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

HEALTH HAZARD EVALUATION DETERMINATION  
REPORT NO. 74-84-188

COSMO PLASTICS COMPANY  
FREDERICKSBURG, OHIO  
APRIL 1975

I. TOXICITY DETERMINATION

A medical evaluation was conducted on November 13, 1974 concerning employee exposure to fibrous glass during molding and regrinding of nylon resin reinforced with fibrous glass. It was concluded based upon the results of medical interviews and limited cutaneous examinations of employees by the investigating dermatologist that a very minor fibrous glass dermatitis problem has periodically occurred at Cosmo Plastics Company. In all affected workers interviewed the dermatitis has been comparatively minor in nature. No evidence was obtained suggesting that any serious occupational health problems were occurring within this plant. Medical recommendations have been made in the report to further control dermatitis associated with fibrous glass in this plant.

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) Cosmo Plastics, Fredericksburg, 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 25 "affected employees" the employer shall "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 workers to fibrous glass.

The request alleged that machine operators were experiencing skin irritation and swelling of the eyes associated with exposure to fibrous glass.

#### IV. HEALTH HAZARD EVALUATION

##### A. Plant Process - Conditions of Use

Cosmo Plastics produces small bobbins or coil forms used in the production of electric transformers for small appliances and fluorescent light ballasts. A large number are also used by the vending machine industry. No actual coil winding is performed in the plant. The coils are manufactured utilizing electrically heated reciprocating screw injection molding machines. Nylon, polyethylene, and polypropylene plastics are the raw materials. Two varieties of nylon are reinforced with approximately 30 percent fibrous glass. The various resins are received at the plant in drums in a pelletized form. These are pneumatically conveyed from storage drums into the surge bin of the molding machine. Trim is manually cut from the molded coil and recycled with new resins after it is reground. Each piece of trim is manually deposited into the regrind machine. During this step in the process the operator is exposed to freshly ground rough pieces of plastic which may impinge upon the skin of the hand depositing the trim. Approximately once each shift, but on some occasions more frequently, the mold heads are cleaned with a rag saturated with a small amount of solvent identified as chloroethene. This solvent is distributed by the Rex Oil and Chemical Company, Cleveland, Ohio and later identified as 1,1,1-trichloroethane. Not more than a few ounces per day are utilized in the entire plant.

##### B. Evaluation Design

Medical interviews and, where indicated, limited cutaneous examinations of workers potentially exposed to fibrous glass were conducted.

##### C. Brief Discussion of the Known Pathophysiologic Effects of Suspected Agent

Fibrous glass is currently incorporated into an extremely wide range of plastic resin systems utilized in today's modern technologies. Fibrous glass fiber diameters can be varied within close tolerances during manufacture and usually range from .00012 to .004 inches depending upon the characteristics needed in the eventual application or product. This variation in diameter is important since it has been shown that fibers less than .00018 inches do not irritate human skin, while fibers

with diameters greater than .00021 inches commonly do so. Apparently fine fibers lack the rigidity to penetrate the skin surface. While nearly all glass fibers, regardless of their ultimate use, are coated with various binders, lubricants or coupling agents, no component of allergic sensitization has yet been demonstrated in fibrous glass dermatitis. This is probably due to the fact that the resin systems are usually in a fully cured state prior to human exposure. Clinically, fibrous glass produces a miliarial eruption with tiny red papules. Generally, the itching is intense and is usually entirely out of proportion with the objective findings. Secondary lesions from scratching are usually evident. Fortunately, superficial infections are rarely observed. In the vast majority of employees exposed to fibrous glass, the discomfort or dermatitis is relatively mild and quickly abates as "hardening" occurs. "Hardening" to fibrous glass will occur in almost all employees who have any degree of continuous exposure. This phenomenon, however, is not seen where only an intermittent or episodic type exposure occurs. Glass fibers, once airborne, may also result in eye and upper respiratory tract irritation. Despite a large amount of conjecture and study, there is as yet no definite evidence that the inhalation of fibrous glass can result in pneumoconiosis, lung cancer or other pulmonary problems. However, since occasional case reports of these conditions in association with fibrous glass have been reported in the medical literature, this agency is continuing to pursue long-term follow-up studies in those industries where large amounts of fibrous glass are utilized.

In view of the very limited amount of 1,1,1-trichloroethane utilized and its relatively innocuous nature the substance was judged to present absolutely no realistic hazard to employees. Therefore, its toxic properties will not be discussed.

#### D. Medical Investigation and Results

##### 1. Medical Results

A total of fifteen employees were interviewed and, where indicated, limited cutaneous examinations performed. All but three employees were women. The average age was 36 (range 19 to 54). The average duration of employment with Cosmo Plastics was 19 months. Almost all of these individuals had spent their entire employment period in essentially the same job classification. Of the 15 employees, eight had no job related complaints whatsoever. The remaining seven employees related one or more instances of either itching or dermatitis which they attributed to exposure to fibrous glass contained in either of the two fibrous glass reinforced nylon plastics. Of these seven cases, only three related what would be considered as typical histories of fibrous glass dermatitis. In these instances, itching of the exposed surfaces of the arms and face, lasting for several days, was reported. In general, these episodes were considered by the employees to be minor in nature and none had sought medical attention for these problems. The other four cases are somewhat atypical in that they usually involve only the hand or arm which was used to feed trim material into the regrind apparatus. These individuals described the

immediate onset of itching, tenderness, and burning when feeding the grinder. In contrast with typical fibrous glass dermatitis, these symptoms usually abated within minutes of stopping work. It seems quite likely that these cases are related to skin trauma from the impingement of irregularly shaped reground plastic particles upon the skin rather than actual fibrous glass dermatitis in which glass fibers actually penetrate into the skin. Again all these cases were classed by the employees as being minor in nature. One employee who was hospitalized at the time of our survey was followed up via contact with her personal physician. It was his opinion that there was no connection between the nature of her current illness and her employment. A bulk sample of fibrous glass containing nylon pellets were dissolved in formic acid and examined microscopically. This revealed numerous spicules of fibrous glass of varying length and of a completely uniform diameter. This diameter was measured as being approximately 20 microns (0.00078 inch). This diameter fiber is considered to have a high potential for skin irritation.

## 2. Summary of Investigation

Only three of fifteen employees interviewed were found to have medical histories compatible with one or more episodes of true fibrous glass dermatitis. All of these episodes were considered to be minor in nature, none requiring medical attention. These instances were sporadic and were associated with the occasional use of fibrous glass reinforced nylon resin. Another group of four employees were identified as those who reported irritation essentially limited to the hands which were used to feed the regrind hoppers. Again, in this instance, the problem appeared to be associated with the regrinding of fibrous glass reinforced nylon. It is probable that this group of cases is traumatic in origin and probably due to the increased rigidity and irregularity of reground particles reaching the hand.

## 3. Conclusions

It is concluded that a very minor fibrous glass dermatitis problem has periodically occurred at Cosmo Plastics Company. In all instances the dermatitis was minor in nature. No evidence was obtained suggesting that any serious occupational health problems were occurring within this plant.

## E. Medical Recommendations

1. It was noted during this survey that more than half of the employees interviewed had never experienced any episodes of fibrous glass itch or dermatitis. The fact that many of these totally asymptomatic employees had worked in an identical manner with materials that produced symptoms in others points out the importance of individual susceptibility to this condition. In view of this, it is suggested that when lots of fibrous glass reinforced nylon are to be run, those employees

who have not experienced problems in the past be selected to manufacture and handle these materials. This should not cause unusual problems since administrative rotation of machine operators is commonly practiced, although usually at weekly intervals, in this plant setting.

2. Employees should be instructed to wash off exposed skin surfaces with copious amounts of cool water following exposure to fibrous glass containing materials. Several employees noted that bathing immediately after work substantially reduced or totally eliminated their problem.

3. Employees should be requested to wear loose fitting garments when contact with fibrous glass containing resins is anticipated. Tight fitting clothing such as collars and cuffs encourages the entrapment of any airborne fibrous glass spicules that may be generated during the grinding operation.

4. Persons complaining of hand irritation from the irregularly shaped fibrous glass spicules generated by the grinder are more difficult to protect since the wearing of gloves might engender a significant safety problem. It is suggested that these employees be provided with a barrier cream such as Ply No. 9 or No. 2 (The Milburn Co.) since these barrier creams or "liquid gloves" may provide some protection against this type of trauma.

V. AUTHORSHIP AND ACKNOWLEDGEMENTS

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