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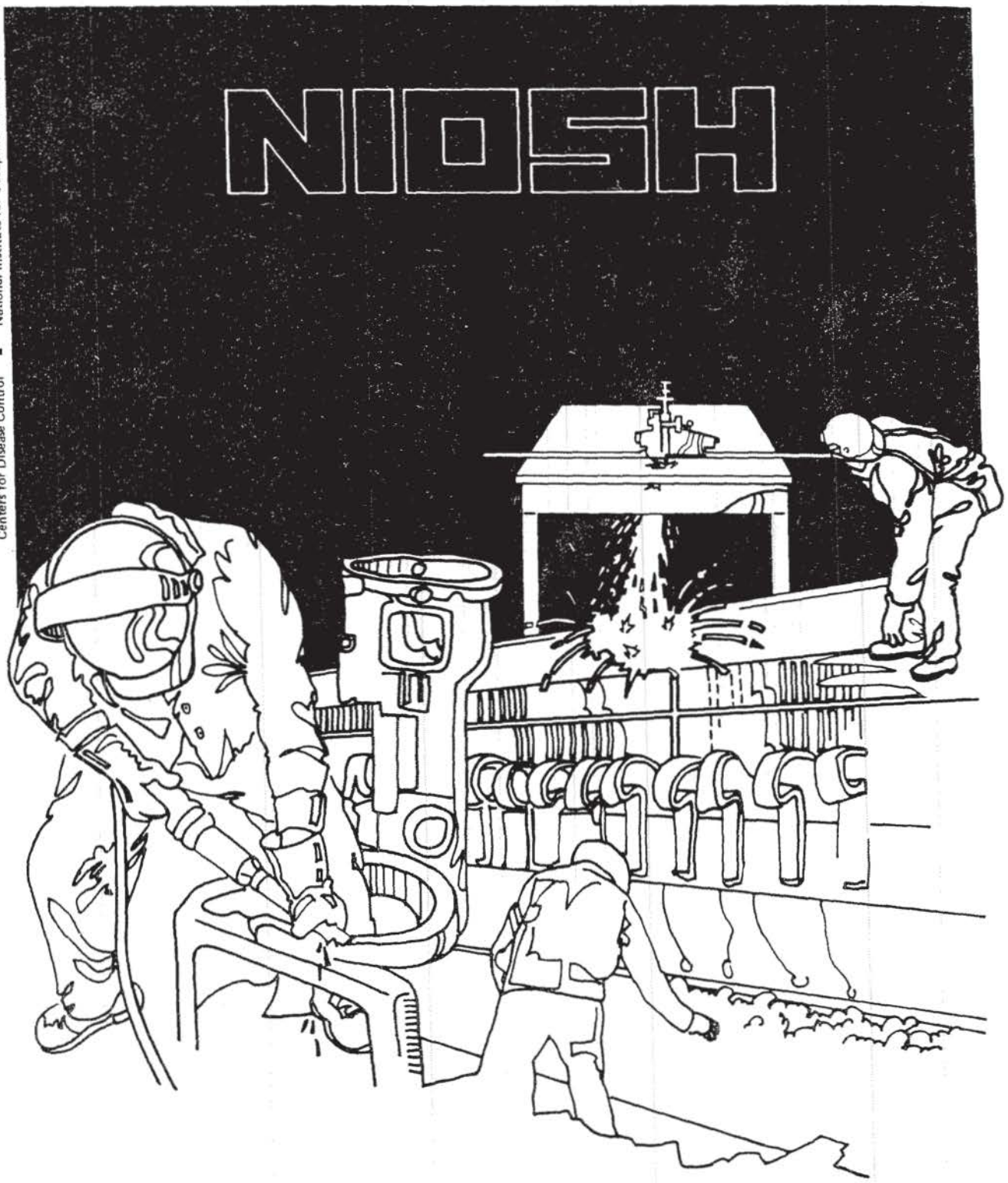

Health Hazard Evaluation Report

HETA 81-164-982
PACIFIC TELEPHONE COMPANY
SAN FRANCISCO, CALIFORNIA

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Pacific Telephone Co.
San Francisco, CA.

NIOSH INVESTIGATORS:
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I. SUMMARY

On February 9, 1981, the National Institute for Occupational Safety and Health received a request for a health hazard evaluation from a representative of the Communications Workers of America, District No. 9. The requestor was concerned that Pacific Telephone office employees working on the first four floors at 215 Fremont Street, San Francisco, CA., may be exposed to vehicle emissions from street traffic (carbon monoxide fumes) entering the intake ventilation system located on the roof of the building. There were also complaints that the air conditioning unit did not work properly resulting in overcooling or overheating and dry air.

NIOSH conducted an environmental survey on April 9, 1981. Air sampling was conducted on all four floors for carbon dioxide, nitrogen dioxide, and sulfur dioxide using Drager® gas detector tubes. Carbon dioxide concentrations were below the limit of detection (less than 0.1 percent) of the detector tube, and no nitrogen dioxide and sulfur dioxide were detected. Peak carbon monoxide (CO) concentrations were measured at random intervals during the day. Peak CO concentrations ranged from 2.5 - 4.0 ppm (parts of a vapor or gas per million parts of air). These concentrations are well below the NIOSH recommended criteria (200 ppm ceiling) or the 35 ppm - 8 hour time-weighted average. Six general area air samples were collected for formaldehyde. No formaldehyde vapors were detected on the specially impregnated charcoal tubes.

Dry bulb temperature measurements were taken at two locations (first and fourth floor). The first floor dry bulb and wet bulb temperatures were 72 degrees F and 58.5 degrees F respectively with a 41 percent relative humidity. The fourth floor measurements were approximately the same. These measurements are considered to be within the comfort control range (72 - 79 degrees F, relative humidity 20-60 percent) recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers. There were no health complaints aside from discomfort due to overheating or overcooling.

Based on the environmental air sampling results during the date of this survey, overexposures to carbon monoxide, carbon dioxide, nitrogen dioxide, sulfur dioxide and formaldehyde did not exist. Also, excessive temperatures due to overheating or overcooling and excessive relative humidity ranges were not measured on the day of this survey.

KEYWORDS: SIC 9999 (OFFICE WORKERS) diesel and gasoline fumes, carbon monoxide, nitrogen dioxide, sulfur dioxide, formaldehyde.

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.

II. INTRODUCTION

On February 9, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation (HHE) from an authorized union representative of the Communications Workers of America (CWA), District 9 at San Francisco, California. The requestor was concerned that Pacific Telephone office workers on the first four floors at 215 Fremont Street, San Francisco, California may be exposed to street traffic exhaust fumes (carbon monoxide) entering the intake ventilation system located on the roof of the building. Also, there were complaints of either overheating or overcooling and dry air.

NIOSH conducted an environmental survey on April 9, 1981. Environmental air sampling was conducted on all floors for all possible vehicle exhaust fumes (carbon monoxide, carbon dioxide, nitrogen dioxide, sulfur dioxide and formaldehyde) which could emanate from gasoline and diesel exhaust systems.

Dry and wet bulb temperature measurements were taken at several locations, and the respective relative humidity was calculated for each temperature reading.

III. BACKGROUND

Pacific Telephone leases four floors of office space at 215 Fremont Street, San Francisco, California from Continental Development Corporation. Approximately, 125 office workers work an 8 hour day, 5 days per week shift.

NIOSH previously received a health hazard evaluation request (HHE 81-054) from an authorized employee representative of the Environmental Protection Agency to investigate diesel fume odors throughout the building. Even though EPA employees only occupy the fifth and sixth floors, it was alleged that workers on all floors complained of engine exhaust odors. Consequently, an authorized representative of the CWA submitted a HHE request to investigate the first four floors occupied by Pacific Telephone. Both studies were conducted the same day in order to characterize the entire building.

IV. HAZARD EVALUATION DESIGN

A. Evaluation Criteria and Health Effects

Occupational exposure criteria have been developed to evaluate workers's exposure to chemical substances. Two sources of criteria were used to assess the workroom concentrations: (1) NIOSH Criteria for a Recommended Standard, and (2) California Occupational Safety and Health Administration (CAL-OSHA) Standards. These values represent concentrations to which it is believed that nearly all workers may be exposed for an 8 hour day, 40 hour week throughout a working lifetime without experiencing adverse health effects.

TABLE A

Substance	Time-Weighted Average (TWA)[a]	Ceiling Value
Carbon Monoxide (NIOSH)	35 ppm	200
Carbon Monoxide (CAL-OSHA)	50 ppm	400
Carbon Dioxide (NIOSH)	10,000 ppm	30,000 (10 min.)
Carbon Dioxide (CAL-OSHA)	5,000 ppm	-
Nitrogen Dioxide (NIOSH)	-	1 (15 min.)
Nitrogen Dioxide (CAL-OSHA)	5	5
Sulfur Dioxide (NIOSH)	0.5 ppm[b]	-
Sulfur Dioxide (CAL-OSHA)	5.0 ppm	-
Formaldehyde (NIOSH)	Lowest feasible limit	-
Formaldehyde (CAL-OSHA)	2	2

(a) TWA - NIOSH exposure is based on a workday up to 10 hours long, whereas CAL-OSHA Standard is based on an 8 hour workday.
(b) ppm - Parts of a vapor or gas per million parts of contaminated air by volume.

B. Environmental Monitoring

Environmental area air sampling was conducted at the following locations: First floor - Requirements unit, second floor - exchange/special services, third floor - long lines pad and special services business center, fourth floor BSE Engineering group and stationary design engineering. Carbon dioxide, sulfur dioxide and nitrogen dioxide was sampled at each location using direct reading Drager® gas detector tubes. Carbon monoxide air concentrations were measured using a direct reading instrument (Ecolyzer®). Formaldehyde air samples were collected using a sampling train consisting of a vacuum pump and a specially impregnated charcoal tube through which a known volume of air was drawn. NIOSH Physical and Chemical Analytical Method 318 was followed with minor variations in the preparation and analysis of samples.[1]

A Bendix psychrometer (Model 566) was used to measure dry and wet bulb temperatures from which the relative humidity was calculated.

C. Toxicological Effects

Gasoline and Diesel Exhaust

Engine exhaust contains many different chemicals and materials, only some of which have been analyzed. A few of these chemicals are most likely to cause immediate irritation to people who may be inhaling them.

(1) Carbon monoxide (CO)

CO prevents the blood from carrying oxygen from the lungs to the tissues. There are small amounts of CO in most smokes (cigarettes, auto exhaust, etc.). CO causes headache and drowsiness at low levels. Diesel fumes contain smaller amounts of CO than gasoline combustion fumes, and CO is considered generally a less serious potential problem in diesel fumes.

(2) Carbon dioxide (CO_2)

CO_2 is a simple asphyxiant. Signs and symptoms of exposure, depending on the concentration present and duration of exposure may include headache, dizziness, restlessness or increased heart rate. "After several hours of exposure to 2 percent (20,000 ppm) subjects develop headache and dyspnea during mild exertion."[2]

(3) Formaldehydes and other aldehydes:

Formaldehyde is best known for its use by embalmers and morticians to preserve dead bodies and tissues. It has a sharp odor which can be smelled at very low levels (less than 1 part in a million parts of air, or 1 ppm). At levels between 1-5 ppm, formaldehyde makes the eyes water and sting. At 20 ppm, many people notice stinging or prickling in the throat and nose. Low levels -- 0.3 to 2.7 ppm -- have also been found to disturb sleep and to be irritating to a smaller number of people. (1)(2)(10)

Other aldehydes -- such as acrolein -- also cause irritation to the nose, throat, eyes and lungs at even lower levels of air concentrations.

(4) Nitrogen dioxide (NO_2)

NO_2 is well known as the gas which makes smog over large cities like Los Angeles turn yellow or yellow brown. This gas also causes irritation of the nose, throat, and lungs at low levels (5 ppm). It may cause cough and phelgm (mucous) which persist at these levels. At higher levels, 50 ppm or more, NO_2 will cause serious swelling in the lungs, and in some cases permanent lung damage.(2)

(5) Sulfur dioxide (SO_2)

SO_2 causes symptoms of irritation similar to those caused by NO_2 and formaldehydes.

V. RESULTS AND DISCUSSION

Environmental air sampling was conducted for diesel and gas fumes generated by street traffic vehicles. There was concern that diesel and gas fumes could enter the ventilation intake ducts located on the roof of the building. Workers reported no health complaints; however, several workers complained about overheating or overcooling.

No sulfur dioxide or nitrogen dioxide was detected on any of the gas detector tubes. Carbon dioxide concentrations were below the limit of detection (less than 0.1 percent) of the gas detector tube. Carbon monoxide peak measurements were taken at various intervals of the day. The concentrations ranged from 2.5 - 4.0 ppm (parts of a vapor or gas per million parts of air). These concentrations were well below the NIOSH recommended criteria and CAL-OSHA standard listed in Table A.

Six area air samples were collected for formaldehyde; however, none was detected on either section of the impregnated charcoal tube. The analytical limit of detection was four and two micrograms for the front and backup section of the charcoal tube respectively.

Temperature measurements (dry bulb and wet bulb) were taken in the late afternoon on the first and fourth floors. Also, the relative humidity was calculated from these two temperature measurements. The first floor was measured to have a dry bulb temperature of 72 degrees F, wet bulb temperature of 57.5 degrees F, and a relative humidity of 40 percent. The fourth floor was measured to have a dry bulb temperature of 74 degrees F, wet bulb temperature of 58.5 degrees F and a relative humidity of 41 percent. These temperatures and relative humidity are within the comfort control range (dry bulb temperature range - 72 degrees to 79 degrees F and relative humidity range - 20-60 percent) recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).[3] It should be mentioned that ASHRAE recommends a ventilation rate for general offices of 15 cubic feet per minute per occupant.

VI. CONCLUSIONS

Based on the environmental air concentrations measured during this survey, no overexposures to diesel or gasoline exhaust fumes (carbon monoxide, carbon dioxide, nitrogen dioxide, sulfur dioxide or formaldehyde) were measured. Also, no excessive temperatures were measured and relative humidity was calculated to be within the comfort range.

VII. REFERENCES

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IX. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Communications Workers of America, District 9, San Francisco, California
2. Pacific Telephone Company
3. OSHA, California
4. OSHA, Region IX
5. NIOSH, Region IX

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