FILE COPY

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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 73-154-146

FISHER BODY DIVISION, G.M.C.
HAMILTON PLANT
HAMILTON, OHIO
OCTOBER 1974

## I. TOXICITY DETERMINATION

It has been determined that the concentrations of Carbon Monoxide (CO), Nitrogen Dioxide ($NO_2$), and Ozone ($O_3$) in and around the MIG welding operating at No. 1 and No. 2 Door Lines of Fisher Body Division, G.M.C., Hamilton Plant, Hamilton, Ohio, are not toxic to the employees in the conditions as used or found. This determination is based on environmental measurements taken at and around the above locations, and on interviews conducted with affected employees.

## II. DISTRIBUTION - AVAILABILITY OF REPORT

Copies of this report are available upon request from the Hazard Evaluation Services Brnach (NIOSH), U.S. Post Office Building, Room 508, Fifth and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

a. Fisher Body Division, G.M.C., Hamilton, Ohio
b. Authorized Representative of Employees
c. U.S. Department of Labor, Region V
d. NIOSH Regional Program Director

For the purpose of informing the 96 "affected" employees, the employer will promptly "post" the Determination Report in a prominent place near where affected 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. Code 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 substances 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 a representative of employees regarding exposure to welding fumes from the MIG welding operations of the No. 1 and 2 Door Lines of the Fisher Body Division, G.M.C., Hamilton Plant, Hamilton, Ohio.

## IV. HEALTH HAZARD EVALUATION

### A. Plant Process - Conditions of Use

Fisher Body Division, Hamilton Plant, a division of General Motors Corporation, manufactures automobile body parts. Approximately 2,400 people are involved in various manufacturing operations throughout the plant. In the door fabrication, door components undergo pretreatment with a metal spray, are dried, then manually assembled, welded in the MIG (metal inert gas) welder and then unloaded. Employee groups working on the Door Lines include Door Loaders (16), Door unloaders (16), Inspectors (4), Weld Repairmen (8), Material Handlers (12), and Maintenance Personnel (40).

The MIG welding operation, using Carbon Dioxide ($CO_2$) as the shielding gas, is completely automatic , except for periodic touch-up welding. A canopy hood with plexiglass side-curtains is situated over the MIG welder to exhaust metal fumes and welding gases from the area. General dilution ventilation is present throughout the plant, and door loaders, unloaders, inspectors, and weld repairmen work in the immediate area of the MIG welder. During the day, however, material handlers and maintenance personnel groups would have occasion to be in the MIG welding area.

### B. Evaluation Design

On December 13, 1973, NIOSH representatives conducted an observational survey of the MIG welding operation. Pertinent information was obtained from the employer regarding plant processes, affected employees were interviewed, and work procedures observed.

Detector tube measurements for Carbon Monoxide (CO), Ozone ($O_3$), and Nitrogen Dioxide ($NO_2$) were taken near and around the MIG welding operation.

Smoke tube tests were taken around the MIG welder to check the canopy hood ventilation efficiency.

Interviews were held with eleven potentially exposed employees with regard to possible adverse health effects related to emissions from the MIG welding process.

C. Evaluation Criteria

The occupational health standards as promulgated by the U.S. Department of Labor (Federal Register, October 18, 1972, Title 29, Chapter XVII, Part 1910, Subpart G, Section 1910.93, Table G-1) applicable to this evaluation are as follows:

| Substances | p.p.m.[a] | mg/M$^3$[b] |
|---|---|---|
| Carbon Monoxide | 50 | 55 |
| Ozone | .1 | .2 |
| Nitrogen Dioxide | 5 | 9 |

[a]parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm Hg pressure.

[b]approximate milligrams of substance per cubic meter of air.

Occupational health standards for individual substances are established at levels designed to protect workers from occupational exposure to toxic agents on an 8-hour-per-day, 40-hour-per-week basis over a normal working lifetime.

NIOSH has recommended that occupational exposure to carbon monoxide shall be controlled so that no worker shall be exposed at a concentration greater than 35p.p.m. determined as a time-weighted average (TWA) exposure for an 8-hour day, with samples being collected at random intervals throughout the day so that a statistically accurate determination of exposure level can be made.[1]

Of all gases that have poisonous effects upon man and animals, Carbon Monoxide (CO) is the most frequently encountered. It is a product of incomplete combustion of carbon containing material and exerts its effect by combining with the hemoglobin of the blood and interrupting the normal oxygen supply to the body tissue. Acute effects of exposure to CO include headache, nausea, impaired senses, general debility, weakness, vertigo, and ataxia. Increases in hemoglobin and red cells have also been attributed to chronic poisoning.[2]

Ozone, a constituent of the atmosphere we breathe, is very irritant to all mucous membranes, and significant exposures can cause pulmonary

edema. Its prolonged inhalation in concentrations above .05 p.p.m. is inadvisable because of danger of pulmonary irritation.[3] In low concentrations, ozone may cause dryness of the mouth, irritation of the throat, headaches, coughing, and pressure or pain in the chest, followed by difficulty in breathing.

Nitrogen Dioxide ($NO_2$), which can react with water to form a mixture of nitrous acid ($HNO_2$) and nitric acid ($HNO_3$) has a distinct odor in concentrations as low as 5 p.p.m. In concentrations of 10 to 20 p.p.m., the gas is mildly irritant to the eyes, nose, and upper respiratory mucosa.

D. Evaluation Results and Discussion

Detector tube samples were taken in and around the MIG welding operation. Ten Carbon Monoxide measurements, 6 Ozone measurements, and 6 Nitrogen Dioxide measurements were taken. Carbon Monoxide levels ranged between 10 and 15 p.p.m. In analyzing the CO readings, consideration must be given to the presence of fork-lift trucks in the immediate area as a source of CO generation--in addition to CO generation by the MIG welder. No detectable levels of Ozone and Nitrogen Dioxide were found. Detector tube measurements are designed to measure levels of Ozone between .05 - 1.4 p.p.m. Nitrogen Dioxide range is from .5 - 10 p.p.m. Smoke tests showed the canopy hood ventilation around the MIG welder to be functioning effectively.

Eleven employees were interviewed for possible adverse effects resulting from exposure to welding fumes. Nine of the eleven employees indicated no health problems associated with their employment; while two employees indicated mild irritation of nose and throat. One stated that the conditions subside in the evening when the work day is completed, and the other employee stated conditions persist from day to day.

Conclusions:

Environmental measurements of $NO_2$, CO, and $O_3$ indicated that no employees are exposed to toxic concentrations of these gases. Smoke tube tests indicated that the canopy hood ventilation around the MIG welder was functioning adequately. Interviews with employees seem to compliment these statements. Therefore, it is concluded that the $NO_2$, CO, and $O_3$ are not toxic in the concentrations as used or found.

## VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared:

Thomas F. Bloom
Assistant Regional Industrial Hygienist
Region V - Chicago, Illinois

Richard S. Kramkowski
Acting Regional Program Director
Region V - Chicago, Illinois
Project Officer

Originating Officer:

Jerome P. Flesch
Hazard Evaluation Services Branch
Cincinnati, Ohio

## VII. REFERENCES

1. National Institute for Occupational Safety and Health Occupational Exposure to Carbon Monoxide, 1972.

2. Patty, Industrial Hygiene and Toxicology, Vol. II, pp 924-936.

3. Ibid, Patty, pp 916.