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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. 75-178-295

New York Telephone and Telegraph Company
770 Broadway
New York, N.Y.

JUNE 1976

I. TOXICITY DETERMINATION

On the basis of the air test results and observed operating conditions during a health hazard evaluation conducted in a New York Telephone Company cable vault at the N.E. corner of 59 St. and Central Park West, New York, N.Y. on January 8, 1976, it was determined that the workers were not exposed to hazardous airborne concentrations of styrene vapors. Routine operations were in progress at the time of this investigation, but the exposure may increase significantly during extended working periods. Therefore, recommendations are being made to assure effective control under prolonged working hours. Lack of sufficient oxygen in the vaults also may create a potential health hazard.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this determination report are available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Copies have been sent to:

- a) New York Telephone Company
- b) Authorized Representative of Employees
- c) U.S. Department of Labor, Region II

For the purpose of informing the affected employees, the employer will promptly post the Determination Report in a permanent place(s) readily accessible to workers 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 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 received such a request from an authorized representative of employees of the New York Telephone Company regarding worker exposure to styrene vapor while coating cable splices with polyester in telephone company cable vaults. The employees are members of Local 1101 of the Communication Workers of America.

IV. HEALTH HAZARD EVALUATION

A. Plant Process - Conditions of Use

When new and replacement telephone cables are installed, the cable ends are spliced and the splices covered with a protective coating. The coating material being used is Kold-Wipe[®], a puttylike polyester containing styrene, which is packaged in bags weighing about three pounds. One ounce tubes of a hardener consisting of 50% benzoyl peroxide and 50% butyl benzyl phthalate also are used.

The operation is generally performed by two workers, one of whom is stationed in the vault below street level while the other remains above ground. Before the vault is entered and periodically thereafter when a worker is in the vault, the vault atmosphere is checked for flammable vapors by means of a combustible gas detector equipped with a long probe extending into the vault through a manhole opening. The oxygen content of the vault is not tested.

In practice, the worker at street level adds the hardener to the polyester and manually kneads the mass. During this time, he wears disposable gloves. When the coating material is of proper consistency, it is dropped through the manhole opening to the operator in the vault. This employee, who also wears disposable gloves, manually shapes the compound around the splice and then covers the splice with a plastic sheet to complete the process. Two to three packages of Kold-Wipe[®] are required per splice, and the entire operation takes about 30 minutes.

Normally, a crew will average one to two splice coatings per week. At times, more than one splice in a vault may be coated. There also may be more than one worker in a vault applying the plastic simultaneously. Occasionally, these operations may be done over a full shift.

The size of the cable vaults varies and access to them is gained through one or more manholes. The vaults are ventilated both naturally through their manhole openings and mechanically by means of a blower located at street level. The blower discharges air through an eight inch diameter flexible duct which is dropped into the vault through the manhole opening. The open end of the duct is directed toward a vault wall away from the splice coating location. Such a blower was in use during the time of this investigation.

Air flow measurements indicated that the volume of air supplied to the vault was approximately 700 cfm. This blower also is used to purge the vaults prior to entry. The purge time varies from 15 minutes to an hour depending on the vault size. The blower is designated as Mopeco ACH-2 and is manufactured by General Cable Corp.

B. Evaluation Design

An initial survey was conducted by NIOSH on January 8, 1976 in a cable vault located at the northeast corner of 59 Street and Central Park West, New York, N.Y. This vault is approximately 20 ft. by 6 ft. by 9 ft. high and is entered by either of two manhole openings. Both the employees and management considered this vault to be a typical work location.

C. Evaluation Methods

Personal air sampling pumps with charcoal tubes were worn by both workers while splice coating operations were in progress. General air samples in the vault also were taken with personal air sampling pumps and charcoal tubes during this time. An additional short term sample was taken to determine peak concentrations. All samples were analyzed for styrene by gas chromatography. Bulk samples of the polyester and hardener also were submitted for analysis. Ventilation measurements were made to determine the capacity of the air supply blower. Both workers were interviewed to determine any health problems.

D. Evaluation Criteria

The evaluation criteria for styrene used in this evaluation is based on the American Conference of Governmental Industrial Hygienists threshold limit value of 100 ppm. The Federal occupational health standard as promulgated by the Occupational Safety and Health Administration of 200 ppm as a ceiling level and a peak concentration of 600 ppm (See Table Z-2 of 29 CFR Part 1910.1000) also were considered.

Exposure to styrene vapor concentrations above 200 ppm causes irritation to the eyes and upper respiratory tract. Cracking and inflammation of the skin due to defatting also may occur. Higher exposures have been reported to cause central nervous system depression and electroencephalographic changes.

E. Evaluation Results

The results of the samples are indicated below:

<u>Sample No.</u>	<u>Flow Rate</u> <u>lpm</u>	<u>Sample</u> <u>Time-Min.</u>	<u>PPM</u>	<u>Description</u>
1	1.8	14.5	2	General air in east end of vault approx. 15 ft. from splice location

E. Evaluation Results - continued

<u>Sample</u>	<u>Flow Rate</u> lpm	<u>Sample</u> <u>Time-Min.</u>	<u>PPM</u>	<u>Description</u>
2	1.8	16	7	General air in west end of vault approx. 2 ft. from splice location
3	1.6	15	16	Breathing zone of worker at street level while mixing
4	.116	15	7	Breathing zone of worker in vault applying plastic
5	2.0	3	2	Breathing zone of worker in vault applying plastic - short term sample for peak concentrations

On the basis of these results and observed operating conditions, the workers were not exposed to hazardous airborne concentrations of styrene vapors. However, only one splice was coated during the time of this investigation, and under extended working periods, the exposure may increase significantly. Even under these conditions, and despite the fact that the highest styrene concentrations were found at the mixing operations, it is felt that the natural outdoor air flow probably will provide sufficient dilution of the vapors to prevent excessive breathing zone levels when mixing is done. In the vaults, however, changes in the existing ventilation practices may be warranted to insure satisfactory air levels under all operating conditions.

Failure of the workers to check the vault's oxygen content also may create a hazardous situation.

The results of the employee medical interviews failed to reveal any symptoms or complaints consistent with exposure to styrene.

F. Recommendations

1. In order to obtain more rapid removal of the styrene vapors from the worker's breathing zone, the flexible hose supplying air to the vault should be positioned to blow the air toward the splice coating location. This technique may be particularly necessary when the splice coating operations are done continuously for more than two to three hours and may require that the supply air be heated during the cold weather.
2. During such extended working times and when splice coating operations are performed in a vault simultaneously by more than one worker, an increased air volume of at least 700 cfm may have to be supplied to the vault to prevent the accumulation of excessive vapor concentrations.

F. Recommendations - continued

3. Prior to entering any vault, tests should be made to determine that the oxygen content of the vault is sufficient. (at least 19.5% by volume)

V. REFERENCES

1. Documentation of the Threshold Limit Values for Substances in Workroom Air, 1971, American Conference of Governmental Industrial Hygienists

VI. AUTHORSHIP AND ACKNOWLEDGMENT

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