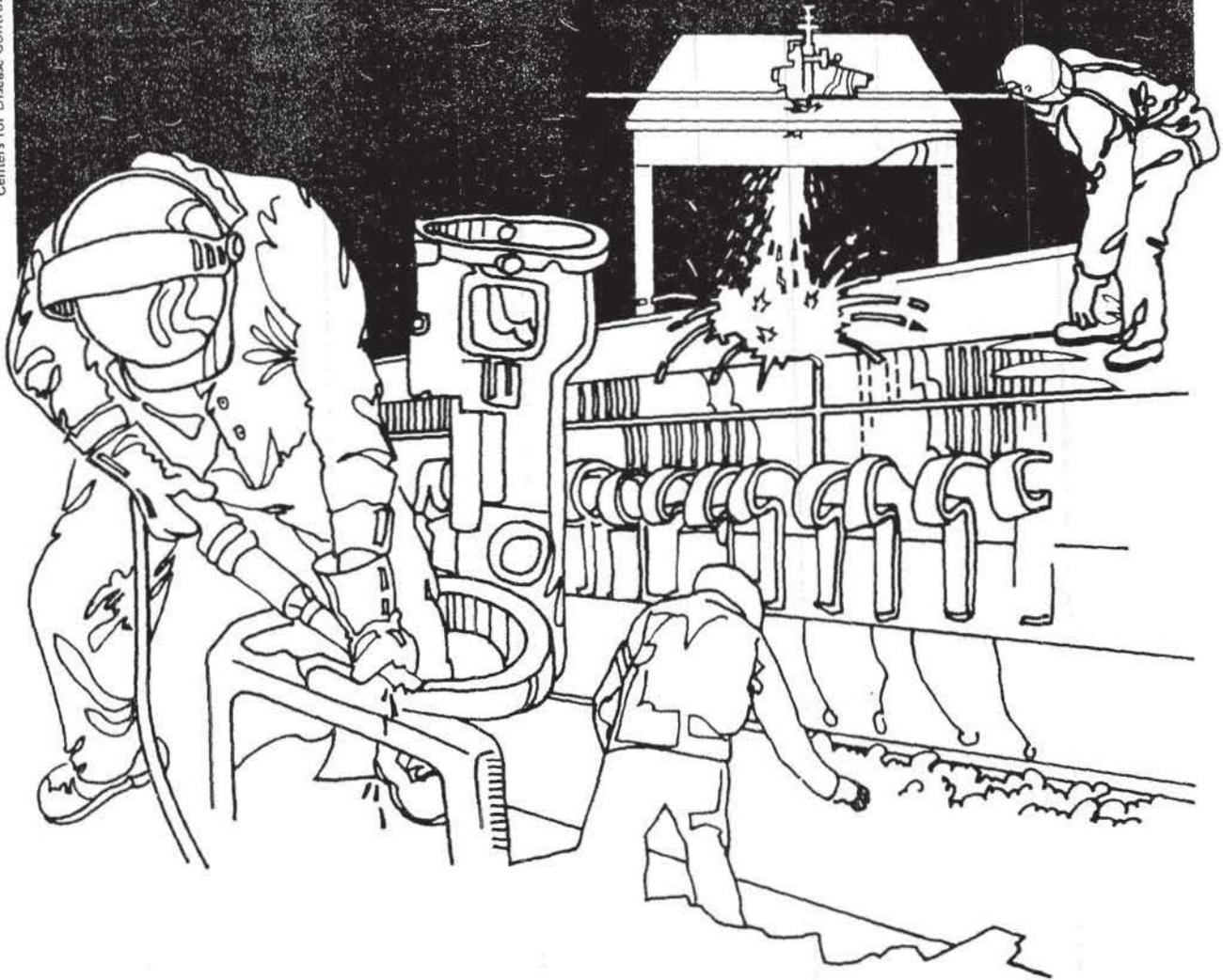


NIOSH



Health Hazard Evaluation Report

HETA 81-181-895
MAIMONIDES HOSPITAL
BROOKLYN, NEW YORK

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.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

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Maimonides Hospital
Brooklyn, NY.

NIOSH INVESTIGATORS
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I. SUMMARY

In February, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request to perform a health hazard evaluation at the data entry office of Maimonides Hospital, 4802 Tenth Avenue, Brooklyn, N.Y. 11219. Eight employees work in the office, which is located in the basement of a three level parking garage across the street from the main hospital building. The employees have been experiencing intermittent episodes of eye irritation, headache, drowsiness and objectionable odors since moving into their present quarters in October, 1979. The hospital's administration had been made aware of the situation, and had employed an industrial hygiene consulting firm to investigate the problem. The consultants determined that the illness episodes were related to air-borne contaminants from the parking garage which were introduced into the office through the air supply system.

The intake port for the air supply system is located on the south side of the garage, at the second level. Carbon monoxide concentrations had been found by the consultants to vary from 2 to 28 parts per million parts of air (ppm). During the latter part of March, baffles were constructed around the intake port in an effort to limit the infiltration of automobile exhaust products into the air supply system. Determinations made by NIOSH representatives after the construction of the baffles indicated that carbon monoxide concentrations were 6 ppm or less. (NIOSH recommends that average exposures be limited to 35 ppm or less for up to a 10-hour work day, 40-hour work week; the OSHA permissible exposure limit for carbon monoxide is 50 ppm for an 8-hour work day, 40-hour work week.) Air is supplied to the data entry office at about 1700 cubic feet per minute (cfm), equivalent to 8 1/2 air changes per hour. The air velocity at the intake grills is 400 to 600 linear feet per minute. However, due to poor air distribution patterns, air circulation at desk top level was less than 15 linear feet per minute.

Measurements both before and after the baffles were constructed indicate that carbon monoxide concentrations in the data entry office were within NIOSH recommended exposure limits. Exposures to carbon monoxide apparently have been reduced by changes in the air supply system. However, employees still complain that odors from the garage intermittently seep into the office area through a door in the rear of the office. NIOSH recommends that this door be equipped with stripping to reduce seepage, and that the air intake grills in the office be equipped with louvers to better distribute air circulation at the work level.

KEYWORDS: SIC 8062 (General Medical and Surgical Hospitals), data entry, garages, carbon monoxide.

II. INTRODUCTION

In February, 1981 the National Institute for Occupational Safety and Health (NIOSH) received a request from District 1199, National Union of Hospital and Health Care Employees, to investigate environmental conditions at the data entry office of Maimonides Hospital, 4802 Tenth Avenue, Brooklyn, N. Y. 11219. The employees complained of eye irritation, headaches, drowsiness, dry throats and objectionable odors. Representatives of NIOSH interviewed employees on March 23, 1981 and conducted environmental monitoring on April 8, 1981.

III. BACKGROUND

In October, 1979, the data processing division of Maimonides Hospital was moved into new quarters in the basement area of a parking garage across the street from the main hospital building. The quarters consist of a supervisory office, tape storage/computer room, collating room, rest room and data entry office. Eight persons work in the data entry office, 4 in the supervisory office and 2 in the computer room. Although employees working in the other areas of the office suite expressed similar complaints of intermittent headaches, etc., the most persistent symptoms occurred among the data entry clerks. The data entry staff consists of seven clerks and one supervisor. Normal work hours are from 9 AM to 5 PM. The work consists of encoding billing information, etc. into a computer by means of a keyboard equipped with a video display terminal, verification and of some keypunching. The data entry office is approximately 30' x 40' with a 10' ceiling. Tempered air is supplied to the office by means of three grills, running down the center of the room. The air is supplied to the office at a rate of 1680 cubic feet per minute (cfm). There is one exhaust grill, near the ceiling on the rear wall.

Complaints of odors began in November, 1979 shortly after moving into the new site. The complaints increased during December, 1980 when changes in street parking regulations resulted in increased use of the parking garage.

The hospital's administration hired the services of an independent industrial hygiene consulting firm to investigate environmental conditions. The consultants performed a survey of environmental conditions on February 3, 1981. As a result of the survey, it was determined that the contaminants entered the data entry office through the air supply system, from the air intake port on the side of the garage. Automobiles were positioned near the intake port, their engines were "reved-up" and environmental samples were collected at the intake port and in the data entry office. Low concentrations of organic compounds (identified as

trichlorotrifluoroethane, tetrachloroethylene, toluene or cycloheptriene and benzene) and carbon monoxide were detected in both locations. The consulting firm attributed the presence of these compounds to contamination from automobile exhausts and/or a near-by incinerator which was in operation at the time of the sampling. In March, 1981, the hospital had 10' wide baffles constructed around the intake port, creating a wall between the intake port and the second level of the garage. Employee's symptoms eased after the construction of the baffles.

IV. METHODS

On the initial site visit, NIOSH interviewed 6 of 7 data entry clerks and all other employees in the basement area. Employees were asked about symptoms, past medical conditions, and environmental complaints.

It was agreed by the union representative and the hospital administration, that NIOSH also would conduct environmental measurements to determine the effectiveness of the baffles in controlling the introduction of contaminants into the intake port. It was decided to monitor the concentration of carbon monoxide, using a portable, direct reading carbon monoxide analyzer with a continuous recording device. This decision was made because of the urgency of having instantaneous results. The data entry staff believed that the conditions were worse early in the morning and late in the afternoon; times when the garage traffic would be maximal. The recording chart would quickly illustrate if increased traffic resulted in increased concentrations of carbon monoxide. The data entry clerks also complained of "lack of air" or "closeness". It was decided to measure air movement and relative humidity, as these conditions are most directly related to these physical complaints.

V. EVALUATION CRITERIA

Exhaust from automobiles may contain carbon monoxide, aldehydes and oxides of nitrogen. Aldehydes and oxides of nitrogen in low concentrations may be responsible for symptoms of eye and upper respiratory tract irritation. Carbon monoxide may cause tissue hypoxia by preventing the blood from carrying sufficient oxygen. Exposure to high concentrations (500 to 1000 ppm) causes the development of headache, tachypnea, nausea, weakness, and mental confusion. Lower exposures may cause transient, milder symptoms.

NIOSH recommends that the average exposure to carbon monoxide be limited to 35 ppm or less for up to a ten-hour work day, 40-hour work week. The Federal occupational health standard, promulgated by the Occupational Safety and Health Administration, U.S. Department of Labor (29 CFR 1910.1000), for carbon monoxide is 50 ppm for an eight-hour work day, 40-hour work week.

VI. RESULTS AND DISCUSSION

A. Employee Interviews

All employees interviewed noted frequent odors of "car exhaust." Secretaries in the supervisory office recalled smelling these odors in the data entry room, but not in their own offices. Symptoms among the data entry clerks included tearing and irritated eyes, dry mouth, headache, dizziness, and fatigue or malaise in the late afternoon. Past medical histories were non-contributory; 4 of 7 data entry clerks smoked cigarettes. Car exhaust odors reportedly were present intermittently during the day, but increased from 3:30 to 5:30 p.m. during the change of shift for most hospital employees. They noted that the problem became worse after local parking regulations were changed, resulting in increased use of the parking garage. The odors and health symptoms improved after baffles were installed around the intake vent on the second level of the garage.

One employee in the data entry area became lightheaded and dizzy on March 19, 1981, and was sent to the hospital emergency room. (This was the week before the baffles were installed.) Other than mild hypertension, her physical examination and arterial blood gases were within normal limits. Carbon monoxide levels were not obtained. She was treated with oxygen and released. No other employees have required medical treatment for this exposure.

Employees throughout the basement office area also noted that the area was subject to temperature extremes, especially during the few days after the outside temperature had changed substantially. The engineering department of the hospital is responsible for regulating the office's thermostat. They apparently are aware of the problem and try to respond as soon as they are available.

B. Environmental Monitoring

Continuous monitoring of carbon monoxide levels revealed that concentrations were approximately 3 ppm from about 9:15 A.M. to 3 P.M., when they increased to approximately 6 ppm. Concentrations were determined to remain at this level until 5:15 P.M., when the measurements were ended. The concentrations were uniform throughout the data entry office (and the rest of the office suite). The only source for the increase was from the air handling system intake. Presumably the construction of baffles around the entry port has limited the entry of greater concentrations of carbon monoxide into the air supply system.

At about 3:30 P.M., an odor of automobile exhaust occurred near a rear door, which leads to a stairway to the first level of the garage. The employees stated that this odor occurred almost every afternoon. Increased traffic in the garage at this time of day is the probable source of this odor.

Temperature in the data entry office was 75-76°F. The temperature in the supervisory office was 70-72°F. These temperatures are in the comfort range. Outdoor temperatures were in the low 60s. The building's engineer regulated the data entry office at a slightly higher temperature to suit the entry clerks' preference.

The relative humidity ranged from 22% to 26% in the data entry and supervisory offices. Outdoor relative humidity, as provided by the telephone weather service, was in the mid-30% range. The relative humidity was within the comfort range.

The velocity of the air leaving the fresh air inlets was 400 to 600 linear feet per minute (lfm). The air velocity entering the return air duct was 300 to 400 lfm. The air velocity at desk-top level was less than 15 lfm, the lower limit of detection of the instrument used. The engineer stated that the data entry office was supplied with approximately 1700 cfm. Considering the area of the inlet and return grills, the air movement measurements roughly confirmed this figure. 1700 cfm would supply about 8 1/2 air changes per hour to the data entry office, which corresponds well to the 6 to 8 air changes per hour recommended by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. However, most of the air movement is along the ceiling from the entry grills to the exhaust grill. Air movement at desk-top level was less than 15 lfm, the limit of detection of the instrument used. The data entry clerks complained of "lack of air" and "stuffiness". Very little air movement could be perceived at desk-top level.

VII. CONCLUSIONS AND RECOMMENDATIONS

Carbon monoxide concentrations were within acceptable levels. NIOSH's recommended standard is 35 ppm, time weighted average, for up to a 10 hour work-day, 40 hour work-week. The Occupational Safety and Health Administration (OSHA) has established a Permissible Exposure Limit of 50 ppm, time weighted average, for up to an eight hour work-day, 40 hour work-week.

There was no perceptible air movement at desk-top level. The air intake grills should be equipped with louvers to better distribute air movement within the office.

An intermittent odor of automobile exhaust was perceptible near the stair-well door in the late afternoon. The door should be equipped with stripping to reduce the occurrence of odors seeping from the garage into the data entry office.

VIII. AUTHORSHIP AND ACKNOWLEDGEMENTS

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IX. DISTRIBUTION AND AVAILABILITY OF REPORT

For the purpose of informing affected employees, the employer shall promptly post this report for 30 days in a prominent place(s) near where exposed employees work. 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, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22151. 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. Maimonides Hospital, Brooklyn, New York
2. District 1199, National Union of Hospital and Health Care Employees, N.Y., N.Y.
3. U.S. Department of Labor, O.S.H.A., Regional Office, N.Y., N.Y.
4. U.S. Department of Health and Human Services, NIOSH, Regional Office, N.Y., N.Y.
5. N.Y. State Department of Health, Albany, N.Y.