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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 74-53-179



CONTAINER CORPORATION OF AMERICA
PIQUA, OHIO
MARCH 1975

## I. TOXICITY DETERMINATION

It has been determined that the exposures of workers to methyl methacrylate vapors during mixing and molding of liquid resin and to dust generated when machining the hardened resin were not toxic under conditions of use at the time of the investigation on July 11, 1974. There was a suggestion of past toxic exposure in the mixing and molding process as evidenced by the reported swelling of one worker's face. There was also evidence that there had been toxic exposures from dust generated during sawing and grinding the hardened resin. This evidence consisted of reports of dermatitis which cleared on cessation of exposure. Workers involved in mixing, molding, and machining the resin at the time of investigation had no complaints or symptoms. This determination is based upon (1) physical inspection of the workplace, (2) medical histories of workers, and (3) medical examination of workers' exposed skin.

## 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) Container Corporation of America, Piqua, Ohio
b) Authorized Representative of Employees
c) U.S. Department of Labor - Region V
d) NIOSH - Region V

For the purposes of informing the approximately 14 "affected employees", the employer shall 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 received such a request from an authorized representative of employees regarding exposure of employees during the sawing, grinding, and polishing of container lids mounted in plastic in preparation for quality control examination.

The request alleged a worker was seeing a specialist for a rash and possibly cancer which was thought to be associated with the plastic dust.

## IV. HEALTH HAZARD EVALUATION

### A. Plant Process - Conditions of Use

The plant manufactures composite fiber cans and tubes which have metal lids and bottoms used to package a variety of ready to use products. The operation under investigation involves the preparation of can lids for quality control examination by embedding the lids in a translucent plastic. The plastic is prepared by combining two parts of a powder to one part of liquid in a small fiber can and mixing with a wooden spatula for about two minutes. This resin is then poured under and over the metallographic specimen, usually a stack of can lids, contained in another small can and allowed to harden. These steps of the sample preparation are performed in the quality control laboratory under a hood.

The stock of can lids is then cross sectioned with a band saw and the cut edge polished on a grinding wheel permitting the cut section to be examined for conformance with specifications. The liquid used in the two part mix is methyl methacrylate and these vapors may be evolved during mixing. Plastic dust is produced from cutting, grinding, and polishing of the specimen and may come into direct skin contact with workers' arms and chest.

### B. Evaluation Design

The work areas in which samples are prepared were inspected on July 11, 1974 by a NIOSH physician and industrial hygienist, and workers described the actual operations which they performed while preparing specimens. Five persons were identified as having worked with the resin system. All were interviewed regarding any medical problems with its use utilizing an undirected questionnaire. As the composition of this resin was unknown prior to the visit, the interview was not directed towards any particular symptoms. Previously the dermatologist who had been caring for one of the workers had been contacted.

### C. Evaluation Results and Discussion

#### 1. Medical Criteria

The initial mixing of the methyl methacrylate resin may produce a strong, nauseating odor if vapors are uncontrolled. In the cutting and particularly the grinding of the hardened plastic, "a certain amount of swarf is produced which may be irritant to the skin or which may enter the eyes."[1] Other problems which have been associated with exposure to methyl methacrylate vapors are vasodilation and hypotension on an acute basis and neurasthenia symptoms, anemia and liver changes on a chronic basis.

The question of cancer was raised in the hazard evaluation request. Methyl methacrylate as a chemical has not proved to cause cancer.[2] Large, smooth plastic prostheses which have been implanted into the body do carry a certain risk of cancer developing in 10 or more years. Although methyl methacrylate prostheses carry this risk, it is their shape and not the methyl methacrylate which causes the risk. As the exposure here is completely different from the use of a medical prosthesis, no cancer hazard should exist.

2. Medical Findings

a. Mixing and Molding

About six months prior to the NIOSH investigation there appears to have been some problems with the methyl methacrylate vapors from the molding process. Complaints at that time involved the nauseating odor as reported by workers in the vicinity and a swelling of the face as reported by the individual working directly with the substance. Since the mixing and molding steps were moved into the laboratory and performed under the hood, the two workers currently doing these steps have no complaints.

b. Machining

The two maintenance workers who had been machining the mounted lids gave histories of skin irritation particularly on arms and chest where one might expect them to be exposed to any dust thrown off from the processing. For one this was particularly severe requiring the care of a dermatologist. Cessation of exposure was followed by a clearing of the dermatitis. The two maintenance workers are no longer performing this job and are no longer having this problem. The supervisor currently doing this job has no complaints.

3. Environmental Findings

Observation of the mix area revealed an overhead hood with a fan vented directly to the outside. No provision for makeup air into this laboratory space had been made. Subsequent discussion revealed that one worker keeps the door open which allows the exhaust to operate effectively. Vapors during mixing cause no unusual response with the fan operating and the door open in this worker's experience.

4. Conclusions

a. Currently there is no toxic exposure to the methyl methacrylate vapors or hardened resin as evidenced by a lack of complaints on the part of the two persons who still work with this material. Chronic problems are unlikely due to its infrequent use.

b. There is evidence that there has been a toxic exposure to the methyl methacrylate resin in the past, primarily in sawing and grinding the hardened resin. This evidence consisted of reports of dermatitis which cleared on cessation of exposure. Two out of the three persons who have cut the resin were affected. Also there is the suggestion of past toxic exposure in the molding process as evidenced by the reported swelling of one worker's face.

D. Recommendation

1. Provide makeup air when the laboratory hood fan is operating. A louvered door may be sufficient for this purpose.

## V. REFERENCES

1. Encyclopedia of Occupational Health and Safety, International Labour Office, McGraw-Hill, New York, N. Y., 1972, page 36.

2. Bischoff, F., Organic Polymer Biocompatibility and Toxicology, Clinical Chemistry, 18:869-894, 1972.

## VI. AUTHORSHIP AND ACKNOWLEDGMENTS

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