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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 73-5-110

CUMMINS NORTHEASTERN INCORPORATED
DEDHAM, MASSACHUSETTS
MARCH 1974

I. TOXICITY DETERMINATION

It has been determined that employee exposures to phenol/cresol, methylene chloride vapors and sodium hydroxide mist found in the cleaning room and chassis cleaning area are not toxic in concentrations measured during the environmental evaluation performed on August 23, 1973. This determination is based on documented, low-work-room concentrations of these substances and the absence of medical symptomatology. Medical interviews failed to elicit relevant symptoms associated with exposures to the substances evaluated. One employee did complain of an obnoxious odor present when the degreaser was filled. This problem can be abated if employee spend a few minutes outside of the immediate area, allowing the odor to be dispersed and diluted with the general room air.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of the 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) Cummins Northeastern Inc.
b) U.S. Department of Labor - Region I
c) NIOSH - Region I

For the purposes of informing the twenty to thirty 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(s) 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 employer representative regarding exposures to Calgon P-2000 alkaline cleaner and Calgon P-3504 cold solvent degreaser used in the engine and component cleaning room and chassis wash room at Cummins Northeastern Inc., Dedham, Massachusetts.

IV. HEALTH HAZARD EVALUATION

A. Description of Process - Condition of Use

The Cummins Northeastern Inc. maintenance shop is primarily engaged in servicing diesel engines. Very often, prior to rebuilding and/or after disassembling an engine, parts are placed in a dip basket and immersed in vats containing either hot alkaline cleaning solution or a room temperature solvent degreaser. After the part has been soaked in either of the two cleaning solutions, it is removed, allowed to drain, and then rinsed with water. Degreasing solvent vapors and alkaline mist were the substances concidered in this evaluation.

The cleaning solution vats are located in a room that is separated from the adjacent work areas. The vats are provided with covers and natural draft exhaust stacks that extend beyond the roof.

Alkaline spray cleaning is accomplished in the chassis wash room. This room is also separated from the general work areas.

Twenty to thirty mechanics are potentially exposed to degreasing vapors and alkaline mists when engine parts are either placed or removed from the cleaning vats or while cleaning a chassis (spray cleaning). A plastic full face shield is worn while spray cleaning engines.

B. Evaluation Methods and Design

An environmental evaluation of exposures to alkaline mist and solvent vapors was conducted on August 23, 1973 in the cleaning room and chassis cleaning area. Exposures to alkaline mist, cresol/phenol and degreasing vapors were measured via general area samples. An alkaline mist personal air sample was obtained during a spray cleaning operation. Alkaline mist and cresol/phenol vapors were sampled in midget impingers with absorbing solutions. An air sampling tube containing activated charcoal was used to collect chlorinated solvent vapors. The alkaline mist air sample was analyzed for sodium by atomic absorption and reported as sodium hydroxide. Cresol/phenol air samples were analyzed by the 4-aminoantipyrine

method[2] and reported as phenol. The charcoal tube containing methylene chloride was analyzed by the gas chromatographic method reported by White et al.[2] Bulk liquid samples of alkaline cleaner (Calgon P-3000) and degreasing solution (P-3504) were obtained and analyzed. The NIOSH laboratory in Cincinnati, Ohio performed analyses of bulk liquid and air samples collected.

Employees were asked non-directed questions regarding work related health problems. Their responses were recorded and later evaluated with air sampling data.

C. Evaluation Criteria

The occupational health standard promulgated by the U.S. Department of Labor (Federal Register, October 18, 1972, Title 29, Chapter XVII, Subpart G, Tables G-1 and G-2) applicable to individual substances of this evaluation are as follow:

Substances	8-Hour Time-Weighted-Average
Cresol/phenol	5 ppm*
Sodium Hydroxide	2 mg/M^3**
Methylene Chloride	500 ppm

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* Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm Hg pressure

** Milligrams of particulate per cubic meter of air

Recently it has been demonstrated that methylene chloride will induce the formation of carboxyhemoglobin by an unknown mechanism.[3] This will occur with levels as low as 200 ppm and until the exact significance of this finding is determined, the American Conference of Governmental Industrial Hygienists TLV Committee has proposed lowering the acceptable level to 250 ppm.

Occupational health standards for individual substances are established at levels designed to protect workers occupationally exposed on an 8-hour per day 40 hours per week basis over a normal working life time.

D. Evaluation Results and Discussion

1. Environmental

Determination of 8 hour-time-weighted-average exposures to alkaline mist, cresol/phenol and chlorinated solvent (methylene chloride) was complicated since employees are not permanently assigned to the cleaning room or chassis cleaning room. Exposures to these substances are infrequent and brief. Concentrations of air contaminants

found in general room air samples were used to characterize the degree of work room air contamination. Chemical analysis indicated that methylene chloride was the chlorinated solvent in Calgon P-3504 and that sodium hydroxide was the major constituent in Calgon P-2000. Cresol/phenol air samples were collected adjacent to the room temperature degreaser containing Calgon P-3504. During the morning sampling period the degreasers were covered with the exception when dip baskets were either placed or removed from the degreaser. In the afternoon, one of the degreasers was left open. While the degreaser cover was removed a cresol/phenol concentration of 10 ppm was measured. However, normal procedure requires the degreaser to remain covered. It should be noted that a potential health hazard exists if the degreasers are left uncovered.

In sampling the alkaline spray cleaning operation it was difficult to prevent alkaline droplets from entering the air sampling device. Clouds of steam were visible during the chassis cleaning operation which usually lasted twenty minutes. The personal air sample indicating 6.8 mg/M^3 for sodium hydroxide mist was contaminated with concentrated alkaline droplets resulting in an erroneously high value.

2. Medical Interviews

A sample of maintenance shop mechanics were interviewed toward the end of the work shift. Each interview was begun in a non-directed manner to elicit any health complaints and general information regarding working conditions. The employees interviewed were then specifically questioned regarding dermatitis, and eye, nose and throat symptoms. One employee reported a complaint directed to the cresol/phenol odor released during degreaser refilling. This problem can be readily eliminated by spending a few minutes outside the immediate area until the odor clears.

Based on absence of medical symptomatology and low concentrations of degreaser vapors and alkaline mist, when established procedures were followed at the time of this evaluation, it is judged that concentrations found are not toxic to employees. It should be noted that a potential health hazard exists if the degreaser covers are not used and if the full face shield is not used during chassis alkaline spray cleaning.

V. REFERENCES

1. Tentative Method of Analysis for Determination of Phenolic Compounds in the Atmospheric (4-Aminoantipyrine Method) pp. 220-223, Methods of Air Sampling and Analysis, American Public Health Association, Washington, D.C., 1972.

2. White, W. D., D. B. Taylor, P. A. Mauer and R. E. Kupel. "A Convenient Optimized Method for Analysis of Selected Vapors in the Industrial Atmosphere." Am. Hg. Assoc., J. Vol. 31, 225-227, March - April 1970.

3. Steward, R. D., et. al.: Arch. Env. Health, 25, 342 (1972).

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Summary of Air Sample Concentrations
Cummins Northeastern Incorporated
Dedham, Massachusetts

August 23, 1973

Location	Type of Sample	Air Concentrations		
		Phenol/Cresol ppm*	Sodium Hydroxide mg/M^3**	Methylene Chloride ppm
Cleaning room	General Area	0.05	-	
Cleaning room	General Area	0.02	-	
Cleaning room	General Area	10. ***	-	
Cleaning Room	General Area	-	-	11
Chassis cleaning room	Personal	-	6.8****	-
Cleaning room	General Area	-	0.3	
Federal Standard		5.0 ppm	2.0 mg/M^3	500 ppm

* Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 Hg pressure
** Milligrams of Particulate per cubic meter of air
*** Air sample was obtained with cover of the degreaser removed
**** Personal air sample was collected near the breathing zone of the sprayer; full face shield protection was, however, worn by the sprayer.