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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-20-209

RICHDEL CORPORATION
CARSON CITY, NEVADA
JULY 1975

I. TOXICITY DETERMINATION

It has been determined that a potential health hazard exists in the Regrind Room from vinyl chloride gas at the concentrations measured during normal operating conditions. This determination is based upon environmental measurements obtained on March 24 and April 21, 1975, analysis of work practices, and on available information regarding the toxicity of vinyl chloride.

NIOSH recommends that the employer reduce airborne concentrations of vinyl chloride to levels not detectable by the recommended analytical 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 one "affected employee" 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 an employee to vinyl chloride gas 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 for the control boxes are made of polyvinyl chloride (PVC) and are molded via a process called "screw injection molding" of angle body parts. An evaluation of the Regrind Room for vinyl chloride gas was requested as a follow-up to a previous study (RHE 74-96-173) conducted at the plant.

B. Plant Process - Conditions of Use

In a previous Health Hazard Evaluation at the Richdel Corporation plant, it was determined that a potential health hazard existed in the Regrind Room from vinyl chloride gas at the concentrations measured during normal operating conditions.

The Regrind Room is approximately 20' X 6' X 10' and has a sliding door which separtes it from the other work areas of the plant. Two grinding machines are positioned in the room toward the North wall and are used to regrind defective plastic parts into reusable pellets. The grinding operation is handled by one worker who runs the grinders approximately 1 day per week after enough reusable parts have accumulated. About 1/3 to 1/2 of the defective parts are made with PVC (polyvinyl chloride). PVC parts are reground in only one machine which, however, is not used exclusively for PVC. Plastic parts are fed by hand into a chamber and the reground material is caught in a hopper at the bottom of the machine. When enough material fills the hopper, it is emptied into a 55 gallon barrel with a lid.

Shortly after the first NIOSH survey, the management installed a fan on the North wall which provided general ventilation to the room and exhausted approximately 1200 CFM (60 air changes per hour). To recheck the Regrind Room for vinyl chloride gas, a representative of management submitted a hazard evaluation request to NIOSH.

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[1], "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 of 1970, the concept of a threshold limit for vinyl chloride gas in the atmosphere was rejected."

D. Worksite Evaluation

On March 24, 1975, Mr. Okawa conducted an environmental evaluation for vinyl chloride in the Regrind Room while the operator had enough PVC parts to run. On April 21, 1975, Mr. Okawa repeated the evaluation and also sampled inside the PVC hopper in the grinding machine.

E. Evaluation Methods

The employee's exposure to vinyl chloride and the area samples were measured via personal air sampling equipment. All the samples were obtained using Sipin Personal Sampler pumps and charcoal air sampling tubes. The sampling rate was 45-50 cc/minute and the sampling times ranged from 26-60 minutes in length (1.3 to 3.6 liters). The charcoal tubes were sealed and mailed immediately to NIOSH laboratories in Salt Lake City for analysis.

F. Evaluation Results

The results of the environmental evaluations are contained in Table I. On March 24, 6 breathing zone samples were collected and the VC levels ranged from non-detectable to 0.7 ppm (parts per million). In two samples VC was not detected and in the other 4, the levels ranged from 0.2-0.7 ppm. Three general area samples were collected 10 feet away from the grinding machine. VC was not detected in 2 samples and the other sample showed a level of 0.2 ppm.

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1 "NIOSH Recommended Standard for Occupational Exposure to Vinyl Chloride," March 14, 1974, memorandum from Director, NIOSH to Assistant Secretary of Labor, OSHA.

On April 21, 5 samples were collected before any activity took place in the Regrind Room. Two samples were taken inside the hopper of the grinding machine, and the levels of VC were undetectable. One sample was taken in the general area, and the VC level was undetectable. Two samples were taken inside the PVC barrel which was used to store the reground PVC. The first sample showed a VC level of 0.95 ppm but the second sample was negative.

After the grinder was operating, two breathing zone samples and one general area sample was taken. Vinyl chloride was not detected in these samples. Three samples were taken inside the grinder hopper while PVC was being ground. The VC levels were 0.44, 4.63, and 24.55 ppm.

V. DISCUSSION

The results of the first environmental evaluation (March 24, 1975) indicated that in spite of the excellent general dilution ventilation in the Regrind Room, the operator was being exposed to low levels of vinyl chloride gas. The fact that vinyl chloride could be detected in some samples and not others would seem to indicate that the amount of vinyl chloride gas that is trapped in the molded PVC parts varies significantly and the worker's exposure to VC would vary according to the batch of PVC being reground. The results of the sampling in April tend to support this conclusion. The levels of VC in the hopper ranged from a low of 0.44 ppm to a high of 24.55 ppm. Freshly ground PVC is stored in a covered barrel and it is possible that a residual amount of VC could be left inside the storage barrel. This fact was substantiated by the one positive sample (0.95 ppm) taken prior to any activity. The fact that the second sample was negative was not unusual since the lid of the barrel has been disturbed and any residual VC gas has a chance to excape into the atmosphere.

VI. CONCLUSIONS

The Federal Standard for the permissible exposure limit to vinyl chloride gas promulgated by the U.S. Department of Labor is 1.0 ppm averaged over any 8-hour period and 5 ppm averaged over any period not exceeding 15 minutes. 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 breathing zone level over an extended period of time as measured did not exceed 1.0 ppm or even 0.5 ppm. However, in view of NIOSH's stand of no threshold limit for carcinogenesis and the fact that a source of vinyl chloride gas was identified, it is concluded that a potential health hazard from vinyl chloride gas exists in the Regrind Room to the one employee in the work area.

VII. 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 should wear a respirator approved by NIOSH for protection against vinyl chloride until is is assured that vinyl chloride exposures are controlled. It is also recommended that the exhaust ventilation be concentrated at the regrind machine and hopper.

VIII. AUTHORSHIP

Evaluation conducted and report prepared by:

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TABLE I

LEVELS OF VINYL CHLORIDE GAS IN PARTS PER MILLION (PPM) FROM SAMPLES COLLECTED IN THE REGRIND ROOM AT THE RICHDEL CORPORATION PLANT

DATE	SAMPLE AREA OR LOCATION	SAMPLE PERIOD	CONC.(PPM*)
3/24/75	Breathing Zone (Grinder Operating)	9:00a.m.- 9:33a.m.	N.D.**
" "	General Area 10' From Grinder	9:00a.m.-10:06a.m.	N.D.
" "	Breathing Zone (Grinder Operating)	9:40a.m.-10:23a.m.	0.6
" "	General Area 10' From Grinder	10:10a.m.-11:08a.m.	0.2
" "	Breathing Zone (Grinder Operating)	10:30a.m.-11:01a.m.	N.D.
" "	General Area 10' From Grinder	11:10a.m.-12:00p.m.	N.D.
" "	Breathing Zone (Grinder Operating)	1:00p.m.- 1:26p.m.	0.2
" "	" "	1:30p.m.- 2:00p.m.	0.7
" "	" "	2:00p.m.- 2:30p.m.	0.4
4/21/75	Inside Grinder Hopper (Before Grinding Operation)	7:30a.m.- 8:10a.m.	N.D.
" "	General Area 10' From Grinder (Before Grinding Operation)	7:30a.m.- 8:00a.m.	N.D.
" "	Inside PVC Storage Barrel (Before Grinding Operation)	7:30a.m.- 8:00a.m.	0.95
" "	Inside Grinder Hopper (Before Grinding Operation)	8:30a.m.- 9:00a.m.	N.D.
" "	Inside PVC Storage Barrel (Before Grinding Operation)	8:30a.m.- 9:00a.m.	N.D.
" "	Breathing Zone (Grinder Operating)	9:00a.m.- 9:40a.m.	N.D.
" "	In Grinder Hopper (Grinder Operating)	9:00a.m.- 9:40a.m.	4.63
" "	Breathing Zone (Grinder Operating)	9:45a.m.-10:45a.m.	N.D.
" "	In hopper (Grinder Operating)	9:40a.m.-10:15a.m.	0.44
" "	General Area 10' From Grinder	10:45a.m.-11:15a.m.	N.D.
" "	In Grinder Hopper (Grinder Operating)	10:30a.m.-11:00a.m.	24.55

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

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