

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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 73-169-122

PACIFIC MOULDED PRODUCTS COMPANY
LOS ANGELES, CALIF. 90001
MARCH 1974

I. TOXICITY DETERMINATION

It has been determined that methyl ethyl ketone, xylene, toluene, and petroleum naphtha vapors from a silicone rubber dispersion ("silicone vulcanizer") are not toxic at the concentrations measured within the spray room area during normal operating conditions. This determination is based upon environmental measurements in the workplace, analysis of work practices, employee interviews and on available literature regarding the toxicities of these solvents. During the day of the evaluation (December 12, 1973) no significant symptoms were reported by employees and levels of methyl ethyl ketone, xylene, toluene, and petroleum naphtha were found to be below levels believed to be toxic to employees.

Recommendations are included in this determination which are designed to keep employee exposures to these solvents to a minimum.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this 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) Pacific Moulded Products Co., Los Angeles, California
- b) Authorized Representative of Employees
- c) U.S. Department of Labor - Region IX
- d) NIOSH - Region IX

For purposes of informing the approximately 4 "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 substance 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 (NIOSH) received such a request from an authorized representative of employees regarding exposure to "silicone vulcanizer" paint spray at the Pacific Moulded Products Company, Los Angeles, California.

IV. HEALTH HAZARD EVALUATION

The Pacific Moulded Products Company is involved in the mechanical production of numerous rubber products. An evaluation of the spray room where pre-molded silicone rubber gaskets for aircraft windows are painted was requested by the authorized representative of employees. Representatives of the company call the special paint mixture "silicone vulcanizer." The spraying operation is not continuous but is operated about two days a week dependent upon the demands of the aircraft industry. Two employees are responsible for the operation at any given time. Approximately 4 workers are qualified to operate the spray room.

B. Worksite Evaluation

On December 5, 1973, NIOSH investigator Melvin T. Okawa conducted an opening conference with representatives of management and labor as an introduction to the worksite evaluation. A scheduling conflict prevented the evaluation of the process in operation and a follow-up visit was planned. However, a preliminary survey of the spray room was accomplished and information about work practices and data concerning the potentially toxic compounds contained in "silicone vulcanizer" was obtained.

Silicone rubber gaskets are wiped by one employee with a rag soaked in methyl ethyl ketone (MEK). The employee wears protective gloves while handling the rags and the MEK is dispensed from small safety cans. The employee then hands the gasket to a second worker inside the spray room who sprays it with "silicone vulcanizer" for about 20 - 30 seconds. This employee hands the gasket back to the first one who hangs it on a drying line. During a normal day, 100 - 150 gaskets can be processed.

The spray room measures 10 by 12 feet and is equipped with a small window exhaust fan. The gaskets are sprayed over a barrel which is connected to a duct and a fan. The capture velocity of the system

at the face of the screen located on top of the barrel was 50 - 75 linear feet per minute. The employee wears an organic vapor respirator while in the spray room. Both workers alternate spraying and cleaning jobs throughout the day.

The engineering control measures are not very sophisticated, and if process changes are planned, modifications in the system may be necessary. The silicone itself used in the coating is not very toxic. The coating is called a dispersion by the manufacturer (Dow Corning). The type of solvent used to thin the dispersion and prevent it from setting as a solid mass prematurely is the source of any potential health hazard associated with the use of the dispersion. Suitable thinners are petroleum naphtha, xylene, toluene, and perchloroethylene. The management of the company was under the impression that the thinner was petroleum naphtha which is much less toxic than the other solvents. More toxic solvents require better control measures. The dispersion is mixed with a standard white pigment paint prior to the spraying operation.

On December 12, 1973, Mr. Okawa conducted an environmental evaluation for solvents in the work atmosphere of the spray room area. In conjunction with the sampling, three employees were interviewed in a non-directed manner.

C. Evaluation Methods

1. Solvent Vapor Air Sampling

Employee exposures to solvent vapors were measured via personal air sampling equipment. Breathing zone air samples were obtained using charcoal air sampling tubes. Charcoal tubes were sent to Salt Lake City and analyzed by the gas chromatographic method reported by White et al.¹ A bulk sample of the paint mixture was also analyzed.

2. Employee Interviews

Employees were asked non-directed questions regarding work related and non-work related health problems.

D. Evaluation Criteria

Evaluation of employee exposures to the silicone rubber dispersion is dependent upon the specific solvent(s) being used as the thinner. Evaluation for petroleum naphtha is complicated by the fact that it is not a discreet substance but a mixture of aliphatic and aromatic hydrocarbons. As such, no standard for petroleum naphtha has been established, and consequently, the content of benzene, other aromatics and additives should be determined to arrive at an appropriate standard. The standard for human exposure to methyl ethyl ketone has

been established at 200 ppm (parts of vapor or gas per million parts of contaminated air by volume) based on a time-weighted average for an eight-hour day. Established standards for xylene and toluene are 100 ppm each.

E. Evaluation Results

1. Solvent Vapor Air Sampling

Six breathing zone samples from the sprayer were collected and analyzed. Petroleum naphtha was not present in any of the samples. Xylene and perchloroethylene were also not detected and only a trace of toluene (1 - 4 ppm) was present in the samples. The major chemical was methyl ethyl ketone which ranged from 23 - 63 ppm in the samples. Although the dispersion is not supposed to contain MEK, an analysis of the bulk sample indicated three different compounds: 3% xylene, 2.3% toluene, and 13% MEK. The same bulk sample analysis showed that the dispersion did not contain benzene, petroleum naphtha, perchloroethylene, or trichloroethylene. Three breathing zone samples from the employee cleaning gaskets were collected and analyzed. Only MEK was detected and the concentrations in the three samples were 79, 132, and 134 ppm. These values for MEK are below the level believed to cause adverse effects in workers.

2. Employee Interviews

Both employees responsible for the spray room operation were interviewed. Neither employee related any adverse effects from working in the spray room. It is noted, however, that both of them are relatively new to this operation. One other employee who had previously worked in the spray room was interviewed. This employee reported an instance where she had lost her voice after working in the spray room. Since this one episode, she has not worked in the spray room. This effect would be considered unusual but in high enough levels, certain solvents such as MEK can irritate the throat.² The environmental conditions at the time of this employee's exposure could not be determined.

V. RECOMMENDATIONS

To maintain employee exposure to solvents at a minimum in the spray room area, the following recommendations are made:

1. Local exhaust ventilation for the spraying operation should be improved by increasing the capture velocity of the system to 100 linear feet per minute.
2. The system (spray barrel) should be moved closer to the window exhaust fan and the employee should spray facing the fan at all times.

3. Respirators should be properly maintained and employees instructed in the correct use of the respirators.
4. General dilution ventilation should be improved in the area where gaskets are cleaned with MEK or some type of local exhaust ventilation should be installed.

VI. REFERENCES

1. White, W.D., D.B. Taylor, P.A. Mauer and R.E. Kupel. "A Convenient Optimized Method for the Analysis of Selected Solvent Vapors in the Industrial Atmosphere," Am. Ind. Hyg. Assoc. J., Vol. 31, March-April, 1970.
2. Patty, F.A., editor: Industrial Hygiene And Toxicology, Vol. II, Interscience Publishers, p 1733, 1963.

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