EGME coatings paper+glass

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 72-82-86

1973

UNIVERSAL OIL PRODUCTS
NORPLEX DIVISION
FRANKLIN, INDIANA
OCTOBER 1973

NTIS PB232562

I. TOXICITY DETERMINATION

It has been determined that acetone, methyl ethyl ketone, methyl cellosolve and toluene vapors found in the treater and compounding rooms are not toxic at the concentrations measured during this evaluation. This determination is based on documented low work-room concentrations of these organic vapors and the absence of significant symptomatology. Medical interviews revealed that an episode of employee "light headedness" occurred during a cleaning operation when large quantities of methyl ethyl ketone were used. During this episode employees did not follow the company policy of wearing organic vapor respirators. Adherence to the policy of wearing respirators during clean-up operations should be maintained to preclude exposures to high concentrations of methyl ethyl ketone. Current employee work practices coupled with the company's medical surveillance program appear to be capable of preventing development of serious occupational health problems.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of the Determination Report are available upon request from the Hazard Evaluation Services Branch (NIOSH), U.S. Post Office Building, Room 508, 5th and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

a) Universal Oil Products, Norplex Division, Franklin, Indiana
b) Authorized Representative of Employees
c) U.S. Department of Labor - Region V
d) State of Indiana Health Department
e) NIOSH - Region V

For the purposes of informing the affected employees, the employer will promptly "post" the Determination Report in a prominent place(s) near where exposed employees work 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 substances normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The National Institute for Occupational Safety and Health received such a request from an authorized representative of employees regarding exposures to solvents containing acetone, methyl ethyl ketone, toluene and methyl cellosolve in the treater rooms and compounding areas of the Universal Oil Products, Norplex Division, Franklin, Indiana.

IV. HEALTH HAZARD EVALUATION

A. Description of Process

In the treater and compounding rooms chemicals are metered, weighted, mixed and used in the coating of paper or fiber glass cloth. Those chemicals utilized in large quantities are hanndled entirely by automatic means. Substances used in smaller amounts, including some solvents, hardeners, flame retardents, catalysts, etc. are manually weighted prior to their addition to the main mixing and holding containers. After formulation, resin is pumped directly from storage to the holding wells of the treater machine through which the paper or fabric is continously passed. After removal of excess resin, the coated material passes into a fully enclosed dryer and emerges in a semi-cured state. The application of resin to paper or fiber glass is automated and appears to be adequately ventilated. Chemical exposures are largely related to vapors escaping into the environment of the compounding and treater rooms during compound formulation and to vapors from resin holding wells and rollers removing excess resin.

B. Evaluation Design

A preliminary observational survey of the treater and compounding rooms was made on November 16, 1972 to assess the alleged hazard. During this visit air sampling tubes containing activated charcoal were saturated with airborne solvent vapors and liquid bulk samples were obtained. The saturated charcoal tubes were analyzed and found to contain acetone, methyl ethyl ketone, toluene, methyl cellosolve, dimethylformamide and traces of isopropyl alcohol. The multitude of substances found in the saturated air samples and the need for medical support to adequately evaluate this request precipitated a follow-up environmental/medical evaluation.

On May 15-18, 1973 an environmental/medical evaluation was conducted. As the number of exposed employees per shift was small, it was decided to monitor all treater room operators from each shift and to collect general room samples in the compounding room and adjacent areas. A total of nine personal breathing zone and eight general room air samples were collected. The average length of employee exposure per shift was seven hours. Medical interviews with monitored individuals were conducted in an attempt to elicit any symptoms occurring during the sampling period.

C. Evalution Methods

Employee exposures to acetone, methyl ethyl ketone, toluene and methyl cellosolve vapors were monitored with personal air sampling equipment. The solvents were collected in activated charcoal air sampling tubes. The charcoal tubes were analyzed at NIOSH's Cincinnati laboratories by the gas chromatographic techniques report by White et al[1]. The gas chromatographic procedure was modified to accommodate specific solvents previously mentioned.

Private medical interviews were performed on monitored personnel toward the end of each work shift to elicit health complaints and general information regarding working conditions.

D. Evaluation Criteria

The occupational health standards promulgated by the U.S. Department of Labor (Federal Register, October 18, 1972, Title 29, Chapter XVII, Subpart G, Tables G-1 and G-2) applicable to individual substances of this evaluation are as follows:

Substances	8-hour time-weighted-average ppm*
Acetone	1000
Methyl ethyl ketone	200
Methyl cellosolve	25
Toluene	200

Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm Hg pressure.

Occupational health standards for individual substances are established at levels designed to protect workers occupationally exposed on an 8-hour per day, 40 hours per week basis over a normal working life time.

E. Evaluation Results and Discussions

1. Environmental

Results of environmental sampling together with medical symptoms are contained in Table I. Time-weighted-average employee exposures ranged as follows:

Acetone	2.3 to 33.1 ppm
Methyl ethyl ketone	1.6 to 90.6 ppm
Methyl cellosolve	0 to 11.3 ppm
Toluene	0.7 to 13.9 ppm

The time-weighted-average general room concentrations ranged as follows:

Acetone	3.3 to 24.7 ppm
Methyl ethyl ketone	2.5 to 29.5 ppm
Methyl cellosolve	0.7 to 9.0 ppm
Toluene	2.2 to 18.1 ppm

When two or more hazardous substances are present, their combined effect rather than that of either individually, should be given consideration. In the absence of information to the contrary, the effects of different hazards should be considered additive.[2] The sum of the fractions, concentration over occupational health standard for each substance $\left(C_1/T_1 + C_2/T_2 + C_3/T_3 + \ldots + C_n/T_n\right)$ should not exceed unity. Using the previously mentioned relationship, no employee was found to have a significant $(C_1/T_1 + \ldots + C_n/T_n > 1)$ exposure to this mixture of solvents.

2. Medical

Nine men who work in the treater rooms and two work in the compounding room were interviewed during or at the end of the work shift. Each interview was begun in a non-directed manner to elicit health complaints and general information regarding working conditions. Afterward each man was specifically questioned regarding the following symptoms: dermatitis; eye burning, itching or tearing; nose and throat irritation; weakness; fatigue; drowsiness; sleeplessness; headache; unsteadiness; nausea and vomiting; weight loss; forgetfulness; personality changes; incoordination; tremor; and tingling of the arms or fingers.

All questions failed to elicit any positive response with the following exceptions. Two individuals gave histories consistent with fiber glass dermatitis which occurred when they first started working with the material. Neither was symptomatic during this evaluation. These are examples of the well known ability of the skin to "harden" on repeated contact with fiber glass. Resin 925, a phenolic resin, was also mentioned by two as being a past cause of irritant dermatitis, but both noted that skin cleansing prevented the problem.

No other symptoms were elicited which could be in any way attributed to the work environment. The plant physician was queried regarding the results of the periodic hematology examinations and liver function tests. All biological tests to date have been entirely within normal limits. Three individuals had noted a past episode of "light headedness" when cleaning with large amounts of methyl ethyl ketone. During this episode the employees were not following the company policy of wearing organic respirators. The symptoms were rapidly eliminated by spending a few minutes outside the immediate work area. Adherence to this company policy should be maintained to preclude exposure to high concentration of methyl ethyl ketone vapor while cleaning.

Based on the absence of medical symptomatology and the low concentration of vapors (see Table No. 1) found in the treater and compounding rooms at the time of this survey it has been judged that the concentrations found are not toxic to employees.

V. REFERENCES

1. White, W.D., D.B. Taylor, P.A. Mauer and R.E. Kupel. "A Convenient Optimized Method for the Analysis of Selected Vapors in the Industrial Atmosphere." Am. Ind. Hyg. Assoc. J. Vol 31, 225-227 March-April 1970.

2. Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1972. Appendix C, p. 40.

VI. AUTHORSHIP AND ACKNOWLEDGMENTS

Report Prepared By : Henry Ramos, Industrial Hygienist
Hazard Evaluation Services Branch
Cincinnati, Ohio

James B. Lucas, M.D.
Medical Services Branch
Cincinnati, Ohio

Originating Office : Jerome P. Flesch, Chief
Hazard Evaluation Services Branch
Cincinnati, Ohio

Acknowlegments

Environmental Evaluation : Melvin T. Eddleston, Industrial Hygienist
Hazard Evaluation Services Branch

Robert E. Rosensteel, Industrial Hygienist
Hazard Evaluation Services Branch

Medical Evaluation : James B. Lucas, M.D.
Medical Services Branch

Laboratory Analysis : Robert W. Kurimo
Division of Laboratories & Criteria Development

TABLE NO. 1

Summary of Environmental and Medical Results Obtained at
Universal Oil Products
Norplex Division
Franklin, Indiana
May 15-17, 1973

Type of Sample	Workshift TWA Exposure in PPM[a]					
	Acetone	Methyl ethyl ketone	Toluene	Methyl cellosolve	Combined exposure weighting	Exposure Symptoms
May 15-4 to 12 PM						
Treater No. 1	24.6	3.4	6.7	ND[b]	0.07	ND[b]
" " 2	14.3	1.6	0.7	ND	0.25	ND
" " 3	2.4	2.2	1.3	ND	0.02	ND
General Room #1	3.7	10.2	4.3	0.7	0.07	
" " #2	3.3	3.6	2.2	6.4	0.29	
" " #3	4.8	2.5	5.9	4.5	0.22	
May 16-8 to 4 PM						
Treater No. 4	4.8	16.5	1.6	5.3	0.33	ND
" " 5	33.1	90.6	4.5	11.3	0.96[c]	ND
" " 6	5.9	9.5	2.6	3.2	0.60	ND
General Room #4	10.4	16.6	2.9	2.1	0.19	
" " #5	21.0	26.0	3.4	9.0	0.52	
" " #6	5.3	19.5	46.6	4.8	0.52	
May 17-12 to 8 AM						
Treater No. 7	21.0	5.6	13.9	10.6	0.54	ND
" " 8	6.3	2.5	1.4	3.5	0.16	ND
" " 9	2.3	2.3	11.5	2.6	0.17	ND
General Room #7	24.7	3.5	3.1	7.0	0.45	
" " #8	3.4	29.5	118.1	4.3	0.91[c]	

a PPM = Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm Hg pressure.

b = None detected

c = Minimum concentration, charcoal tube overloaded

Federal Standards:

Acetone	1000 PPM
Methyl ethyl ketone	200 PPM
Toluene	200 PPM
Methyl cellosolve	25 PPM
Combined exposure	1.0