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. 75-28-210

WESTERN STATES BANKCARD ASSOCIATION
SAN FRANCISCO, CALIFORNIA
JULY 1975

I. TOXICITY DETERMINATION

It has been determined that the exposure of Western States Bankcard Association employees to nitrogen dioxide (NO_2), formaldehyde, sulfur dioxide (SO_2), carbon monoxide (CO), and hydrogen sulfide (H_2S) was not toxic at the concentrations measured during the NIOSH evaluation (May 13, 15, 1975). This determination is based on the fact that airborne levels of these substances were below levels detectable by the methods used and on an analysis of the circumstances involved in the potential exposure of employees to these compounds.

The results of the evaluation would be academic in the near future since the WSBA is planning to move into a new office building at the end of June, 1975. Nevertheless, it was decided to conduct an evaluation for the purposes of completeness.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are available upon request from the Hazard Evaluation Services Branch, NIOSH, U.S. Post Office Building, Room 508, 5th and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

a) Western States Bankcard Association
b) Authorized Representative of Employees
c) U.S. Department of Labor - Region IX
d) NIOSH - Region IX

For purposes of informing the approximately 600 "affected employees" the employer will promptly "post" the Determination Report in a prominent place(s) near where exposed employees work 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 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 National Institute for Occupational Safety and Health (NIOSH) received such a request from an authorized representative of employees regarding exposure of workers to diesel exhaust fumes and sewage odors at the Western States Bankcard Association office building located in San Francisco, California.

IV. A. Introduction

The Western States Bankcard Association (WSBA) employs approximately 600 people and is responsible for processing credit card ("Master Charge") purchases in the western region of the United States. The WSBA is located in a three-story modern office building. Across the street from the WSBA building is the sewage treatment plant for San Francisco and one block away is the parking yard for the municipal bus system. It was stated in the request that between 5:30 A.M. and 8:00 A.M., the buses would leave the yard and the diesel exhaust would enter the building through the ventilation system. Additionally, the odors from the sewage treatment plant would enter the building at times.

B. Plant Process

The majority of employees work during the day but a "grave yard" shift is in operation to process a small number of purchases which are made in the early morning. The request concerned the time period between 6:00-10:00 A.M. in the morning. The activity during the "grave yard" shift is concentrated on the second floor of the building which is divided into the authroization Center and the Input Area. Less than 50 people are working during this shift.

C. Evaluation Criteria

Diesel exhaust contains a number of substances which are potentially toxic if the concentrations reach a high enough level. It was not expected by the investigator that any of the substances would reach potentially toxic levels since the exposures of employees were transient and were the result of the general levels present in the surrounding streets.

The decomposition of sewage results in the production of sludge gas which may contain potentially toxic concentrations of hydrogen sulfide (H_2S). If the sludge gas contains H_2S, it has the characteristic odor of "rotten eggs." The potentially toxic effects of H_2S and the common substances contained in diesel exhaust are discussed below:

1. Carbon Monoxide (CO).

CO is formed by the incomplete combustion of carbonaceous material such as gasoline or diesel fuel. The signs and symptoms of acute CO poisoning are well known and easily recognized. These may include headache, nausea, vomiting, dizziness, and drowsiness. The biological effect of CO is caused by its ability to bind with hemoglobin to form carboxy hemoglobin, thereby rendering the hemoglobin less able to carry oxygen. NIOSH recommends that no worker be exposed to a CO concentration greater than 35 parts per million (ppm) based on a time-weighted average exposure for an 8-hour work day.

2. Aldehydes (Formaldehyde).

Aldehydes are irritants to the skin, eyes, and mucosa of the respiratory tract. They may be present in diesel exhaust. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a maximum exposure of 2 ppm to formaldehyde.

3. Nitrogen Dioxide (NO_2).

Nitrogen dioxide is a gas that can irritate the eyes and respiratory tract. Inhaling high concentrations of NO_2 may cause severe respiratory difficulties and even death. These respiratory difficulties may be delayed for a number of hours after exposure. The ACGIH recommends a maximum exposure of 5 ppm to NO_2.

4. Sulfur Dioxide (SO_2).

Sulfure Dioxide is an irritant gas and may cause irritation to the eyes, nose, and throat. It may also cause severe breathing difficulties or even respiratory paralysis. NIOSH recommends that no worker be exposed to a SO_2 concentration greater than 2 ppm based on a time-weighted average exposure for an 8-hour work day.

5. Hydrogen Sulfide (H_2S).

Hydrogen Sulfide has the smell of rotten eggs. In high concentrations it may act on the nervous system and stop breathing. This may occur with little or no warning. H_2S can also irritate the eyes and respiratory tract. It may cause breathing difficulties immediately or some hours after exposure. H_2S can be detected by odor at 0.3 ppm. The ACGIH recommends that no worker be exposed to a concentration greater than 10 ppm based on a time-weighted average exposure for an 8-hour work day.

D. Worksite Evaluation

On May 13, 1975, NIOSH investigator presented the official hazard evaluation notification to a representative of management who was present during the day shift and arrangements were made for a worksite evaluation. On May 15, 1975, Mr. Okawa conducted a worksite evaluation between the hours of 6:00-10:00 A.M.

E. Evaluation Methods

Environmental levels for CO, NO_2, Formaldehyde, SO_2, and H_2S were sampled with MSA and Drager detector tubes. Samples were taken in the Authorization Center and Input Area during three different times in the morning: 6:15-6:45 A.M., 7:00-7:30 A.M., and 8:00-8:30 A.M. Additionally, several employees in each area were selected at random and questioned about their experiences from the diesel exhaust and sewage odors.

F. Evaluation Results

During the day of the evaluation (May 15, 1975), there were no apparent fumes or odors in the building. CO, NO_2, SO_2, Formaldehyde, and H_2S levels were not detectable by the methods used. After talking with several employees, there was a consensus of opinion on the following: 1) the employees were unaware of any diesel exhaust fume problem and, 2) the sewage odors were occasionally offensive and were only a real problem once during a recent city worker's strike when raw sewage spilled into the streets.

V. DISCUSSION

The ventilation system is designed to keep the incoming air a temperature of 55°F. If the outside air is 55°F (which is the average temperature in San Francisco), then 100% fresh air is brought into the building. This percentage decreases down to 15% fresh air at higher and lower temperatures. Therefore, some quantities of substances in the outside air surrounding the building can enter the ventilation system. It was not anticipated that toxic quantities of any of the substances investigated would be found, and in fact, the concentrations were not detectable by the method used.

VI. CONCLUSION

It is concluded that the substances contained in diesel exhaust fumes and sewage gases were not toxic to the Western States Bankcard Association employees at concentrations measured on the day of this investigation (May 15, 1975).

VII. AUTHORSHIP

Evaluation conducted and report prepared by:

Melvin T. Okawa
Regional Industrial Hygienist
NIOSH - Region IX
San Francisco, California

Originating Office:

Jerome P. Flesch
Chief, Hazard Evaluation Services Branch
NIOSH
Cincinnati, Ohio.