U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 73-63-115

CHEVROLET TRUCK ASSEMBLY PLANT
FLINT, MICHIGAN

MARCH 1974

I. TOXICITY DETERMINATION

Exposures of plant guard employees to carbon monoxide (CO) in the New Car Shipping Building of the General Motors-Chevrolet Truck Assembly Plant in Flint, Michigan have been evaluated by the National Institute for Occupational Safety and Health. Each plant guard is routinely exposed to CO in the New Car Shipping Building for a two hour period once every thirty hours of plant operation. Transient concentrations of carbon monoxide were found to be variable (10 to 150+ ppm). The average concentration of CO measured over a five and one-half hour period was 41+ ppm. Employees reported no symptoms of CO exposure on the day of evaluation. Based on two-hour exposures and the absence of reported symptomatology, it is judged that carbon monoxide is not toxic in the concentrations found under near normal conditions in the New Car Shipping Building.

Interviews with several plant guard employees revealed that heavy vehicle traffic, cold vehicle engines, and/or stagnant atmospheric conditions occasionally cause higher than normal accumulations of vehicle exhaust in the New Car Shipping Building. Therefore, it is recommended that operating conditions, be modified as planned to reduce the occurrence of adverse conditions.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are availabe 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) General Motors - Chevrolet Truck Assembly Plant, Flint, Mich.
b) Authorized Representative of Employees
c) U.S. Department of Labor - Region V
d) NIOSH - Region V

For the purpose of informing the approximately 45 "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 in regard to exposure to carbon monoxide in the New Car Shipping Building of the General Motors Chevrolet Truck Assembly Plant in Flint, Michigan.

IV. HEALTH HAZARD EVALUATION

A. Conditions of Use

A total of 45 security guards are exposed to variable carbon monoxide concentrations in the New Car Shipping Building. The carbon monoxide is emitted by recently assembled Blazers, Suburbans, and Pickups driven here (by non-General Motors employees) for a security check prior to being shipped.

These vehicles are left running while one guard compares the serial number on the invoice to the one on the plate mounted on the door frame of the vehicle. These checks require from 5 to 10 seconds per vehicle and are conducted by one guard for a 2 hour period. Under normal conditions, between 150 and 250 vehicles are checked through the building every 2 hours. Serial number checks are conducted continuously, but since there are an average of 15 guards per shift each guard spends only 2 hours at this particular security point every 30 hours.

This security measure is conducted in a small building (the New Car Shipping Building) which is approximately 75' long, 18' wide and has a 16' ceiling. A push-pull ventilation system positioned at tail pipe exhaust level is present in the building and is constantly operating. Also present are two overhead heating systems positioned above the north entrance door and the south exit door. These doors are kept open at all times.

B. Evaluation Design

On December 20, 1973, Industrial Hygienists Raymond Rivera and Robert Vandervort evaluated the work environment at the New Car Shipping Building for carbon monoxide. Carbon monoxide concentrations were measured during 5 security guards' 2 hour exposures. Also, all guards working 2 hour periods at the New Car Shipping Building during the evaluation were interviewed with regard to work and non-work related health problems. No quantitative ventilation measurements were made during the evaluation, but the system appeared adequate.

C. Evaluation Method

Breathing zone samples were collected in mylar bags at 0.5 cu. ft./hr. with the aid of a portable battery operated pump. CO concentrations were measured by utilizing Drager detector tubes. These measurements were made immediately after each sample was collected.

D. Evaluation Criteria

The present standard for carbon monoxide is 50 ppm determined as a time-weighed average (TWA) for an 8-hour work day. However, the National Institute for Occupational Safety and Health recommends that "no worker be exposed to a concentration greater than 35 ppm determined as a TWA for an 8-hour work day." Also, "no level of CO to which workers are exposed shall exceed a ceiling concentration of 200 ppm."

E. Evaluation Results and Discussion

A total of 16 samples, all breathing zone samples, were collected during this evaluation. Concentrations for the breathing zone samples ranged from 10 to greater than 150 ppm. (See Table I). Concentrations for samples collected during serial number checks only ranged from 30-80 ppm. The average CO concentration for the total period sampled was 41+ ppm. From Table I it is obvious that CO concentrations are highly variable.

According to security guards, automobile exhaust is much more noticeable on those days when there is heavy vehicle traffic, still air, and vehicle engines are cold. They also stated that during such time they occasionally get slight headaches of short duration.

During the day-shift sampling period, vehicle traffic was not particularly heavy since there were only four drivers.

During the second-shift, vehicle traffic was heavier (due to more drivers) and engines were cold. However, CO concentrations were lower (10 ppm) due to rapid clearing by a strong wind out of the north.

Due to the possibility of higher CO concentrations during heavy vehicle traffic, cold engines, and still air, it is recommended that the ventilation system be modified as planned.

V. REFERENCES

Criteria for a Recommended Standard....Occupational Exposure to Carbon Monoxide. U.S. Department of Health, Education, and Welfare, Health Services and Mental Health Administration, National Institute for Occupational Safety and Health, 1972.

VI. AUTHORSHIP AND ACKNOWLEDGMENTS

Report Prepared By: Raymond O. Rivera
Industrial Hygienist
DTS/SLC

Originating Office: Jerome P. Flesch, Chief
Hazard Evaluation Services Branch

Acknowledgments

Environmental Evaluation:
Robert Vandervort
Industrial Hygienist
Hazard Evaluation Services Branch

TABLE I

CARBON MONOXIDE CONCENTRATIONS

NEW CAR SHIPPING BUILDING

BREATHING ZONE SAMPLES - SECURITY GUARDS

Guard	Period Sampled	Total Time (Min)	CO Concentration (ppm) Detector Tube #1	Detector Tube #2	Average #1 & #2	Conc X Time (ppm) (Min)	Comments
JB	1010-1040	30	30	25	27.5	825	
	1040-1100	20	150+	150+	150+	3,000+	
JH	1130-1155	25	20	15	17.5	437.5	
	1155-1224	29	25	20	22.5	652.5	
	1225-1255	30	120	80	100	3,000	
RD	1255-1335	40	10	10	10	400	
	1335-1420	45	10	10	10	450	
	1421-1452	31	20	--*	20	620	
JS	1452-1516	24	150+	150+	150+	3,600+	
	1516-1530	14	40	--*	40	560	
JB	1716-1750	34	10	--*	10	340	Double Samples Cold Vehicles
	1760-1750		10	--*			
	1750-1815	25	10	--*	10	250	
	1750-1815		10	--*			
Total Time 347 min.				Total Conc X Time 14,135 + ppm min.			
	1335-1420		30	30	30[a]		Sampler hand held but representative of BZ.
	1516-1530		80	80	80[b]		

*No analysis of sample with 2nd detector tube.

[a]Sample collected during vehicle checking only--19 vehicles in approximately 4 minutes.

[b]Sample collected during vehicle checking only--17 vehicles in approximately 4 minutes.

Average Carbon Monoxide Concentration over sampling period:

$$\frac{13,890+ \text{ ppm-min}}{337 \text{ min}} = 41+ \text{ ppm}$$