U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
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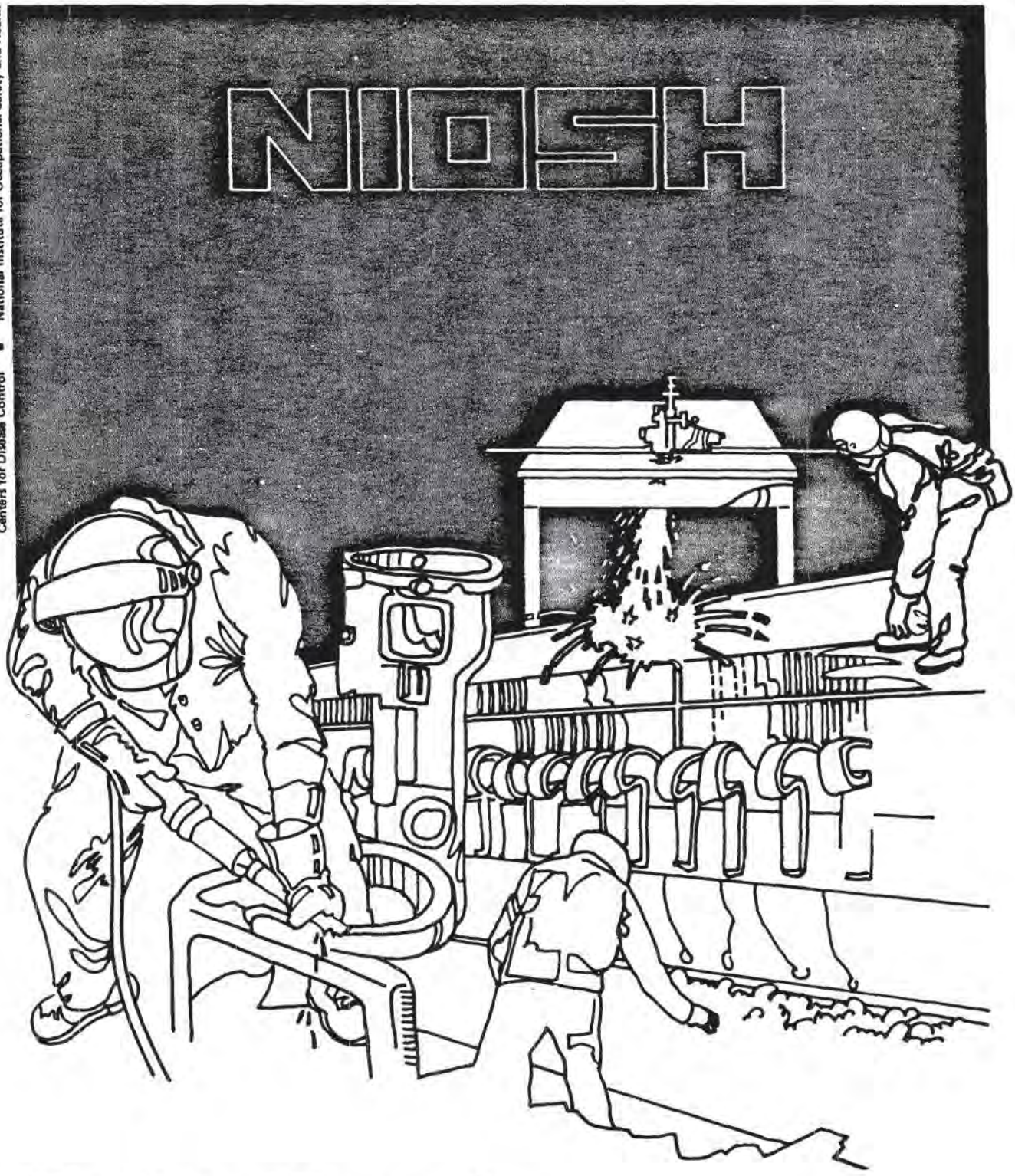

Health Hazard Evaluation Report

HETA 82-311-1250
UNIROYAL, INC.
OPELIKA, ALABAMA

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

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January 1983
Uniroyal, Inc.
Opelika, Alabama

NIOSH INVESTIGATORS:
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I. SUMMARY

On July 5, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from the United Rubber, Cork, Linoleum and Plastic Workers of America, Local Union No. 753 for a health hazard evaluation of the tread-leaf cleaning area at Uniroyal Inc., Opelika, Alabama. The request stated that employees are exposed to potentially toxic chemicals while removing rubber residue from tread leaves. These employees complained of headaches, sore throats and burns on their hands and arms as a result of exposure to the chemicals.

On August 29, 1982, a survey of the tread-leaf cleaning area was conducted. A proprietary solvent, Klean-Strip, is used for the cleaning operation. Klean-Strip contains by weight approximately 75% methylene chloride, 10% propylene dichloride, 5% methanol, and 1% ammonia, the balance consisting of a thickening agent, a vaporization retardant and a surfactant. The highest vapor concentration of methylene chloride detected with personal samples during the survey was 35 ppm. Area air samples taken 10 to 12 feet from the operation ranged between 9 and 40 ppm for methylene chloride vapors. Propylene dichloride for both personal and area samples were all less than 2 ppm. Two area samples using silica gel as an adsorber for the detection of methanol were zero and 39 ppm. Ammonia was detected in the range of 3-5 ppm with detector tubes held in the breathing zone of the employee. No vapor exposures found in the work area exceeded regulatory or recommended limits.

Some personal protection equipment is available but its use generally has been left to the discretion of the individual employees who do the cleaning. At the time of the evaluation, the employee doing the cleaning wore short rubber gloves, a short-sleeved shirt, rubber boots, and a full-face-shield supplied-air respirator equipped with a dust, fume, and mist filter cartridge. The employee reported experiencing headaches in the past but not recently and indicated conditions were better now than when the job first started.

No vapor exposures found in the work area exceeded regulatory or recommended limits. However, several conditions were found that are conducive to potential health hazards. To alleviate these potential problems adequate protective clothing should be worn by the employee engaged in the cleaning operation to prevent skin contact with the paint remover. The employees' air supply should be protected by a solvent vapor cartridge. Meantime, management should search for and use an alternative leaf-cleaning method which will further reduce employee exposure to solvents; such as, use of less or non-toxic solvents, process changes and/or engineering controls.

KEYWORDS: SIC 3011, respirtory symptoms, dermatitis, methylene chloride, propylene dichloride, methanol, ammonia.

II. INTRODUCTION

On July 5, 1982, the United Rubber, Cork, Linoleum and Plastic Workers of America, Local Union No. 753 requested a health hazard evaluation of the tread-leaf cleaning area at the Uniroyal, Inc. plant at Opelika, Alabama. The request stated that employees are exposed to potentially toxic chemicals while removing rubber residue from tread leaves. These employees complained of headaches, sore throats and burns on their hands and arms as a result of exposure to the chemicals.

A survey of the tread-leaf cleaning area was conducted August 29, 1982 by two industrial hygienists. The goals of the survey were to evaluate the environmental conditions for possible excess respiratory and skin exposure to chemicals, and to develop appropriate recommendations to management to alleviate any problems found.

III. BACKGROUND

In the production of tires at the Opelika plant, rubber treads are transported to the tire builder on tread trucks containing leaves. In March 1982, a decision was made to clean these tread leaves after an employee was injured while trying to remove a tread stuck on one of the leaves of a tread truck. Also, a large number of rubber tire treads were being distorted in shape when employees removed stuck treads from the leaves. The trucks are approximately five feet high, and usually contain 18 leaves, each leaf being 3x6 feet in area.

Tread leaves are cleaned during the day and evening shifts in the following manner. An employee applies Klean-Strip® aircraft finish remover to the leaves, brushes and/or scrapes the surface to loosen rubber residue, and removes the loosened material with a high-pressure water spray. Previously, a steam spray was used, but water was found to be more effective.

Cleaning the leaves was so effective in improving tread removal operations that leaf trucks from other Uniroyal plants are now brought here for cleaning, extending what was first considered to be a temporary job.

According to its Material Safety Data Sheet, Klean-Strip contains by weight approximately 75% methylene chloride, 10% propylene dichloride, 5% methanol, and 1% ammonia, the balance consisting of thickening agent, vaporization retardant and surfactant. The solvent is obtained in 55, 5 and 1-gallon containers as available. It is poured directly onto the leaves from 1-gallon containers, and dispersed by hand into 1-gallon cans from the larger containers.

Some personal protection equipment is available but its use generally has been left to the discretion of the individual employees doing the cleaning. One employee refused to clean the leaf-trucks because of the chemicals solvent content and others complained of

respiratory problems, and burning skin from contact with the paint remover. At the time of the evaluation, the employee doing the cleaning wore short rubber gloves, a short-sleeved shirt, rubber boots, and a full-face-shield supplied-air respirator equipped with a dust, fume, and mist filter cartridge, Figure 1.

IV. METHODS AND MATERIALS

Environmental evaluation consisted of interviews with company and union personnel about environmental conditions, a walk-through industrial hygiene survey, review of properties of chemicals used, and collection of air samples for organic vapor analyses. Questionnaires were not used; the day shift cleaning employee observed was requested to provide such information as he was able in the interviews.

Two personal and six area air samples were collected. Six were collected with charcoal tubes, and were analyzed for methylene chloride and propylene dichloride by means of gas chromatography following elution with carbon disulfide. The other two samples, both area, were collected with silica gel tubes and analyzed for methanol by means of gas chromatography following elution with water.

Detector tubes were used to sample for ammonia in the breathing zone of the employee. The lower limit of detection for this method is approximately one ppm.

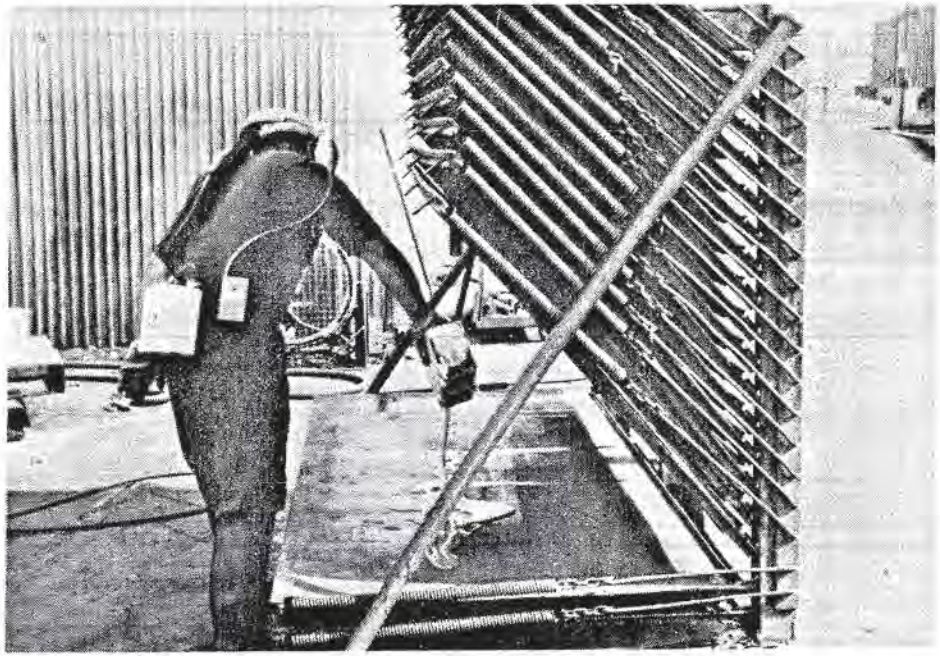
Following the survey, a conference was held with management and union personnel to discuss the nature and scope of the evaluation, to review its findings, and to offer suggestions for improving conditions as observed during the one day of evaluation.

V. EVALUATION CRITERIA

The criteria for evaluating the organic vapors assayed are the current American Conference of Governmental Industrial Hygienists' Threshold Limit Values (ACGIH-TLVs)(1), NIOSH Criteria Documents (2,3), and the Occupational Safety and Health Administration (OSHA) permissible exposure limits (4). Limits appearing in Table 1 are the lowest found among these sources, and the current OSHA limits.

Table 1 - Evaluation Criteria for Chemicals Assayed and Used in the Cleaning Area

Substance	Ceiling Limit or STEL (ppm)	8-hour Time Weighted Average (ppm)	Source	OSHA Standard (4)
Ammonia	35	25	ACGIH(1)	50
Methanol	800	200	NIOSH(2)	200
Methylene chloride	500	75	NIOSH(3)	500
Propylene dichloride	None	75	OSHA(4)	75



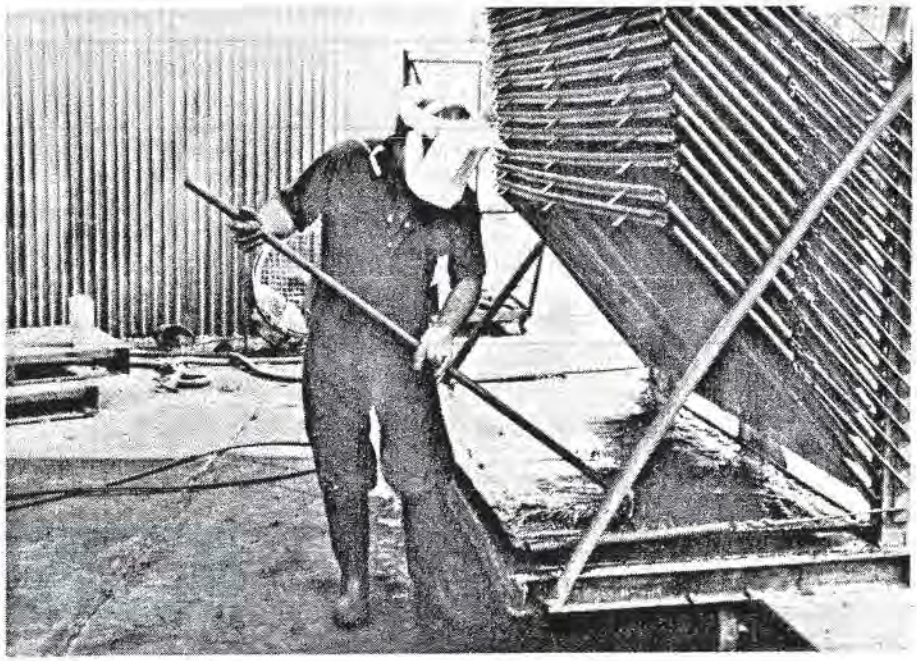


Figure 1

A. (Upper left) Employee pouring solvent chemical on tread leaf. Note air intake for face mask.

B. (Upper right) Employee spreading chemical solvent and scraping rubber residue.

C. (Lower left) Employee using water under pressure to remove loosened material from leaf.

VI. RESULTS AND DISCUSSION

Cleaning the rubber residue from the tread leaves requires 1-1½ gallons of Klean-Strip per leaf. Each truck generally has eighteen leaves, and requires approximately 24 gallons of chemical for cleaning.

An employee can clean two complete tread trucks per shift. During cleaning (as observed during the survey) the employee wears a full face protection shield with supply air drawn at belt level with a filter cartridge recommended for dust, fumes and mist. In addition rubber boots and short rubber gloves are worn. There is no protection from chemical splattering on the arms or through clothing (See photographs in Figure 1). A 20-inch diameter propellor fan is located approximately 10 feet behind the employee and is intended to blow vapors away from the employee.

The leaves of the tread truck are cleaned starting with the bottom and progressing to the top leaf. About half-way through the cleaning of the leaves the intake for the supply air to the employee's face shield is at the same level as the chemical being spread on the leaves. This appears to increase the employee exposure to the solvent vapors. At times the employee was observed backing away from his work if he had inhaled a heavy concentration of solvent vapor.

Sampling results are shown in Table 2. The highest vapor concentration of methylene chloride detected with personal samples during the survey was 35 ppm. Area air samples taken 10 to 12 feet away ranged between 9 and 40 ppm for methylene chloride vapors. Propylene dichloride for both personal and area samples were all less than 2 ppm. Two area samples using silica gel as an adsorber for the detection of methanol were zero and 39 ppm. Ammonia was detected in the range of 3-5 ppm with detector tubes held in the breathing zone of the employee.

Turbulent air in the vicinity of the employee and the air monitors, caused by the 20-inch fan directed toward the work area, may account for the variation in the vapor concentrations found during the survey. Higher peak exposures to the employees than reported in Table 2 would be expected due to the nature of the work.

Interview with employees indicated conditions were better now than when the job first started. The full face shield with supply air and the 20-inch fan which directs vapors away from the employee were put into use approximately two weeks prior to this survey. Occasional splatters of the chemical onto the skin burns the skin unless removed immediately with water, as was observed during the survey. Employees reported experiencing headaches in the past but not recently, perhaps due to their being more cautious in handling the chemical to reduce spills, and in removing themselves when high vapor concentrations are in the work area.

Table 2 - Vapor Concentrations for Area and Personal Samples in the Cleaning Area during Cleaning Operations

Tube Type, Number, and Sampling Time (mins)	Sampling Location/Comments	Vapor Concentrations (ppm) Methylene Chloride	Propylene Dichloride	Methanol	Ammonia
Charcoal tube 1009 (48)	Personal, during cleaning	18.6	1.5	-	-
Charcoal tube 1003 (32)	Personal, same as above	34.6	1.5	-	-
Indicator tube 3 samples	Breathing zone area of employee during cleaning	-	-	-	3-5
Charcoal tube 1000 (26)	Area 10 feet west of employees, 4 ft. above ground	15.8	1.2	-	-
Charcoal tube 1004 (46)	Area, same as above	13.5	0.9	-	-
Silica gel 600 (28)	Area, same as above	-	-	N.D.	-
Silica gel 602 (44)	Area, same as above	-	-	39.2	-
Charcoal tube 1006 (27)	Area, 12 ft. east of employee, 2 ft. above ground	9.0	0.4	-	-
Charcoal tube 1008 (45)	Area, same as above	39.9	1.8	-	-

N.D. = not detected
ppm = parts per million

VII. CONCLUSIONS

No vapor exposures found in the work area exceeded regulatory or recommended limits. However, several conditions were found that are conducive to potential health hazards. Carrying out the following recommendations should do much to alleviate these potential problems.

VIII. RECOMMENDATIONS AND FOLLOW-UP

It is recommended that:

1. Adequate protective clothing be worn by the employee engaged in the cleaning operation to prevent skin contact with the paint remover. Impervious gloves to cover the forearm and a plastic apron to protect his coveralls may be satisfactory. Consideration should be given to freedom of movement and, in summer, adequate ventilation for cooling the worker.

2. Management should search for and use an alternative leaf-cleaning method which will further reduce employee exposure to solvents; such, as use of less or non-toxic solvents, process changes and/or engineering controls. While this is underway, the worker's breathing air supply be protected by a solvent vapor cartridge. The currently used dust filter is ineffective against vapors.

The company and union reported by telephone November 12, 1982 that only one employee on first shift was responsible for cleaning the tread leaves trays. The employee is continuing to use the same chemical and method of cleaning. The full face shield continues in use. A rubber-like apron is now furnished and used by the employee when spreading and scraping the chemical.

Cooler weather recently has made conditions during cleaning the tread leaves more pleasant. Employees have not complained of health problems or poor working conditions to the company or the union.

IX. REFERENCES

1. Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment with Intended Changes for 1981, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1982.

2. Criteria for a Recommended Standard-Occupational Exposure to Methanol. U.S. Department of Health, Education and Welfare. DHEW(NIOSH) Publication No. 76-148 (March 1976).

3. Criteria for a Recommended Standard - Occupational Exposure to Methylene Chloride. U.S. Department of Health, Education and Welfare. DHEW(NIOSH) Publication No. 76-138 (March 1976).

4. General Industry Standards, Occupational Safety and Health Administration, Publication OSHA 2206 (November 1978).

X. AUTHORSHIPS AND ACKNOWLEDGEMENTS

The cooperation of Mr. Bill Lett, Mr. Gerald Ford, Mr. Larry F. Dieringer, Mr. Rodney D. Abrams and other management and union officials in the environmental evaluation is hereby acknowledged.

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(c) U.S. Department of Labor, OSHA, Region IV
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