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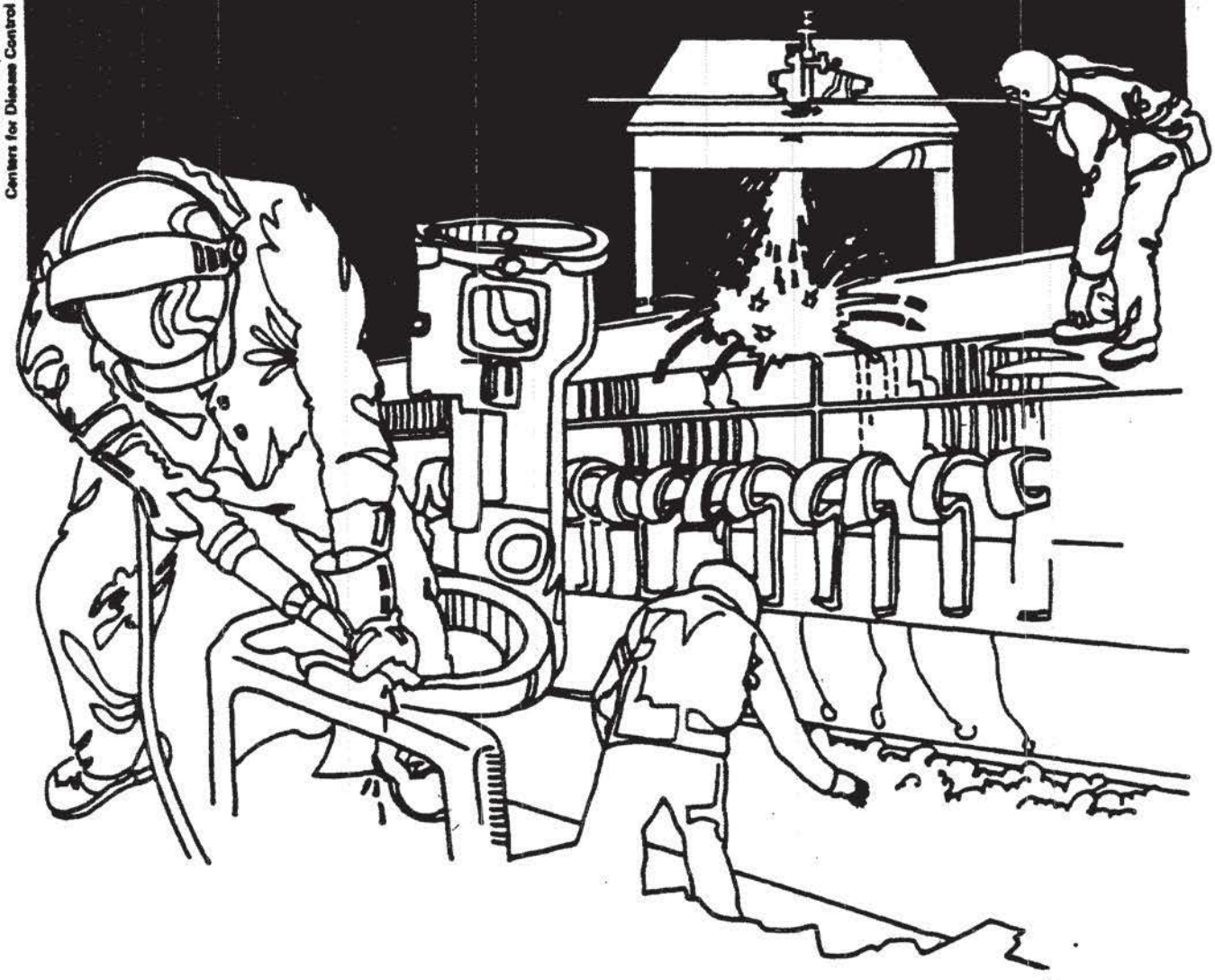

Health Hazard Evaluation Report

HETA 81-275-1122
GENERAL TELEPHONE COMPANY
YORK, PENNSYLVANIA

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.

HETA 81-275-1122
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General Telephone Company
York, Pennsylvania

NIOSH Investigators:
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I. SUMMARY

On April 13, 1981, NIOSH received a request from Local 1451, International Brotherhood of Electrical Workers for a health hazard evaluation at the General Telephone Company of Pennsylvania Service Department in York, Pennsylvania. The request stated that the employees in the office have been recently experiencing sore eyes, sinus problems, headaches and skin irritation.

On May 12, 1981, a NIOSH Industrial Hygienist visited the Service Department to initiate the investigation. A walk-through of the area and non-directed medical interviews were conducted with twenty-one employees. The following health complaints were elicited; sinus, skin and respiratory problems, eye itching/burning, nose itching/burning, dry throat, headaches and face itching. Some of the workers stated that the adverse health problems existed only when handling a yellow carbonless paper.

Five air samples were collected for total dust. The airborne dust concentrations ranged from 0.06-0.20 milligram per cubic meter of air (mg/M^3). The OSHA standard for nuisance dust is 15 mg/M^3. Two atmospheric air samples were collected for formladehyde and the concentrations found were 0.22 mg/M^3. These levels were below the OSHA standard of 3.6 mg/M^3. However, the NIOSH recommended standard is the lowest feasible limit.

During this evaluation, employees handling the carbonless paper were asked to wear white cotton gloves which were analyzed. A bulk sample of the carbonless paper was collected.

The common contaminant in both the gloves and carbonless paper was dibutyl phthalate although other contaminants (diethyl phthalate and dioctyl adipate) were also detected in the gloves. (However qualitative analysis of the carbonless paper did not detect formaldehyde.)

On May 13-14, 1981 a NIOSH dermatologist visited the plant. Thirty-three employees were interviewed and examined, of these, twenty-eight were patch tested. The negative patch tests combined with a general lack of skin findings consistent with allergic contact dermatitis rule out that allergic phenomena are a major problem, however certain individuals may be allergic to a component of the paper.

On the basis of the data obtained in this investigation, NIOSH determined that a health hazard from overexposure to dust and formaldehyde did not exist; however, certain individuals may be allergic to certain components of the carbonless paper (dibutyl phthalates). Recommendations for alleviating this problem are included in the report.

KEYWORDS: SIC 4811 (Telephone Communications), carbonless paper, dibutyl phthalate diethyl phthalate, dioctyl adipate, formaldehyde, inert dust, sinus, skin and respiratory irritation

II Introduction

On April 13, 1981, NIOSH received a request from Local 1471, International Brotherhood of Electrical Workers stating that assigners, service representatives, clerks, dispatchers, switchboard operators and others have been experiencing sore eyes, sinus problems, headaches and skin irritation from unknown substances at the General Telephone Company of Pennsylvania, Service Department, York, Pennsylvania.

III Background

General Telephone Company employees in the Service Department provide services to customers. The employees are engaged in receiving reports of malfunctioning telephone service and requests for new services. The employees distribute the reports to their substations which provide the service requested. The assignments come in by teletype machines or phone. Two machines use carbonless paper which is a paper with an encapsulated ink. Previously, carbon paper was used and there were no complaints. Following the introduction of carbonless paper, the employees started experiencing health effects such as sinus, skin and respiratory problems, eye itching/burning, headaches and face itching. These problems only occur while handling the carbonless paper. This problem abates when they are away from the job and disappears completely when they do not handle the paper. They also stated that the yellow copy was more irritating than the white copy.

IV Evaluation Methods

A. Environmental

On May 12, 1981, the NIOSH industrial hygienist visited the facilities. A visual walk-through survey was conducted, twenty-one employees were interviewed concerning any adverse health effects they may have. Four bulk samples of the carbonless paper were collected. The carbonless paper was subsequently analyzed for formaldehyde, the results were negative.

On August 26-27, 1981, seven air samples were collected for organic vapor utilizing charcoal tubes and air sampling pumps operating at 150 cubic centimeters (cc) per minute. Sampling duration was approximately 15 hours.

During this sample period, seven employees handling the carbonless paper were requested to wear cotton gloves which were subsequently analyzed.

A bulk sample of the carbonless paper which was being handled was collected.

Five environmental air samples were collected on 0.8 micron membrane filters. These samples were subsequently analyzed gravimetrically for total dust.
Two formaldehyde air samples were collected on special treated charcoal filters using a personal sampling pump operating at 50cc per minute. These samples were subsequently analyzed by NIOSH method P&CAM 318. (1)

Relative humidity readings were taken in various locations in the work area utilizing a Bendix psychrometer.

B. Dermatological

Thirty-three employees were interviewed, examined, and of these, 28 were patch tested. The patch tests with carbonless paper were conducted using standard closed patch test techniques, using the unmarked white top sheet, unmarked yellow sheet, and marked yellow sheet as test materials. The tests were read after 48 hours.

An interim report was sent June 1981 containing the results of the non directed interviews and what future actions were to be taken.

V Evaluation Criteria

Substance*	OSHA	NIOSH	ACGIH3
Diethyl phthalate	-	-	5
Dibutyl phthalate	5	-	5
Dioctyl adipate	-	-	-
Formaldehyde	3.6 TWA	LFL**	-***

* Denotes milligrams of substance per cubic meter of air samples.
** Denotes Lowest Feasible Limit
*** Industrial Substances Suspect of Carcinogenic Potential for Man.

Diethyl phthalate (4,5,6)

Diethyl phthalate is generally regarded as having little acute or chronic toxic properties. It has been widely used as a plasticizer in cellulosic materials and seems to be devoid of any major irritant or sensitizing effects on the skin. Exposure to heated vapor may produce some transient irritation of the nose and throat. There are no reports of effects in its occupational use.

However, it has been reported in literature (6) that diethyl phthalate is an irritant to the mucous membranes and a central nervous system depressant when absorbed.

Dibutyl phthalate (5,7)

Extensive experience with dibutyl phthalate as an insect repellant has shown that it is relatively non-irritating to the skin, eyes, and mucous membranes. Aerosols from heated dibutyl phthalate may cause irritation of the eyes and upper respiratory tract. In one report of a human case, accidental ingestion of ten grams of this compound by a chemical operator produced nausea and dizziness with lacrimation, photophobia, and conjuctivitis, but recovery was prompt and uneventful. Animal experiments to determine dermal and oral toxicity of dibutyl phthalate showed that extremely high doses were considered necessary to produce toxic effects. Dibutyl phthalate was found to be teratogenic by intraperitoneal injection of doses representing 1/10, 1/5, and 1/3 of the LD50 value into female rats at the 5th, 10th and 15th day of gestation. This probably is of no significance in industrial exposures.

Although no specific information has been reported on the local irritative effects of dibutyl phthalate, the phthalate esters closely related to dibutyl are regarded as inert. They rarely cause skin difficulties, but are somewhat irritating to the eyes and nose.

From the standpoint of hazard by inhalation, the dibutyl ester should present little problem because of its low vapor pressure; inhalation of significant amounts would occur only by spray or mist exposures.

A TLV of 5 mg/M3 is recommended more from the standpoint of controlling excessive airborne mists of dibutyl phthalate rather than as a health measure.

Dioctyl adipate (4)

Adipic esters are extensively used as plasticizers and, to a lesser extent, in liquid cosmetic preparations. They possess low acute toxicity and their irritant effect on the skin and eye is very slight.

Formaldehyde (8,9)

Local - Formaldehyde gas may cause severe irritation to the mucous membranes of the respiratory tract and eyes. The aqueous solution splashed in the eyes may cause eye burns. Urticaria has been reported following inhalation of gas. Repeated exposure to formaldehyde may cause dermatitis from irritation or allergy.

Systemic - Systemic intoxication is unlikely to occur since intense irritation of upper respiratory passages compels workers to leave areas of exposure. If workers do inhale high concentrations of formaldehyde, coughing, difficulty in breathing and pulmonary edema may occur. Ingestion, although usually not occuring in industrial experience, may cause severe irritation of the mouth, throat, and stomach.

NIOSH recommends that formaldehyde be handled as a potential occupational carcinogen and that approriate controls be used to reduce worker exposure. These recommendations

are based primarily on a Chemical Industry Institute of Toxicology (CIIT) study in which laboratory rats and mice exposed to formaldehyde vapor developed nasal cancer, and are supported by a New York University study where rats exposed to a mixture of formaldehyde and hydrochloric acid vapors developed nasal cancer. Formaldehyde has also been shown to be a mutagen in several short-term laboratory studies.

VI Results

A. Environmental

a. Total Dust - Five samples of the environmental air were collected with MSA model G pumps operating at 1.7 liters per minute and closed face cassettes containing 2.0 um polyvinyl chloride filters. These samples were analyzed gravimetrically The same filters were used on two consecutive days. The dust concentrations ranged from 0.06 to 0.20 milligrams per cubic meter (mg/m3) air sampled. The OSHA standard is 15 mg/m3.

b. Formaldehyde - Two samples of the environmental air were collected for formaldehyde gas. The samples were collected on specially treated charcoal tubes with a sampling pump operating at 50cc per minute. These samples were analyzed by NIOSH method P&CAM 318. Analysis of these samples showed that the airborne concentrations in both samples was 0.22 milligram per cubic meter of air. These levels can be attributed to the fact that in both areas where sampling was being done, there was also cigarette smoking which would produce formaldehyde. A qualitative test of the paper showed that no formaldehyde was present.

c. Organics (Diethyl phthalate, dibutyl phthalate, dioctyl adipate) - Environmental air samples collected on charcoal tubes showed no significant peaks of any air contaminants.

The methylene chloride extract of the gloves was qualitatively analyzed. The major peaks identified were diethyl phthalate, dibutyl phthalate and dioctyl adipate. Dibutyl phthalate was also present in the bulk sample of the carbonless paper. No quantitive analysis on the gloves or carbonless paper was done as the quantities were small.

d. Relative Humidity - Percentage relative humidity (%RH) readings were determined both indoors and outdoors on August 26,-27, 1981 utilizing a psychrometer. On August 26, 1981 the % RH ranged from 50-58, while on August 27, 1981 the % RH ranged from 54-61. The outdoor % RH ranged from 47-74. Since the employees complained of respiratory irritation, the % RH readings were taken. Authorities recommend 30-70% RH.

B. Medical

A dermatologic evaluation was conducted as part of the investigation into the occurrence of headaches, eye and skin irritation occurring among office workers. Based upon preliminary data, exposure to and handling of carbonless copy paper seemed to be both temporally and physically related to the symptoms. Therefore, patch test on

employees exposed to carbonless paper were performed.

Thirty-three employees were interviewed, examined, and of these, 28 were patch tested. Fifteen individuals had moderate to high exposure to the paper, and/or a history of eye or skin problems apparently associated with this exposure. The other thirteen had little or no exposure to the paper and no complaints. The patch tests were conducted using standard closed patch test techniques, using the untreated white top sheet, treated but unmarked yellow sheet, and marked yellow sheet as test materials, and the tests were read at 48 hours. Of the 33 employees interviewed and examined, 7 had skin problems. Three had eczema, 1 peri-oral dermatitis, 1 acne, 1 post influenza and 1 neurotic excoriation.

Of the 28 employees who were patch tested, 27 were negative and 1 employee did not return for an examination.

VII Conclusions

The negative patch tests combined with a general lack of skin findings consistent with allergic contact dermatitis all but rule out the possibility that allergic phenomena are a major problem in this case. It is still possible, however, that an occasional individual may be allergic to a component of the copy paper or some other material in the work environment. The environmental results indicate the lack of any overexposure to known hazards. However, solvents were detected, albeit at low levels. The type of symptoms described and the eczematous skin findings, demonstrated by three individuals would be consistent with an irritant reaction to solvent exposure. However, 33 individuals, and the symptoms described could be real or the result of extensive discussions among the workers, or a combination of the two. The adverse health effects cannot be attributed to any of the occupational exposures, yet the minimal solvent exposure cannot be ruled out as a contributing factor in the symptoms described.

Following the initial visit of May 12, 1981, maintenance engineering work was performed on the air handling system. This entailed readjusting and cleaning the system and approximately 20% outside air was introduced. The employees also felt that more outside air was being introduced. This appeared to alleviate the employee health complaints.

VII Recommendations

Establish a periodic maintenance program on the air handling system.

IX Authorship and Acknowledgements

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X Distribution and Availability

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, OH 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), Springfield, VA. Information regarding its availablity through NTIS can be obtained from NIOSH, Publication Office at the Cincinnati address.

Copies of this report have been sent to:

1. General Telephone Company
2. President, Local 1451, IBEW
3. NIOSH, Region III
4. OSHA, Region III

For the purpose of informing the 100 employees of the results of the General Telephone Company survey, the employer shall promptly "post" for a period of 30-calendar-days the Determination Report in a prominent place(s) near where employees work.

XI References

1. NIOSH Manual of Analytical Methods, Vol. 6, NIOSH Publication #80-125, August 1980
2. U.S. Department of Labor, Occupational Safety and Health Administration, Federal Register, Vol., 39, No. 125, June 27, 1974 (Revised July 1, 1980)

3. American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment 1981
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6. Gosselin, Hodge, Smith, Gleason, Clinical Toxicology of Commercial Products, Fourth Edition, 1981
7. NIOSH/OSHA, Occupational Health Guidelines for Chemical Hazards, (NIOSH) Publication #81-123, January 1981
8. NIOSH Criteria for a Recommended Standard, Occupational Exposure to Formaldehyde, Publication #77-126, December 1976 (NIOSH)
9. NIOSH Current Intelligence Bulletin 34, April 15, 1981

TABLE I

GENERAL TELEPHONE COMPANY
YORK, PENNSYLVANIA
HHE 81-275

AUGUST 26-27, 1981

TOTAL AIRBORNE DUST IN WORK ENVIRONMENT

SAMPLE #	LOCATION	TIME	AIRBORNE CONCENTRATIONS*
M5-994	EAX Teletyper	8-26-81 08:25-16:14 8-27-81 08:30-15:25	0.16
M5-990	Assignment Printer	8-26-81 08:21-16:18 8-27-81 08:25-15:34	0.08
M5-984	Assignment Desk	8-26-81 08:26-16:18 8-27-81 08:25-15:19	0.20
M5-1001	EAX Typing	8-26-81 08:19-16:14 8-27-81 08:35-15:25	0.06
M5-999	Teletype Enclosed Room	8-26-81 08:31-16:18 8-27-81 08:25-15:34	0.11

*Denotes milligram of dust per cubic meter of air sampled

TABLE II

General Telephone Company
York, Pennsylvania

HETA 81-275

August 26-27, 1981

Results of Atmospheric Air Sampling for Formaldehyde

Sample #	Location	Air Sample Period	Airborne Concentrations*
1	Enclosed Room Printer	14:30-16:18 08:15-15:34	0.22
2	Assignment Printer	14:30-16:18 08:15-15:35	0.22

* Denotes millligram of formaldehyde per cubic meter of air samples.