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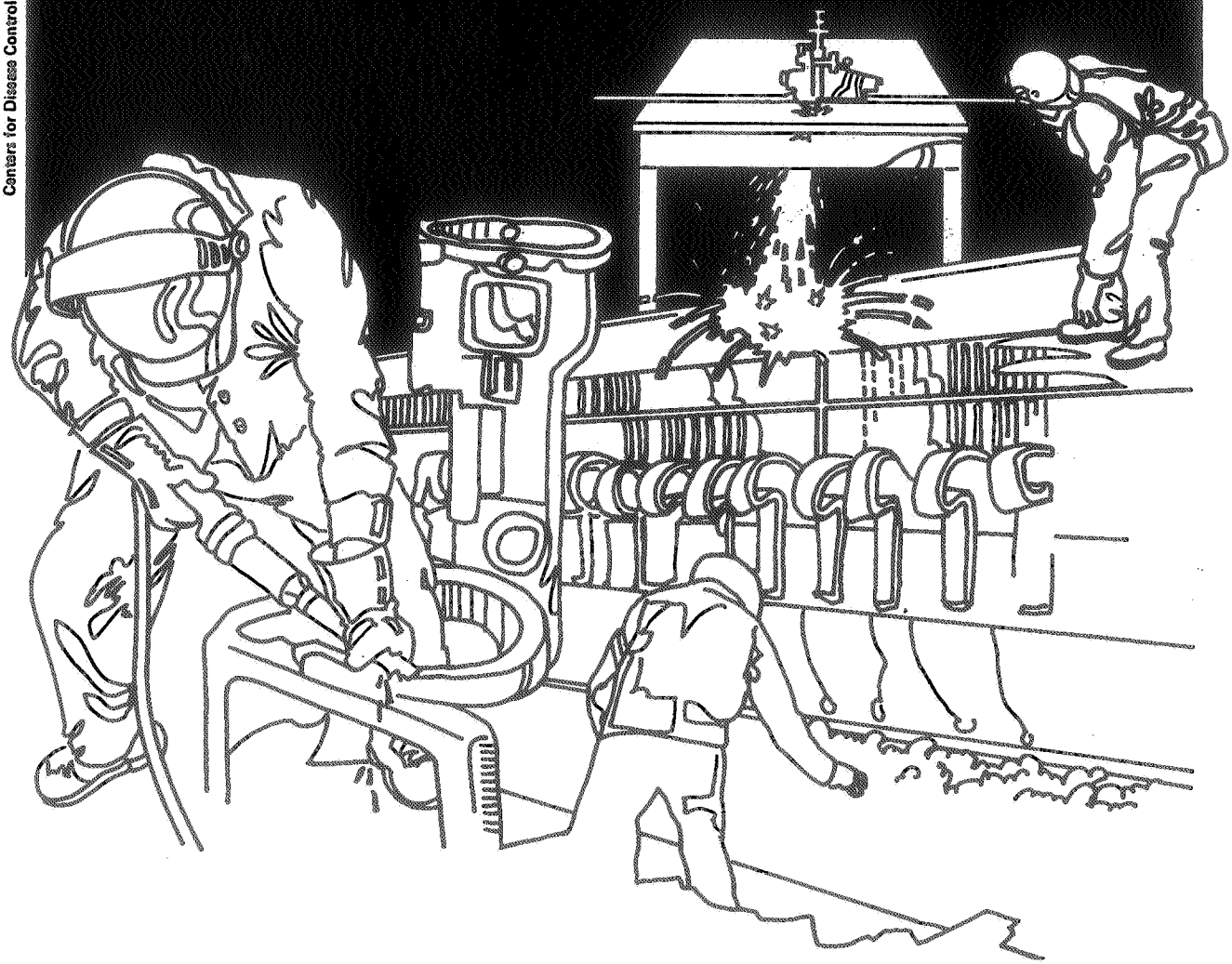

Health Hazard Evaluation Report

HETA 83-266-1391
MC COURT LABEL COMPANY
BRADFORD, PENNSYLVANIA

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.

HETA 83-266-1391
NOVEMBER 1983
MC COURT LABEL COMPANY
BRADFORD, PENNSYLVANIA

NIOSH INVESTIGATORS:
Raymond L. Ruhe

I. SUMMARY

In May 1983, the National Institute for Occupational Safety and Health (NIOSH) received a request to determine employee exposures to perchloroethylene, butyl alcohol, isopropyl alcohol, and 2-ethoxyethanol at McCourt Label Company, Bradford, Pennsylvania. On July 12 and 13, 1983, an industrial hygiene survey was conducted by NIOSH. Twenty six personal and eight area samples were collected to evaluate workers exposure to these compounds.

Airborne concentrations of perchloroethylene (2 personal and 4 area samples) ranged from 2.0 to 29 milligrams per cubic meter of air (mg/m^3) 8-hour time-weighted average (TWA). NIOSH recommends that it is prudent to handle perchloroethylene in the workplace as if it were a human carcinogen. Therefore, exposure to perchloroethylene should be reduced to the lowest feasible limit. Butyl alcohol concentrations for 24 personal and 4 area samples were all less than the detectable limit (0.01 mg/sample). Isopropyl alcohol concentrations for 24 personal and 4 area samples were all less than the detectable limit (0.01 mg/sample). Isopropyl alcohol concentrations for 24 personal and 4 area samples ranged from 4 to 148 mg/m^3 8-hour TWA. NIOSH recommends that the TWA exposure not to exceed 980 mg/m^3 with a ceiling limit of 1968 mg/m^3 for a 15-minute sample. 2-ethoxyethanol concentrations (22 samples) ranged from less than the detectable limit (0.10 mg/sample) to 17 mg/m^3. NIOSH recommends that 2-ethoxyethanol be regarded in the workplace as having the potential to cause adverse reproductive effects in male and female workers. The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) for 2-ethoxyethanol is 185 mg/m^3 with a notice of intended change to 19 mg/m^3.

Based on the environmental sample results and available toxicological information, NIOSH concludes that a potential health hazard to perchloroethylene did exist at the time of this survey on July 12 and 13, 1983. Recommendations to aid in providing safe and healthful working environment are presented in Section VII of this report.

KEYWORDS: SIC 2751 (Commercial Printing) perchloroethylene, butyl alcohol, isopropyl alcohol, and 2-ethoxyethanol.

II. INTRODUCTION

In May 1983, NIOSH received a request for technical assistance from the personnel manager of the McCourt Label Company in Bradford, Pennsylvania to evaluate employees exposures to solvents used in manufacturing of labels. An industrial hygiene survey was conducted on July 12 and 13, 1983.

McCourt Label Company is in the process of expanding their facilities. They wish to take precautionary measures to help insure their employees' health and safety when using solvents in the manufacturing of labels. They also wish to ascertain that they are within acceptable standards when using solvents to clean their printing presses.

III. BACKGROUND

McCourt Label Company has manufactured labels and prescription blanks for over 85 years. The most popular label is the pressure sensitive label used by pharmacies throughout the country. The Bradford Plant employs a total of 50 production employees, three shifts per day, five days per week and occupies a one-story building built in 1971. The building houses six presses with ventilation ducts located on the presses and exhausted to the roof.

The rolls of paper are loaded onto the press with a fork truck. The paper is fed into the press via a system of guide rollers which thread the paper through a series of printing units. The paper is printed using a standard letter press technique.

Many different oil and water base ink colors are used in the printing units for special color labels. These colors are applied separately by running the paper through a special series of printing units. Black printing ink is piped directly from bulk storage tanks to permanently installed ink fountains which are located in each printing unit. Colored inks are supplied to portable fountains by hand carried buckets. After printing, the paper feeds into the folder machine for final assembly.

IV. EVALUATION DESIGN AND METHODS

On July 12 and 13, 1983, the survey consisted of collecting personal area air samples for perchloroethylene on 150 mg activated charcoal sorbent tubes, using a vacuum pump operating at 0.05 liters per minute (LPM) and analyzed by NIOSH Method S-335.(1)

Personal and area samples for butyl alcohol, isopropyl alcohol and 2-ethoxyethanol were collected on 150 mg activated charcoal sorbent tubes, using a vacuum pump operating at 0.05 LPM and analyzed by NIOSH Method P&CAM 127.[1]

V. EVALUATION CRITERIA

A. Environmental Criteria

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 primary 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.

The criteria used for this evaluation are listed in Appendix A.

B. Toxic Effects

1. Perchloroethylene (tetrachloroethylene)

Perchloroethylene is a clear, colorless, nonflammable liquid with a characteristic odor. The odor is noticeable at 50 ppm, though after a short period it may become inconspicuous, thereby becoming an unreliable warning signal.
Acute exposure to perchloroethylene may cause central nervous system depression, hepatic injury, and anesthetic death. Cardiac arrhythmias and renal injury have been produced in animal experiments. Signs and symptoms of overexposure include melaise, dizziness, headache, increased perspiration, fatigue, staggering gait, and slowing of mental ability. These usually subside quickly upon removal into the open air.[2]

NIOSH Current Intelligence Bulletin #20 (CIB) recommends that it is prudent to handle perchloroethylene in the workplace as if it were a human carcinogen. The recommendation is based on a recent study by the National Cancer Institute (NCI) indicating that perchloroethylene causes liver cancer in laboratory mice.[3]

2. Butyl alcohol and isopropyl alcohol

These compounds have similar effects. Exposure may cause eye, nose, throat, and skin irritants, and such symptoms as lightheadedness, sleepiness, fatigue, slow reaction time, decreased ability to concentrate, and nausea. The alcohols can be absorbed through the skin.[2]

3. 2-ethoxyethanol (ethylene glycol ethyl ether)

Acute exposure to this compound results in narcosis, pulmonary edema, and severe kidney and liver damage. Symptoms from repeated overexposure to vapors are fatigue and lethargy, headache, nausea, and rexia, and tremor. Anemia and encephalopathy have been reported with ethylene glycol memomethyl ether. Acute poisoning by ingestion resembles ethylene glycol toxicity with death from renal failure.(4)

NIOSH Current Intelligence Bulletin #39 recommends that 2-ethoxyethanol be regarded in the workplace as having the potential to cause adverse reproductive effects in male and female workers. These recommendations are based on the results of several recent studies that have demonstrated dose-related embryotoxicity and other reproductive effects in several species of animals exposed by different routes of administration. Of particular concern are those studies in which exposure of pregnant animals to concentrations of 2-ethoxyethanol at or below their respective occupational safety and health administration (OSHA) permissible exposure limits (PEL) led to increased incidences of embryonic death, teratogenesis, or growth retardation. Exposure of male animals resulted in testicular atrophy and sterility. In each case, the animals had been exposed to 2-ethoxyethanol concentrations at or below the respective OSHA PEL. Therefore, appropriate controls should be instituted to minimize worker exposure to the compound. NIOSH suggests that producers, distributors, and users of 2-ethoxyethanol and of substances and materials containing 2-ethoxyethanol give this information to their workers and customers, and that professional and trade associations and unions inform their members.(5)

VI. RESULTS AND DISCUSSION

Results of the environmental samples for perchloroethylene, butyl alcohol, isopropyl alcohol and 2-ethoxyethanol and presented in Table I and II. Airborne concentrations of perchlorotethylene ranged from 2.0 to 29 mg/m^3 8-hour TWA. NIOSH recommends that it is prudent to handle perchloroethylene in the workplace as if it were a human carcinogen, therefore exposure to perchloroethylene should be reduced to the lowest feasible limit. Butyl alcohol concentrations were less than the detectable limit (0.01 mg/sample). Isopropyl alcohol concentrations ranged from 4 to 148 mg/m^3 8-hour TWA. NIOSH recommends that TWA exposure not to exceed 984 mg/m^3 with a ceiling limit of 1968 mg/m^3 for a 15 minute sample. 2 ethoxyethanol ranged from less than the detectable limit (0.10 mg/sample) to 17 mg/m^3 8-hour TWA. NIOSH recommends that 2-ethoxyethanol be regarded in the

workplace as having the potential to cause adverse reproductive effects in male and female workers. The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) for 2-ethyethanol is 185 mg/m^3 8-hour TWA with a notice of intended change to 19 mg/m^3 8-hour TWA. The TLV was lowered to prevent workers from being exposed to concentrations that had produced significant blood changes in laboratory animals.

Based on the environmental sample results and available toxicological information, NIOSH concludes that a potential health hazard to perchloroethylene did exist at the time of this survey on July 12 and 13, 1983.

VII. Recommendations

1. All local exhaust ventilation systems should be serviced regularly to ensure that they are operating at maximum efficiency.

2. An educational program should be instituted so that employees are made aware of the potential hazards associated with the chemicals used at McCourt Label Company.

3. All containers of perchloroethylene, butyl alcohol, isopropyl alcohol, and 2-ethoxyethanol should be properly labeled.

4. Good personal hygiene and good work practices should be observed by all employees: washing of hands before smoking, eating, and drinking will help reduce contamination.

5. Better housekeeping is needed throughout the press room. All chemical spills should be cleaned up immediately.

VIII. References

1. National Institute for Occupational Safety and Health. NIOSH manual of analytical methods. Vol 2, 2nd ed. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1977. (DHEW (NIOSH) publication no. 77-157-B).

2. National Institute for Occupational Safety and Health. Occupational diseases: a guide to their recognition. Revised ed. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1977. (DHEW (NIOSH) publication no. 77-181).

3. National Institute for Occupational Safety and Health. Current intelligence bulletin 22--ethylene thiourea. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1978. (DHHS (NIOSH) publication no. 78-144).

4. American Conference of Governmental Industrial Hygienists. Threshold limit values for chemical substances and physical agents in the workroom environment with intended changes for 1982. Cincinnati, Ohio: ACGIH, 1982.

5. National Institute for Occupational Safety and Health. Current intelligence bulletin 39--glycol ethers. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1983. (DHHS (NIOSH) publication no. 83-112).

IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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X. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. 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. Manager of McCourt Label Company
2. NIOSH, Region III
3. OSHA, Region III

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

APPENDIX A

Evaluation Criteria

McCourt Label Company
Bradford, Pennsylvania
HETA 83-266

July 13, 1983

	NIOSH Recommended Criteria TWA (mg/m^3)	OSHA Standards TWA (mg/m^3)	ACGIH TLV mg/m^3
Perchloroethylene	Lowest feasible limit* CIB #20	678	335
Butyl Alcohol	----	300	300
Isopropyl Alcohol	980	980	980
2-ethoxyethanol	CIB #39	740	19

* CIB - NIOSH Current Intelligence Bulletin

TABLE I

McCourt Label Company
Bradford, Pennsylvania
HETA 83-266

July 12, 1983

Job and/or location	Sample Period	Sample Volume (liters)	Type	Perchloro-ethylene mg/m^3*	Butyl Alcohol mg/m^3	Isopropyl Alcohol mg/m^3	2-ethoxyethanol mg/m^3
Pressman	0735-1200	14.4	PBZ**	---	LD***	10	LD
Pressman	1232-1530	8.8	PBZ	---	LD	4	LD
Pressman	0736-1200	14.8	PBZ	---	LD	25	LD
Pressman	1230-1500	6.2	PBZ	---	LD	61	LD
Pressmen	0741-1200	12.9	PBZ	---	LD	16	LD
Pressman	1230-1500	6.8	PBZ	---	LD	31	LD
Pressman	0743-1200	13.2	PBZ	---	LD	8	LD
Pressman	1234-1530	8.1	PBZ	---	LD	14	LD
Pressman	0745-1200	13.2	PBZ	---	LD	27	9
Pressman	1236-1527	8.3	PBZ	---	LD	17	LD
Pressman	0749-1200	14.0	PBZ	---	LD	60	11
Pressman	1235-1525	9.1	PBZ	---	LD	7	LD
Bindery	0900-1510	17.7	GA****	---	LD	12	LD
Bindery	0753-1510	19.8	GA	---	LD	11	LD
Plate Maker	0930-1415	13.5	PBZ	13	--	--	--
Plate Maker Room 1	0930-1415	15.8	GA	17	--	--	--
Plate Maker Room 2	0933-1415	14.5	GA	2	--	--	--
Environmental Criteria (mg/m^3)				lowest feasible limit	300	980	19
Limit of detection (mg/sample)					0.01	0.02	0.10

* mg/m^3 = Milligrams of substance per cubic meter of air samled
** PBZ = Personal breathing zone
*** LD = Less than limit of detection. The volume of adjusted lower limit of detection equals the analyte's lower limit of detection (mass per sample) divided by the air volume (cubic meter) sampled.
**** GA = General area

TABLE II

McCourt Label Company
Bradford, Pennsylvania
HETAB 83-266

July 13, 1983

Job and/or location	Sample Period	Sample Volume (liters)	Type	Perchloro-ethylene mg/m^3*	Butyl Alcohol mg/m^3	Isopropyl Alcohol mg/m^3	2-ethoxyethanol mg/m^3
Pressman	0734-1155	14.2	PBZ**	---	LD***	148	9
Pressman	1231-1526	9.1	PBZ	---	LD	43	LD
Pressman	0736-1159	13.8	PBZ	---	LD	80	11
Pressman	1232-1525	8.7	PBZ	---	LD	36	LD
Pressmen	0733-1200	12.9	PBZ	---	LD	19	8
Pressman	1233-1531	8.3	PBZ	---	LD	13	17
Pressman	0738-1202	13.3	PBZ	---	LD	22	LD
Pressman	1235-1520	8.0	PBZ	---	LD	15	15
Pressman	0740-1205	13.9	PBZ	---	LD	4	8
Pressman	1236-1530	8.7	PBZ	---	LD	14	15
Pressman	0741-1207	15.1	PBZ	---	LD	19	8
Pressman	1237-1527	9.3	PBZ	---	LD	26	12
Bindery	0742-1510	20.7	GA****	---	LD	8	LD
Bindery	0742-1510	22.1	GA	---	LD	9	LD
Plate Maker	0905-1405	14.5	PBZ	29	--	--	--
Plate Maker Room 1	0905-1405	17.8	GA	4.9	--	--	--
Plate Maker Room 2	0905-1405	15.9	GA	9.4	--	--	--
Environmental Criteria (mg/m^3)					300	980	19
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Pressman	1231-1526	9.1	PBZ	---	LD	43	LD
Pressman	0736-1159	13.8	PBZ	---	LD	80	11
Pressman	1232-1525	8.7	PBZ	---	LD	36	LD
Pressmen	0733-1200	12.9	PBZ	---	LD	19	8
Pressman	1233-1531	8.3	PBZ	---	LD	13	17
Pressman	0738-1202	13.3	PBZ	---	LD	22	LD
Pressman	1235-1520	8.0	PBZ	---	LD	15	15
Pressman	0740-1205	13.9	PBZ	---	LD	4	8
Pressman	1236-1530	8.7	PBZ	---	LD	14	15
Pressman	0741-1207	15.1	PBZ	---	LD	19	8
Pressman	1237-1527	9.3	PBZ	---	LD	26	12
Bindery	0742-1510	20.7	GA****	---	LD	8	LD
Bindery	0742-1510	22.1	GA	---	LD	9	LD
Plate Maker	0905-1405	14.5	PBZ	29	--	--	--
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