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. 75-94-219

PROTO PRODUCTION PLASTICS, INC.
BOULDER, COLORADO

SEPTEMBER 1975

I. TOXICITY DETERMINATION

It has been determined on the basis of environmental sampling in the workplace on June 23, 1975 and a review of the confidential health questionnaires that a health hazard from exposure to vinyl chloride monomer did not exist within the worksite area where polyvinyl chloride (PVC) telephone switchbox covers are manufactured by means of an injection molding process.

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) Proto Production Plastics, Inc., Boulder, Colorado
b) U.S. Department of Labor - Region VIII, Denver, Colorado
c) NIOSH - Region VIII, Denver, Colorado

For the purpose of informing the approximately 7 "affected employees", this report shall be posted in a prominent place readily accessible to workers for a period of at least 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 an 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 the employer regarding exposure to vinyl chloride at Proto Production Plastics, Inc., Boulder, Colorado.

IV. HEALTH HAZARD EVALUATION

A. Process Description - Condition of Use

The process begins with the manual removal of PVC pellets into a hopper on the injection molding machine. A reciprocating screw transfers the material from the hopper into the mold press barrel. The temperature of the press barrel is maintained at 450°-500° F. The physical form of the solid material is converted into a liquid. The liquid is then injected into the insert mold to form a clear PVC telephone switchbox cover. The PVC pellets are sealed in plastic bags within cardboard boxes and stored in the molding room adjacent to the injecting molding machine.

B. Evaluation Methods

Employees exposures to vinyl chloride were measured via personal air sampling equipment. Breathing zone and general air samples were obtained using Sipin personal pumps and charcoal air sampling tubes. A known volume of air is drawn through two charcoal tubes connected in series to trap the vinyl chloride gas present. The analyte is desorbed from the charcoal with carbon disulfide, and the sample is separated and analyzed using a gas chromatograph with a flame ionization detector. The first charcoal tube is analyzed as a single sample (both front and back section together) and the second tube is used as a breakthrough indicator. Sample rates for vinyl chloride were approximately 50 cc/minute and sample volumes ranged from 2 to 7 liters of air. The charcoal tubes were sealed and sent to the NIOSH laboratories in Salt Lake City for analysis. A total of 18 samples for vinyl chloride was collected.

C. Evaluation Criteria

Vinyl chloride is considered a carcinogenic agent. It is suspected of being an etiological agent in the development of angiosarcoma of the liver (a rare form of liver cancer). 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. As a result, the NIOSH recommended standard for occupational exposure to vinyl chloride states that exposure to vinyl chloride monomer should not exceed levels that are detectable by the recommended methods of sampling and analysis.

D. Evaluation Results and Discussion

1. Environmental

Six personal breathing zone samples were taken on the two employees working in the molding room area. No vinyl chloride was detected in any of the samples. The limit of detection for vinyl chloride was

0.25 ppm. Twelve general area samples were collected in the molding room and the office; vinyl chloride was not detected. A summary of air sampling data and results for vinyl chloride is presented in Table I.

2. Medical

Five employees were interviewed using a non-directed questionnaire designed to elicit symptomatology possibly related to health problems arising from their work environment. The questionnaire revealed no symptomatology.

3. Conclusion

Based on the environmental sampling in the workplace, a review of the confidential health questionnaires and the criteria outlined in Part C, it was determined that no vinyl chloride hazard existed.

V. AUTHORSHIP AND ACKNOWLEDMENTS

Report Prepared By:	Raymond L. Ruhe Industrial Hygienist Hazard Evaluation Services Branch Cincinnati, Ohio
Originating Office:	Jerome P. Flesch, Chief Hazard Evaluation Services Branch Cincinnati, Ohio
Acknowledgments:	
Environemtnal Evaluation	Bobby Gunter, Ph.D. Industrial Hygienist Region VIII Denver, Colorado
Analytical Laboratory Services	Western Area Occupational Health Laboratory

TABLE I

Charcoal tube determination for vinyl chloride in parts per million (ppm)

Collected on June 23, 1975 at Proto Production Plastics, Inc., Boulder, Colorado

Job/Location	Type	Sampling Period	Approximate Sample Volume (Liters)	Vinyl Chloride (ppm) *
Mold Operator	BZ	10:18 - 12:30	5	<0.25
Mold Operator	BZ	10:18 - 12:30	5	<0.25
Mold Room	GA	10:23 - 12:40	7	<0.25
Mold Room	GA	10:23 - 12:40	7	<0.25
Mold Room	GA	10:29 - 12:45	6	<0.25
Mold Room	GA	10:29 - 12:45	6	<0.25
Office	GA	10:37 - 12:50	5	<0.25
Office	GA	10:37 - 12:50	5	<0.25
Mold Operator	BZ	12:37 - 2:37	4	<0.25
Mold Operator	BZ	12;37 - 2:37	4	<0.25
Mold Room	GA	12:45 - 3:10	6	<0.25
Mold Room	GA	12:45 - 3:10	6	<0.25
Mold Room	GA	12:50 - 1:52	2	<0.25
Mold Room	GA	12:50 - 1:52	2	<0.25
Office	GA	12:57 - 2:58	4	<0.25
Office	GA	12:57 - 2:58	4	<0.25
Mold Operator	BZ	1:04 - 3:05	4	<0.25
Mold Operator	BZ	1:04 - 3:05	4	<0.25

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

Detection limits for these samples are <0.25 ppm

BZ - personal breathing zone air samples

GA - general area