

#### DECEMBER 1979

# 1. TOXICITY DETERMINATION

1.

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at Digital Equipment Corporation, Colorado Springs, Colorado, on August 28, 1979. Breathing zone and general room air samples were taken for 1,1,2-trichloro 1,2,2-trifluoroethane (Freon-113B). Environmental concentrations were less than 15% of the evaluation criteria of 7600 mg/M<sup>3</sup>.

All workers were interviewed. The interviews were directed towards possible effects of exposure to Freon-113, phosgene, and carbonyl fluoride exposures. At the time of this evaluation none of the workers reported any symptoms. Several said they were sick previously but had not had a reoccurrence in over a month.

Based on employee interviews and the low levels of Freon-113, a health hazard did not exist at the time of this evaluation.

#### II. DISTRIBUTION AND AVAILABILITY

Copies of this determination report are currently available upon request from NIOSH, Division of Technical Service, 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. Digital Equipment Corporation.
- U.S. Department of Labor/OSHA Region VIII.
- 3. NIOSH Region VIII.

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

#### III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by 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.

NIOSH received such a request from an electrician who was working on electrical wiring at Digital. He was a contractor and not an employee of Digital. This request was to evaluate potential hazards associated with the use of Freon-113 as a degreaser. The electrician had become ill with symptoms such as chills, nausea, and fainting. Several other workers in the plant had similar histories of medical complaints. Several consultants were contacted by plant management and did surveys of the degreasing area. Results of their environmental data was very similar to data collected during this survey.

#### IV. HEALTH HAZARD EVALUATION

#### A. Processes Evaluated

Digital Equipment Corporation produces a variety of small desktype computers similar to ones used by airlines. Various parts of these computers must be passed through a vapor degreaser containing Freon 113. It was in this area that the workers became ill.

#### B. Evaluation Design

All workers were monitored for Freon-113 exposures. General room samples were taken in all areas surrounding the vapor degreaser. All workers were interviewed with questions directed at health problems associated with exposures to Freon-1138.

#### C. Evaluation Methods

All air samples were collected on organic vapor charcoal sampling tubes using vacuum pumps operated at 50-200 cc's per minute. Samples were analyzed by gas chromatography by NIOSH Method S129.

#### D. Criteria for Assessing Workroom Concentrations of Air Contaminants

Three sources of criteria are generally used to assess workroom concentrations of air contaminants: (1) NIOSH criteria for recommended standards; (2) recommended Threshold Limit Values (TLVs) and their supporting documentation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH), 1979; (3) Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1000), January 1978. The most recent and re!evant recommendations for Freon 113 are as follows:

Permissible Exposures 8-Hour Time-Weighted Exposure Basis (mg/M<sup>3</sup>)

N Substance	IOSH Criteria or Recommended Standard	TLV	Current OSHA Standard
1,1,2-trichloro 1,2,2- trifluoroethane (Freon-113®)		7600_	7600

mg/M<sup>3</sup> = 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.

#### E. Toxicology

Fluorocarbon compounds may produce mild irritation to the upper respiratory tract. Dermatitis occurs only rarely. Decomposition products may also be the cause of these effects.

Mild central nervous system depression may occur in cases of exposure to very high concentrations of fluorocarbons. Symptoms from acute exposure may manifest themselves in occasional tremor and incoordination. It has been reported that dizziness had resulted from an exposure of 5% dichlorodifluoromethane and unconsciousness from exposure to 15%. Cardiac arrhythmias, with sudden death, have occurred from breathing some of these chemicals. Typically, fluorocarbons have very low levels of toxicity, and their predominant hazard is from simple asphyxia. (Reference 1)

#### F. Environmental Results and Discussion

The results of fifteen breathing zone and general room air samples show there were exposures to Freon-113®. None of these exposures exceeded the most recent evaluation criteria. All workers were questioned as to whether they were smoking at the time of their illness since Freon drawn through a cigarette will produce not only phosgene, but also produces carbonyl fluoride. Smoking is not permitted at the work site.

There was no health hazard found at the time of this survey. However, the degreaser had been repaired and was under careful observation which may not have been true at the time of the workers' illnesses.

G. Conclusions

Results of the environmental data, employee interviews, and the physical conditions of the work place illustrate that there was no health hazard during the time of this survey; however, a

hazard probably existed at the time the workers became ill. At the time of this survey, the vapor degreaser was operating under optimum conditions and, if used in this manner consistently, should not pose a health hazard.

# V. RECOMMENDATIONS

- 1. No eating, drinking, or smoking should occur at the work station.
- 2. Employees should be educated on the hazards of Freon-113.
- 3. Workers should report any symptoms such as rapid pulse, tremors, incoordination or dizziness.

# VI. REFERENCES

 Occupational Diseases - A Guide to Their Recognition, Revised Edition, June 1977, DHEW (NIOSH) Publication No. 77-181, pp. 204-205.

#### VII. AUTHORSHIP AND ACKNOWLEDGMENTS

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# TABLE 1

# Breathing Zone and General Room Air Concentrations of 1,1,2-trichloro 1,2,2-trifluoroethane (Freon-113®)

# Digital Equipment Corporation Colorado Springs, Colorado

# August 28, 1979

Sample Number	Location	Job Classification	Sampling Time	mg/M3 Freon-113
1	Vapor Degreaser	Degreaser Operator 1	7:44 AM - 9:50 AM	110
2	Vapor Degreaser	General Room	7:46 AM - 9:44 AM	1164
3	Sub Assembly	Lead Man 3	7:50 AM - 10:55 AM	72
4	Sub Assembly	Assembler 4	7:55 AM - 10:59 AM	58
5	Sub Assembly	Assembler 2	7:59 AM - 9:51 AM	69
6	Vapor Degreaser	General Room	8:00 AM - 9:45 AM	341
7	Vapor Degreaser	General Room	9:45 AM - 11:22 AM	581
8	Vapor Degreaser	General Room	9:47 AM - 11:20 AM	420
9	Degreaser	Degreaser Operator 1	9:50 AM - 1:20 PM	108
10	Degreaser	Assembler 2	9:51 AM - 1:50 PM	71
11	Assembly	Lead Man 3	10:55 AM - 1:18 PM	57
12	Assembly	Assembler 4	10:59 AM - 1:50 PM	70
13	Vapor Degreaser	General Room	11:24 AM - 1:55 PM	779
14	Vapor Degreaser	General Room	11:20 AM - 12:40 PM	463
15	Degreaser	10 feet above Degreaser	12:45 PM - 2:00 PM	59
		EVALUATION CRITERIA		7600

LABORATORY LIMIT OF DETECTION mg/sample 0.01