U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. HE 79-134-638

HISTORIC ATLANTA LOCAL DEVELOPMENT COMPANY
ATLANTA, GEORGIA

DECEMBER 1979

I. TOXICITY DETERMINATION

The National Institute for Occupational Safety and Health (NIOSH) conducted a health hazard evaluation in the office of the Historic Atlanta Local Development Company (HALDC) located in the Old Atlanta Railroad Freight Depot, Atlanta, Georgia. An initial survey was completed August 20, 1979, and two follow-up visits were made September 27 and October 21, 1979. Based on the results of these investigations it has been determined that the symptoms reported by the HALDC employees (eye, nasal, throat irritation, and headaches) may have been caused by a defective refrigerator. Some of the rubber insulation on a section of the refrigerant line had previously been burned and damaged from an unknown heat source. The refrigerant used in this system was sulfur dioxide (SO_2), an irritant gas which is capable of causing eye, nose and throat irritation, and sometimes choking followed by nasal discharge, sneezing, coughing, and increased mucus secretions. No complaints or symptoms were noted after August 31, 1979. At the request of the NIOSH investigator, the refrigerator was removed from the office on September 28, 1979.

II. 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, Ohio 45226. After ninety (90) days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati, Ohio address.

Copies of this report have been sent to:

a) Historic Atlanta Local Development Company
b) U.S. Department of Labor (OSHA)-Region IV
c) NIOSH-Region IV

For the purpose of informing the approximately 3 "affected employees", the employer will promptly "post" the Determination Report for a period of thirty (30) calendar days in a prominent place(s) near where the affected employees work.

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 normally found in the place of employment has potentially toxic effects in such concentrations as used or found. NIOSH received such a request from the Director of HALDC on August 17, 1979. NIOSH was asked to determine the cause of daily headaches, red itchy puffy eyes, sore throats, and sinus congestion which had affected the HALDC staff since opening the office in June.

IV. HEALTH HAZARD EVALUATION

A. Description

HALDC is conducting and coordinating a feasibility study for the City of Atlanta in an effort to revitalize "Underground Atlanta", which has been adversely affected by recent construction of Atlanta's new rapid rail transit system. The HALDC office is located in the Old Atlanta Freight Depot. Built in 1869 this building is the oldest standing structure in Atlanta. The office is a 20 ft. x 20 ft. enclosure located in the northwest corner of the depot. The rest of the depot is used as parking space for approximately 20-30 automobiles. Inside the office were located 3 desks, tables, chairs, a small copying machine, one window air conditioner, and a small refrigerator (now removed). Rail lines for the electric powered rapid transit system and railroad tracks were only a few yards north of the depot. Rapid transit trains switched tracks near the depot every 15 minutes but diesel locomotive traffic was light. Autos were driven in and out of the depot mostly during rush hour. All the large doors in the north and south walls of the depot were open and provided adequate natural ventilation inside the depot.

B. Evaluation Design

An initial survey was conducted on August 17, 1979, by the NIOSH Regional Industrial Hygienist. The HALDC Director, Assistant Director, and Secretary were interviewed. The most frequently reported symptoms were red irritated eyes, swelling under the eyes, headache, sinus congestion, and throat irritation. Direct reading detecter tubes were used to test the air for formaldehyde, carbon monoxide, oxides of nitrogen (NO_2/NO), ozone, nitrogen dioxide (NO_2), and phosgene. All test results were negative.

Air tests taken near the carpet and walls were negative for formaldehyde. A panel of the false ceiling was removed to inspect the area above the office enclosure. Nothing unusual was observed. One staff member suspected a build up of pigeon droppings on top of the false ceiling but no droppings were observed on any of the ceiling panels. The office copying machine was not used frequently and the small refrigerator had not operated since July 25, 1979. No environmental causes of the reported symptoms could be identified during the initial survey.

On September 27, 1979, a follow-up survey was conducted to determine if staff members were still experiencing adverse health effects when working in the office. Many of the symptoms first reported had cleared up.

Because the refrigerator was old and had made unusual noises prior to breaking down, a more thorough inspection was made. The drive belt which connected the motor to the compressor was reinstated and the refrigerator was turned on. It was noted that most of the rubber insultation which had covered the refrigerant line leading from the compressor to the freezer coil had been burned and portions of the burned rubber had fallen away from the line. This line was cool when touched. After about 5 minutes the refrigerator shut down. The cause for the burned rubber insulation could not be determined. An emblem on the front door identified the refrigerator as a "Leonard SO_2 System". From its design and size it probably was built sometime in the 1930's. Because the refrigerant was SO_2, instead of Freon, it was decided to have the unit removed from the office to be tested for SO_2 leakage.

On October 21, 1979, the NIOSH investigator conducted a second follow-up survey in order to check the refrigerator for any leaking SO_2. The refrigerator had been moved to a maintenance shop in another building. Long term sampling was not possible as the refrigerator would not operate for more than 10 minutes. The leak check was conducted using direct reading detector tubes.

C. Evaluation Methods

All atmospheric sampling was conducted using direct reading colorimetric detector tubes. A known volume of air was drawn through the tubes using a small hand held pump. The tubes contained chemicals which change color by reacting with a specific airborne contaminant. The length of the color change is an indication of the concentration of the contaminant in the air sampled. The detector tubes had been certified for accuracy to within $\pm$ 25% of actual contaminant concentration.

D. Evaluation Criteria

Sulfur dioxide (SO_2) is a colorless gas at ambient temperature and pressure with a strong pungent odor. SO_2 is a severe irritant of the eyes and mucous membranes of the upper respiratory tract. Chronic exposure can cause rhinitis (runny nose), dryness of the throat, fatigue, nasopharyngitis (inflammation of the nasopharynx), cough, and shortness of breath.[1] SO_2 rapidly forms sulfurous acid on contact with mucous membranes. This accounts for its severe irritant effects. It is estimated that 10 to 20% of the young healthy adult population are especially susceptible to SO_2 effects. Recent studies have shown some chronic effects such as chronic bronchitis and reduced pulmonary function at chronic exposures below the current federal occupational standard of 5 PPM TWA (parts per million as a 8-hour time weighted average concentration). NIOSH has recommended occupational SO_2 exposures be reduced to levels where the average daily exposure to SO_2 does not exceed 0.5 PPM over any work shift up to a 10 hour work day, 40 hour work week.[2]

E. Evaluation Results and Discussion

In all of the atmospheric samples taken during this survey, no toxic substances were detected. If SO_2 was leaking from the refrigerator, it could not be confirmed. SO_2 detector tubes did not react (change color) when leak testing the pressurized SO_2 system. Tests were taken near the compressor, the high side and low side pressurized lines, the condenser coils, and the evaporator coils. Sufficient SO_2 remained in the system to freeze condensation on the evaporator coils after approximately 5 minutes operation. The motor would not operate longer than 10 minutes before tripping the circuit breaker. Long term sampling was not possible.

If the refrigerator could have been operated for several days it might have been possible to determine if some internal malfunction, over heat, or SO_2 leak had caused the reported symptoms. Since the symptoms had cleared-up after the refrigerator had broken down and the refrigerator had been removed from the office on September 28th, further investigation was not necessary or justified.

F. Recommendations

It is recommended the refrigerator be replaced with a newer model which uses Freon type refrigerant. If the symptoms reported should reoccur, the staff should notify NIOSH.

V. REFERENCES

1. Occupational Diseases, A Guide to Their Recognition, Revised Edition, DHEW (NIOSH) Publication No. 77-181,(June 1977) NIOSH

2. Testimony before the Department of Labor Occupational Safety and Health Administration Public Hearing on the Occupational Standard for Sulfur Dioxide, May 1977.

VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared by:

Stanley A. Salisbury
Regional Industrial Hygienist
NIOSH Region IV
Atlanta, Georgia

Originating Office:

Jerome P. Flesch
Acting Chief, Hazard Evaluations and Technical Assistance Branch
Cincinnati, Ohio

Report Typed by:

Barbara Rice
Secretary
NIOSH Region IV
Atlanta, Georgia