

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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 74-96-173

RICHDEL CORPORATION
CARSON CITY, NEVADA
FEBRUARY 1975

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I. TOXICITY DETERMINATION

It has been determined that a potential health hazard exists in the Re grind Room from vinyl chloride gas at the concentrations measured during normal operating conditions. This determination is based upon environmental measurements obtained on August 12 and October 14, 1974, analysis of work practices, and on available information regarding the toxicity of vinyl chloride. It has also been determined that a potential health hazard may exist in the injection molding areas although this determination could not be conclusively made. It is based on the fact that the majority of environmental measurements (17 out of 20) showed undetectable levels but the remaining three samples showed levels exactly at the lower limit of detection (0.2 ppm) for the method used and the fact that NIOSH rejected the concept of a threshold limit for vinyl chloride gas since there is probably no threshold for carcinogenesis.

It has been determined that trichloroethylene is not toxic at the concentrations measured at the degreasing operation. This determination is based upon environmental measurements, an interview conducted with the affected employee, and an analysis of work practices.

NIOSH recommends that the employer reduce airborne concentrations of vinyl chloride to levels not detectable by the recommended method, and that any employee who is exposed to measurable concentrations of vinyl chloride shall wear an air supplied respirator or other appropriate respirator approved by NIOSH for such use.

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) Richdel Corporation, Carson City, Nevada
- b) U.S. Department of Labor - Region IX
- c) NIOSH - Region IX

For purposes of informing the approximately 10 "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 an employer regarding exposure of employees to vinyl chloride and trichloroethylene vapors at the Richdel Corporation plant in Carson City, Nevada.

IV. HEALTH HAZARD EVALUATION

A. Introduction

The Richdel Corporation produces control devices for automatic lawn sprinkler systems. The internal valves of the control boxes are made of polyvinyl chloride (PVC) and are molded via a process call screw injection molding of angle body parts. An evaluation of the injection molding areas and a trichloroethylene (TCE) degreaser was requested by a representative of management.

B. Plant Process - Conditions of Use

On August 12, 1974, NIOSH investigator Melvin T. Okawa conducted a conference with a representative of management as an introduction to the hazard evaluation. A preliminary walk-through survey of the PVC molding and the TCE degreaser areas was performed.

Two similar injection molding areas are separated by a wall and an open door. Each area is about 400 square feet and contains three injection molding machines which are located in close proximity to each other. Raw PVC pellets are placed in a hopper on a machine and by heat extrusion (injection) are molded into the desired part. PVC is not run exclusively and other plasticizers are also molded. Three to four employees work in each injection molding area. One utility man is responsible for keeping the hoppers full of raw PVC. This worker also relieves on the injection molding machines and regrinds defective parts which are recycled with the raw PVC. The grinding operation is conducted in a small room and may run for a total of one day per week. The grinding machine is not equipped with local exhaust ventilation. The injection molding machines themselves are not equipped with local exhaust ventilation but are located in areas which are not enclosed but are sections of the entire plant.

A small degreaser is located in a different section of the plant away from the molding areas as part of a deburring operation. The company has its own automatic screw machine operation. The screw machine products are deburred and cleaned in a small degreaser which contains TCE. The degreaser is positioned under a canopy hood and is run irregularly for a total of 1-2 days per week. A single employee is responsible for the operation. He places a tray of parts inside one section of the degreaser and sprays TCE in the tray for about 5 seconds with a nozzle. The lid is closed and the tray is left for about 5 minutes, removed and placed in a second compartment and dried for another 5 minutes. The worker's total exposure to TCE during any sequence seems to be about 1-2 minutes. In one hour, 5 or 6 trays of parts may be cleaned.

C. Evaluation Criteria

Vinyl chloride is now suspected as being an etiological agent in the development of angiosarcoma of the liver. Based on theoretical considerations, as stated in NIOSH's Recommended Standard for Occupational Exposure to Vinyl Chloride, "there is probably no threshold for carcinogenesis although it is possible that with very low concentrations, the latency period might be extended beyond the life expectancy. In view of these considerations and NIOSH's inability to describe a safe exposure level as required in section 20(a) (3) of the Occupational Safety and Health Act, the concept of a threshold limit for vinyl chloride gas in the atmosphere was rejected."

NIOSH has recommended to the Department of Labor that occupational exposure to TCE be controlled so that workers will not be exposed to concentrations in excess of 100 ppm as a time-weighted average exposure for an 8-hour day (measured by a minimum sampling time of 10 minutes) and that no worker be exposed to peak concentrations of TCE in excess of 150 ppm (measured by a maximum sampling time of 10 minutes). The adverse effects from exposure to excess levels of TCE are well documented. During the day of the evaluation (August 12, 1974), the one employee responsible for the degreaser had no symptoms and stated that he had not been adversely affected in the past while working with TCE. Therefore, only a study for airborne levels of TCE was conducted.

D. Worksite Evaluation

On August 12, Mr. Okawa conducted an environmental evaluation for VC in the injection molding areas and for TCE in the degreaser area. On October 14, a follow-up study for VC was conducted in the injection molding areas.

E. Evaluation Methods

Employee exposures to VC and TCE were measured via personal air sampling equipment. Breathing zone air samples were obtained using Sipin Personal Sampler pumps and charcoal air sampling tubes. Sampling rates for VC were 35-50 cc/minute and sample volumes ranged from 1.16-3.61 liters. The sampling rate for TCE was 105 cc/minute and sample volumes ranged from 4.5-7.8 liters. The charcoal tubes were sealed and mailed immediately to NIOSH laboratories in Salt Lake City for analysis.

F. Evaluation Results

On August 12, PVC molding was sporadic and fewer samples were collected than on October 14. The results are contained in Table I. Five breathing zone samples were taken in injection molding Area 2 and VC was not detected. One sample was taken in Area 1 and VC was not detected. Two samples were taken on the "regrind man" who operated the grinding machine and conducted his other duties as usual. Both samples showed a VC concentration of 0.3 ppm. On October 14, 1974, the environmental study was repeated and seven breathing zone samples each were taken in Area 1, Area 2, and on the "regrind man." In Area 1, VC was not detected in 6 out of 7 samples. In one sample, a concentration of 0.2 ppm was found which is at the limit of detection for the method of analysis. In Area 2, VC was not detected in 5 out of 7 samples. In the other two samples, concentration of 0.2 ppm was found. Seven samples taken in the breathing zone of the "regrind man" were all positive for VC. The concentrations ranged from 0.2 - 1.0 ppm.

The trichloroethylene vapor degreaser did not seem to present a health hazard but 3 breathing zone samples on the worker were taken on August 12, 1974. The TCE concentrations found were 1.7, 24.5, and 29.0 ppm.

V. CONCLUSIONS

The Federal Standard for vinyl chloride gas promulgated by the U.S. Department of Labor is 1.0 ppm based on an 8-hour time-weighted average. This standard also calls for specific steps by an employer when the 8-hour time-weighted average exceeds the "action level" of 0.5 ppm. The average measured concentration of vinyl chloride in the Regrind Room was 0.5 ppm. Therefore, in light of the standard and the fact that NIOSH rejects the concept of a threshold limit for carcinogenesis, it is concluded that a potential health hazard exists for the employee in the Regrind Room when he grinds parts made from polyvinyl chloride. The majority of samples taken in the injection molding areas of the plant showed undetectable levels for VC. Three out of 20 samples showed levels of 0.2 ppm for VC. 0.2 ppm is the lower limit of detection for VC by the method used. These results indicate that vinyl chloride levels in the molding areas are extremely low, but the three positive samples cannot be disregarded. Therefore, it is concluded that there exists a potential health hazard from vinyl chloride in the injection molding areas of the plant.

It has been concluded that trichloroethylene does not present a health hazard in the degreasing area in the concentrations measured during normal operating conditions.

VI. RECOMMENDATIONS

It is recommended that the employer reduce airborne concentrations of vinyl chloride to levels not detectable by the recommended method of sampling. Any employee who is exposed to measurable concentrations of vinyl chloride shall wear a respirator approved by NIOSH for protection against vinyl chloride until it is assured that vinyl chloride exposures are controlled.

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VII. AUTHORSHIP AND ACKNOWLEDGMENT

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TABLE I. Levels of Vinyl Chloride Vapor in Parts Per Million (PPM)
From Breathing Zone Samples Collected at the Richdel Plant.

OPERATION	DATE OF COLLECTION	SAMPLE VOLUME LITERS	CONC. (PPM)*
Injection Molding Area 2	8-12-74	1.16	N.D.**
"	"	1.68	N.D.
"	"	1.38	N.D.
"	"	2.02	N.D.
"	"	2.00	N.D.
"	10-14-74	2.19	N.D.
"	"	2.10	N.D.
"	"	1.69	N.D.
"	"	2.27	N.D.
"	"	2.06	0.2
"	"	1.46	0.2
"	"	1.48	N.D.
Injection Molding Area 1	8-12-74	1.77	N.D.
"	10-14-74	2.40	N.D.
"	"	2.96	0.2
"	"	1.71	N.D.
"	"	1.36	N.D.
"	"	1.81	N.D.
"	"	1.49	N.D.
"	"	1.56	N.D.
Regrind Room	8-12-74	1.35	0.3
"	"	2.10	0.3
"	10-14-74	2.14	0.2
"	"	3.08	0.2
"	"	2.07	0.5
"	"	2.33	0.6
"	"	2.02	0.4
"	"	2.14	1.0
"	"	3.61	0.8

*PPM - Parts of vapor or gas per million parts of contaminated air by volume.

**N.D. - Not-detected; limit of detectability = 0.2PPM.