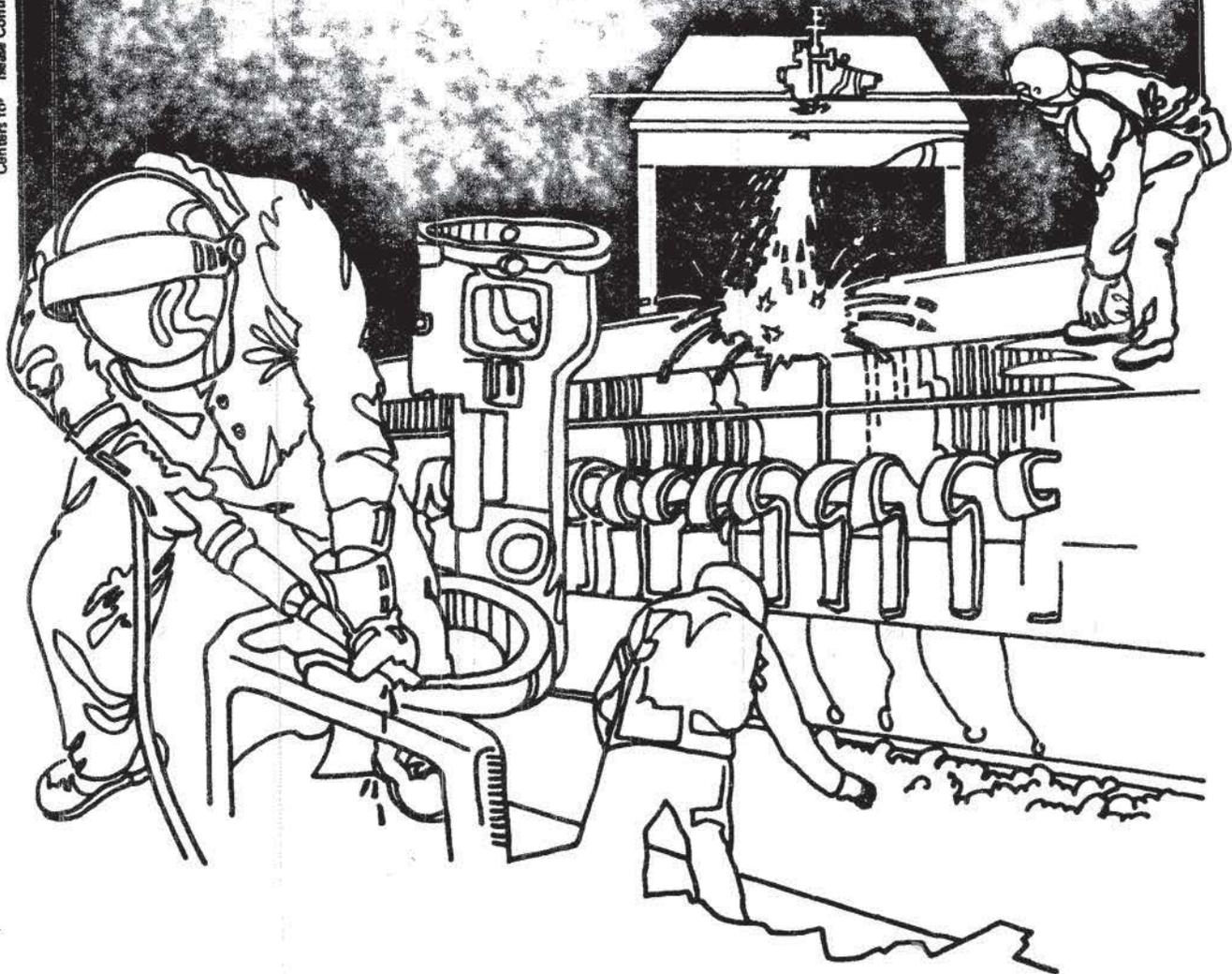


U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



**Health Hazard
Evaluation
Report**
80-083-779

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. 699(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.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HE 80-783-779
December 1980
Video Merchandisers, Incorporated
New York, New York

NIOSH Investigators:
Lawrence D. McLouth, IH
Richard Gorman, IH

I. SUMMARY

In February, 1980, NIOSH received a request for a health hazard evaluation from an employee at Video Merchandisers, Incorporated, New York, New York. The request was filed on the basis of potential employee exposure to organic vapors, and irritation from tobacco smoke. The requestor reported symptoms of coughing, eye irritation, headaches, nausea, and hypersensitivity to air contaminants.

Video Merchandisers is a brokerage firm for television game show commercials. The owner and two employees are engaged in administrative activities and do not use chemicals or solvents. The suspected source of the organic vapors was the graphic arts department of the adjoining advertising firm (Fidler Group) where limited quantities of substances that contained various organic solvents were used. The Fidler Group had agreed to having their graphic arts department evaluated as part of this survey.

On April 3-4, 1980, NIOSH conducted an environmental evaluation of the two worksites. General area air and bulk material samples were collected and analyzed for organic compounds. Workers were interviewed, temperature and humidity data were collected, and the ventilation system was evaluated.

Air sampling for the vapors of the solvents known to be used in the Fidler area indicated that low levels were present in the Video Merchandisers work area. These substances, and their concentration ranges in parts per million (ppm), include: hexane (0.9-2.9), methylene chloride (0.8-0.9) and toluene (0.1). Acetone and cellosolve acetate were not detected. All concentrations found were 3% or less of the most stringent occupational health standard or recommended exposure limit. The Threshold Limit Index (TLI) for the mixture of organic vapors was 0.03 or less which is well below a TLI of 1 which, if exceeded, would represent an overexposure condition.

On the basis of the data obtained in this investigation, NIOSH determined that no occupational health hazards existed at the time of the survey. However, because of fluctuations in temperature, the office may be uncomfortable at times. Recommendations are included to make working conditions more comfortable.

Keywords: SIC 7310 (advertising), SIC 8999 (commercial art), hexane, methylene chloride, toluene, acetone, cellosolve acetate, ventilation, coughing, eye irritation, headaches, and nausea.

II. INTRODUCTION

On February 28, 1980, NIOSH received a request for a health hazard evaluation from an employee of Video Merchandisers, Incorporated (VMI), New York, New York. NIOSH conducted a survey on April 4, 1980 to determine if a health hazard existed from the exposure of employees to organic vapors emanating from the graphic art department of the Fidler Group (an adjoining advertising firm).

III. BACKGROUND

V.M.I is a brokerage firm for T.V. game commercials. There are two full time workers: The owner and his secretary. Another person is employed as a part-time bookkeeper. Their work is administrative and clerical in nature. No chemicals are used.

V.M.I. subleases two interior offices from the Fidler Group. The latter occupies several offices on the same floor (Figure I). Their graphic art department uses a variety of trade name products containing hexane, acetone, toluene, methylene chloride, and cellosolve acetate. The total usage of these amounts to less than one gallon per month.

IV. EVALUATION METHODS

Environmental

Five area air samples for organic vapors were collected. The sampling locations are described in Table II and are shown as X's on the sketch in Figure 1. Bulk samples of the materials used in the graphic arts department of the Fidler Group were obtained to aid in analysis. The air samples were collected and analyzed using a NIOSH validated method (1). No standards exist for the exposure to tobacco smoke, thus NIOSH made no attempt to quantify their levels.

Personnel were interviewed, temperature and humidity data was collected using a battery-powered psychrometer and air flows were observed using a smoke tube technique.

Medical

NIOSH asked the requestor for medical records specifically related to the documentation of allergies and hypersensitivities.

V. EVALUATION CRITERIA

Several criteria are used to determine whether or not a worker has been overexposed to a chemical, biological, or physical agent. The OSHA Federal Standards given in Tables Z-1 & 2 of The General Industry Standards (2) are time weighted averages (TWA's) that shall not be

exceeded. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends health standards known as Threshold Limit Values (TLV's) (3). These represent levels of harmful agents to which the majority of the workers can be exposed without harm throughout their working years. NIOSH also recommends health standards for a variety of chemical substances (4). Like the ACGIH's TLV's, they are recommended standards which are based on the best available research and information.

When a mixture of hazardous substances are present, their combined effect (i.e. the Threshold Limit Index) should be considered. The effects of the different hazards should be thought of as additive unless there is information to the contrary. Hence, if the sum of the following series is greater than unity, then the worker has been overexposed:

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} + \dots + \frac{C_n}{T_n}$$

Where C = measured atmospheric concentration
T = federal or recommended standard

NIOSH's Health Hazard Evaluation Program employs that particular health standard or recommendation that is based on the best available information to determine if a potentially toxic exposure exists.

Table I lists the health effects that may result from overexposure to one or more of the substances of interest for this survey and identifies the various occupational health standards and recommended exposure limits.

VI. RESULTS

Environmental

The environmental air sampling results, and recommended exposure limits are presented in Table II. Analysis of the air samples indicated that low levels of organic vapors were present. These substances, and their concentration ranges included: hexane (0.9-2.9 ppm), and methylene chloride (0.8-0.9 ppm). Toluene concentrations were 0.1 ppm. Acetone and cellosolve acetate were not detected. The highest level found for each contaminant represented less than 3% of the most stringent health standard. Of all samples collected, the highest concentration found was hexane (7.8 ppm). This sample was collected from the Fidler Group's graphic art department. At V.M.I. the highest hexane level was 2.9 ppm. This sample was collected at the bottom of the door which separates the two firms. The toluene and methylene chloride levels were all below 1 ppm in each sample collected. The Threshold Limit Index of the vapors were within the prescribed limit.

Complaints of discomfort from occasional rises in temperature were made by the employees questioned. With the exception of the requestor, no concerns were voiced regarding air contamination.

In V.M.I. there are two inlet diffusers (one in the owner's and another in the secretary's office). Air is exhausted by outlets located at the periphery of each ceiling light fixture. The air conditioning for the entire floor is controlled by a single thermostat in the Fidler Group. Originally, the entire floor was one large open space. Five years ago, the Fidler Group subdivided it into several offices, and subleased them to agencies such as V.M.I.

Smoke tube tests indicated that the offices of Video Merchandisers are under positive pressure relative to the adjacent ones when the air conditioning system is on. Similar tests were not made when the system was off.

Temperature readings ranged from 77-80°F (at V.M.I.) while the humidity levels were stable at 35%.

Medical

The medical records requested were not made available to NIOSH, therefore, a medical evaluation was not possible.

VII. DISCUSSION

The results indicated that low levels of organic vapors can infiltrate V.M.I. from the Fidler Group. The comparatively higher levels measured at the connecting door (e.g. 2.9 ppm hexane) and the lower levels found at the secretary's inlet diffuser (e.g. 0.9 ppm hexane) suggest that the route of entry was the crack under the door. This finding is contrary to smoke tube tests which indicated that V.M.I. is under positive pressure relative to the Fidler Group. However, these tests were conducted when the air conditioning system was on. Therefore, it is possible that a negative pressure may exist when the ventilation system is not operating.

Finally, it was determined that use of a single thermostat in its present location (in the Fidler Group) is ineffective in controlling the temperature for the entire floor, and this probably accounted for complaints of uncomfortable temperatures.

VIII. RECOMMENDATIONS

Although no health hazard existed at the time of the survey, several recommendations are included to make the working conditions more favorable.

Video Merchandisers Incorporated

1. The existing air conditioning inlets and outlets, being on the ceiling, do not effectively move the air at the lower levels. The installation of a small portable fan may aid in the circulation of air.

2. Because of its small size and the present condition of poor air-circulation, smoking should be kept to a minimum in V.M.I.'s offices.

The Fidler Group

1. The effectiveness of the existing air conditioning system should be evaluated. The existing thermostat may be relocated to provide better temperature regulation. Two thermostats may be necessary: One in the coolest area during the winters, and another for the warmest area during the summer.
2. All product containers should be sealed when not being used.
3. If a product is spilled, it should be wiped up immediately.
4. All solvent-laden rags, papers, etc., should be disposed in a fire-proof container, in accordance with city fire regulations.

IX. REFERENCES

1. P&CAM 127, NIOSH Manual of Analytical Methods, DHEW, PHS, CDC, NIOSH, 1979
2. General Industry Standards OSHA Safety and Health Standards, 29 CFR 1910, Tables Z - 1 & 2, Revised November, 1978.
3. Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment With Intended Changes For 1979, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.
4. NIOSH/OSHA Pocket Guide to Chemical Hazards, DHEW, NIOSH, Publication No. 78-210.

X. AUTHORSHIP AND ACKNOWLEDGEMENT

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XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this Determination 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), 5258 Port Royal Road, Springfield, Virginia 22151. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Video Merchandisers, Incorporated
2. The Fidler Group
3. NIOSH, Region II
4. OSHA, Region II

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

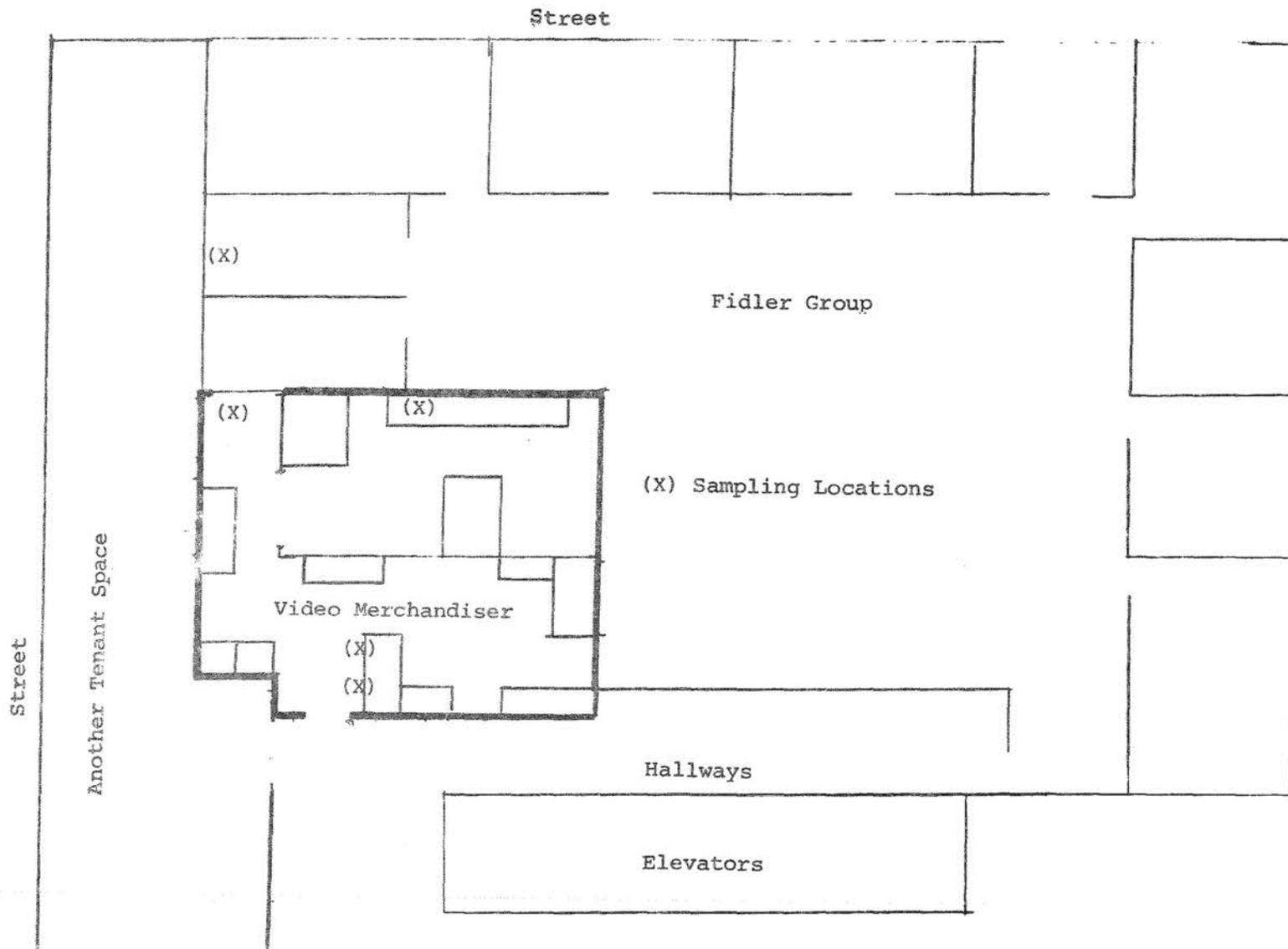


Figure 1

Video Merchandisers
HE 80-83

April 4, 1980

Table I

Evaluation Criteria and Health Effects From Overexposure

Video Merchandisers, Incorporated
HE 80-83
April 4, 1980

Hexane	Acetone	Toluene	Methylene Chloride	Cellosolve Acetate
An asphyxiant and central nervous system depressant. Has neurotoxic properties. Repeated contact results in dermatitis.	Produces a dry, fissured dermatitis. At higher concentrations nose and throat irritation, as well as headache, dizziness, nausea and uncoordination occur.	Produces fatigue, confusion, and skin burns. At higher levels euphoria, dizziness, and nausea occur. Toluene is an eye, skin, and upper respiratory tract irritant. Repeated contact results in defatting of the skin.	Irritating to eyes, skin and upper respiratory tract. Repeated contact results in dermatitis. This substance is a mild narcotic, whose effects include headache, giddiness, stupor, irritability, numbness, and tingling in the limbs. In severe overexposures, toxic encephalopathy (brain damage) with hallucinations, pulmonary edema, coma, and death have been noted.	Irritating to eyes, mucous membranes, nasal passages, and throat.
OSHA Standard ¹ 500 ppm	1000 ppm	200 ppm	500 ppm	100 ppm
ACGIH Level ² 100 ppm	1000 ppm	100 ppm	200 ppm	100 ppm
NIOSH Level ³ 100 ppm	-	100 ppm	-	

1. Occupational Safety and Health Administration Federal Standard.
2. American Conference of Governmental Industrial Hygienists Recommended Level.
3. National Institute for Occupational Safety and Health Recommended Level.

Table II
 Environmental Air Sampling Results (ppm)
 Video Merchandisers, Incorporated
 HE 80-83
 April 4, 1980

<u>Location</u>	<u>Hexane</u>	<u>Acetone</u>	<u>Toluene</u>	<u>Methylene Chloride</u>	<u>Cellosolve Acetate</u>	<u>Additive Effects (Threshold limit index)</u>
Video Merchandisers, Inc.						
On table by xerox	1.0	ND	0.1	0.8	ND	0.03
Door leading to Fidler	2.9	ND	0.1	0.9	ND	0.07
Secretary's desk	2.8	ND	0.1	0.8	ND	0.07
Secretary's air conditioning inlet	0.9	ND	0.1	0.8	ND	0.03
Fidler Group						
Art department workbench	7.8	ND	0.2	0.8	ND	0.16
Recommended Environmental Level (ppm)	100	1000	100	200	100	1.0

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