

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

HEALTH HAZARD EVALUATION DETERMINATION  
REPORT NO. 74-149-180

PROTECTO WRAP COMPANY  
DENVER, COLORADO  
APRIL 1975

I. TOXICITY DETERMINATION

It has been determined that a potential health hazard may exist in the mixer operation from vinyl chloride gas at the concentrations measured during normal operating conditions. This determination is based upon environmental measurements obtained on January 28, 1975, analysis of work practices, and on available information regarding the toxicity of vinyl chloride. It is based on the fact that five of the eleven environmental evaluations indicated levels of vinyl chloride at the lower limit of detection (0.2 ppm) for the method used or were in excess and the fact that NIOSH has rejected the concept of a threshold limit for vinyl chloride gas.

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 should 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) Protecto Wrap Company, Denver, Colorado
- b) U.S. Department of Labor - Region VIII
- c) NIOSH - Region VIII

For purposes of informing the approximately 2 "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 at the Protecto Wrap Company in Denver, Colorado.

### IV. HEALTH HAZARD EVALUATION

#### A. Introduction

The Protecto Wrap Company manufactures a polyvinyl chloride backed material which is used for wrapping utility pipes to protect them against corrosive action when installed underground. An evaluation of the polyvinyl chloride mixing operation was requested by a representative of management.

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

On January 28, 1975, NIOSH investigators, Mr. George J. Butler and Dr. Bobby Gunter conducted a conference with the representative of management as an introduction to the hazard evaluation. A preliminary walk-through survey prior to the collection of samples was performed.

The bulk polyvinyl chloride (PVC) present is received at the plant in inclosed railroad tank cars and transferred to a large outside storage tank by way of a vacuum line. As the PVC resin is needed it is measured into paper barrels placed under the storage tank. Approximately 230 lbs. of the resin is required for each batch and about 5 batches are prepared each day. The barrels of measured resin are brought inside to the mixer area where it is vacuumed into the mixer hoppers. When mixing is completed the PVC is applied to a base material and rolled up. A thin layer of coal tar is also applied by spray.

There are two workers employed in the mixing end of the operation, one tends the blenders and the other controls the flow of the poly-vinyl chloride that goes into the finished product.

#### 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<sup>1</sup> 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".

#### D. Evaluation Design

Employee exposures to vinyl chloride were measured by personal air sampling equipment and area samples. Breathing zone air samples were obtained using personal sampler pumps and charcoal air sampling tubes. Sampling rates for vinyl chloride were approximately 50 cc per minute. The charcoal tubes were sealed and mailed immediately to NIOSH laboratory in Salt Lake City for analyses.

Five employees in the plant including the two located around the mixing operation were asked non-directed questions regarding the status of their health.

#### E. Evaluation Results and Discussions

A total of 11 air samples were collected around the operation and out of these 5 of 8 personal samples indicated concentrations of vinyl chloride from 0.20 - 0.37 ppm. The results are contained in Table 1. The remaining samples were below the detectable limit of analyses (0.20 ppm) one of the men interviewed complained of chest irritation while cleaning the equipment, this same employee displayed some de-pigmentation which may be caused from exposure to the coal tar. The other employees had no complaints regarding their health.

Although the results indicated that vinyl chloride levels in the mixing area are extremely low the positive samples cannot be disregarded. Therefore it is concluded that there may exist a potential health hazard from vinyl chloride in the mixing operation of this plant.

<sup>1</sup>/ "NIOSH Recommended Standard for Occupational Exposure to Vinyl Chloride", March 11, 1974 memorandum from Director NIOSH to Assistant Secretary of Labor, OSHA.

V. 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 it is assured that vinyl chloride exposures are controlled.

VI. AUTHORSHIP AND ACKNOWLEDGMENTS

Report Prepared By: George J. Butler  
Industrial Hygiene Engineer  
WAOHL, Salt Lake City, Utah

Originating Office: Jerome P. Flesch, Chief  
Hazard Evaluation Services Branch

Acknowledgment

Environmental Evaluation:  
Bobby Gunter, Ph.D.  
Industrial Hygiene Engineer  
Region VIII  
Denver, Colorado

TABLE 1. Levels of Vinyl Chloride in Parts Per Million (ppm)  
 Collected on January 28, 1975 at the Protecto Wrap Company

LOCATION	SAMPLE VOLUME LITERS	SAMPLING PERIOD	CONC. (ppm)*
General Area - Mixer	26.7	10:02 - 11:54	N.D.**
Unloader***	3.7	10:05 - 11:16	N.D.
PVC Transfer Area	5.5	10:03 - 11:32	N.D.
Mixer Operator***	1.4	10:01 - 10:26	0.27
Rodman***	3.8	10:06 - 11:17	N.D.
Tankman***	1.6	10:00 - 10:29	0.37
Mixer Operator***	3.4	10:27 - 11:28	0.29
Tankman***	3.5	10:30 - 11:30	N.D.
Mixer Operator***	2.0	11:28 - 12:05	0.24
Tankman***	1.8	11:31 - 12:01	0.20
PVC Transfer Area	1.9	11:33 - 12:03	N.D.

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

\*\*N.D. - none detected, limit of detection is 0.20 ppm.

\*\*\*Personal sample in breathing zone of worker.