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

HEALTH HAZARD EVALUATION DETERMINATION REPORT
HE 80-48-689

MIAMI CAREY INC.
MONROE, OHIO

MAY 1980

I. SUMMARY

An environmental investigation was conducted by the National Institute for Occupational Safety and Health (NIOSH) January 3, 1980, at Miami Carey Inc. of Monroe, Ohio, to determine if dip painting operations were exposing workers to excessive vapor concentrations. Reported symptoms experienced by the worker(s) included dry throat, dizziness, and occasional nose bleed.

To assess the extent of the exposure potential(s), airborne contaminants were obtained via charcoal tube, area, and personal sampling techniques. Analyses of the environmental samples were performed by gas chromatography/mass spectrometer (GC/MS) techniques. Substance and respective concentrations were determined as follows: total alkanes range - 23.7 to 267.1 mg/M^3, (permissible exposure limit [PEL] 3517 mg/M^3, no ceiling data), trichloroethylene-range 4.0 to 11.9 mg/M^3, (PEL 679 mg/M^3, ceiling 1357 mg/M^3), toluene range 0.3 to 0.7 mg/M^3, (PEL 756 mg/M^3, ceiling 1133 mg/M^3), butyl acetate range 1.0 to 4.2 mg/M^3, (PEL 711 mg/M^3), xylene range - 1.8 to 10.3 mg/M^3, (PEL 434 mg/M^3), methyl amyl ketone range 0.7 to 2.9 mg/M^3, (PEL 466 mg/M^3), and cellosolve acetate range 3.3 to 23.6 mg/M^3, (PEL 482 mg/M^3).

Informal interviews were acquired of persons working in and around the dip painting area. Those interviewed indicated they had experienced headaches, nausea and dry throats, and had noted odors similar to airplane glue and/or dry cleaned clothes. As noted in Table I both toluene and trichloroethylene vapors which are associated respectively with airplane glue and dry cleaning odors, were found in the dip painting area.

In view of the data obtained January 3, 1980, from Miami Carey Inc., NIOSH has determined that a health hazard did not exist during painting operations. Workplace observations indicate the exposure(s) to be due to inhalation of vapors and gases emitted by an improperly exhausted dip painting operation. Although management officials responded promptly to the recommendations of enclosing the dip tank and slot hood (six-inch flange addition), additional recommendations are offered for the control of potential emissions that may result from increased production and/or changes in processing materials.

II. INTRODUCTION

Under the Occupational Safety and Health Act of 1970*, NIOSH investigates the toxic effects of substances found in the workplace. Accordingly, an authorized representative of employees for purposes of collective bargaining requested such an investigation by NIOSH to determine if dip painting operations were exposing workers to excessive concentrations of toxic substances. The request alleged that employees working in dip painting areas have experienced symptoms of dizziness, sore throats, headaches and occasional nose bleeds. The request did not identify individual substances that were potential causes for the reported symptoms.

III. BACKGROUND

Miami Carey Corporation, a subsidiary of Jim Walter Company, functions as a fabricator of light sheet metal products. Departments housed at the facility include press, welding assembly, mirrors and painting. Of major concern were the dip painting operations. In this area, 55 gallon drums of white enamel black splatter paint are mixed (five white to one black) with a solvent and blend to produce a gray pigment. The mixed hue is then fed into a 90 gallon dip tank by an automated (air value) feed system. Parts to be dipped are hung onto an overhead conveyor by one to two worker(s) standing approximately 15 feet in front of the dip trough. A slot hood exhaust system presently designed to operate at 1150 CFM extends across the full length of the tank. The worker(s) operate the dipping process only six to eight hours during a 40-hour workweek.

IV. EVALUATION DESIGN AND METHODS

Personal breathing zone (BZ) and area samples (GA) were collected during a scheduled dip painting operation. These samples were collected on charcoal tubes using both Sipin** and MSA** battery-powered sampling pumps calibrated at 200 and 300 cubic centimeters per minute (cc/m) respectively. Analysis of these samples were conducted by gas chromatograph/mass spectroscopy. In addition, smoke tubes were used to observe air movement while evaluating the efficiency of the exhaust system. Informal interviews were obtained from persons working in and around the dip painting area. Such interviews (non-directive questionnaire type) were obtained in effort to correlate symptoms with workplace exposures.

---

*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 an 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.

**Mention of manufacturer's name does not constitute a NIOSH endorsement.

V. EVALUATION CRITERIA

A. Alkanes

Alkanes, also called paraffins, are a class of aliphatic hydrocarbons characterized by a straight or branched carbon chain (formula C_nH_{2n+2}). Their physical form varies with increasing molecular weight from gases (methane) to waxy solids. When reacted with aromatic hydrocarbons as in a stoddard solvent, emissions as low as 150 ppm can cause eye irritation, dizziness and itching. Symptoms from overexposure include narcosis, irritation of the skin, mucous membranes and upper respiratory tract, chemical pneumonitis, pulmonary edema and possible hemorrhaging.

B. Trichloroethylene[2]

A colorless, nonflammable, noncorrosive liquid with a sweet odor characteristic. Decomposition of trichloroethylene, due to contact with hot metal or UV, forms products including chlorine gas, hydrogen chloride, and phosgene. Repeated or prolonged skin contact with the liquid may cause dermatitis. Preliminary evaluation of the carcinogenic activity of trichloroethylene in laboratory rodents by the National Cancer Institute indicates the material to be a potent liver carcinogen. The federal standard is 100 ppm (535 mg/M^3) as a 8-hour TWA with an acceptable ceiling concentration of 200 ppm; acceptable maximum peaks above the ceiling of 300 ppm are allowed for five minutes duration in a 2-hour period. Symptoms of acute exposure include headache, dizziness, vertigo, tremors, nausea, and vomiting, irregular heart beat, sleepiness, fatigue, blurred vision, and intoxication similar to that of alcohol. NIOSH criteria for a recommended standard recommends 25 ppm as set to prevent systemic effects.

C. Toluene[3]

Controlled exposure of human subjects to 200 ppm for eight hours produced mild fatigue, weakness, confusion, lacrimation and paresthesias of the skin. Toluene causes central nervous system depression. In workers exposed for many years to concentrations in the range of 80 to 300 ppm there was no clinical or laboratory evidence of altered liver function. Although the present legal (OSHA) standard is enforced at 200 ppm NIOSH recommends 100 ppm as set to prevent systemic effects.

D. Butyl Acetate[4]

A colorless liquid having a fruity odor. Butyl Acetate is moderately toxic, and an irritant of the skin and respiratory system. Symptoms of overexposure include headaches, drowsiness and eye irritation. OSHA permits 150 ppm as time-weighted average over an 8-hour period.

E. Xylene[5]

Xylene vapor may cause irritation of the eyes, nose and throat. Repeated or prolonged skin contact may cause drying and defatting of the skin which may lead to dermatitis. Liquid Xylene is irritating to the eyes and mucous membranes, and aspiration of few milliliters may cause chemical pneumonitis, pulmonary edema, and hemorrhage. Repeated exposure of the eyes to increased vapor concentration may cause reversible eye damage. The present legal (OSHA) and NIOSH (recommend) standards are both set at 100 ppm for an 8-hour time-weighted exposure.

F. Methyl n-amyl Ketone

This compound, emitting a fruity odor is irritating to the eyes and mucous membranes. At increased concentrations it causes narcosis in animals and possibly in humans. Fifteen hundred ppm was found irritating the mucous membranes of animals. The OSHA standard is 100 ppm.

G. Cellosolve Acetate[7]

2-ethoxyethyl acetate (synonym) is irritating to the eyes, nose and throat and at increased concentrations (500 ppm) has caused central nervous system depression in animals. Mice & rabbits survived twelve 8-hour exposures of 450 ppm, however kidney damage was observed in these animals. This compound in liquid form may be absorbed through the skin. The OSHA enforceable standard is presently set at 100 ppm for an 8-hour time weighted average.

VI. RESULTS AND DISCUSSION

On the basis of the sample results, it does not appear that the dip painting operations present a health hazard during normal work schedules. The worker(s) occupies this station only six to eight hours out of 40 hours per week. In calculating exposure concentrations, all samples, as indicated in Table I, were well within the legal (OSHA) and recommended (NIOSH) standards.

The slot hood exhaust system which extended across the full length of the dip paint trough was noted separated from the dip tank by about six inches. As observed by smoke tube measurements the efficiency of the system was greatly decreased. This deficiency was basically corrected by constructing a flange that would rise above the face of the dip tank and connect the tank to the slotted vent hood.

Two employees were privately interviewed (a dip painter and conveyor attendant) in an effort to correlate personal signs and symptoms with workplace exposures. These persons indicated they experienced headaches and occasional dizziness when working near the dip tank for periods of two hours or more. However, when transferred to a different location the symptoms subsided. Neither persons denoted receiving hospital admission or medical treatment.

VII. RECOMMENDATIONS

Gas/vapor emissions may increase beyond permissible limits due to increased production thus exposing workers to potential health hazards. Therefore, recommendations are offered for the control of such inadvertent overexposure(s):

1. Drums of solvents and paint mixtures should not be left opened unless located in a well ventilated area. Lacquers, paints, and thinners used during dip painting operations should be stored close to the slot hood exhaust system in effort to vent off potential vapor hazards.

2. The slot-hood used to exhaust paint vapor emission, should be cleaned and inspected on a regular basis. If dust and overspray are allowed to build up on and in the slots the efficiency of the system will be greatly decreased.

3. To maintain the proper exhausting potential of the system, a six to eight-inch lip should be attached to the dip tank. The vent system can also be improved by connecting the slot arrangement of the hood to the paint tank.

VIII. REFERENCES

1. Proctor, N.A., Hughes, J. Chemical Hazards of the Workplace, J.B. Lippinatt Company, Philadelphia, 1978.

2. National Institute for Occupational Safety and Health, U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control. Occupational Diseases - A Guide to Their Recognition. June 1979. DHEW (NIOSH) Pub. No. 77-181.

3. Procter, N.A., Hughes, J. Chemical Hazards of the Workplace, J.B. Lippincott Company, Philadelphia, 1978.

4. NIOSH/OSHA, Pocket Guide to Chemical Hazards, U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control, September 1978. Publication No. 78-210.

5. National Institute for Occupational Safety and Health, U.S. Department of Health, Education and Welfare, Public Health Service, Center for Disease Control. Occupational Diseases - A Guide to Their Recognition. June 1977, DHEW (NIOSH) Publication No. 77-181

6. Proctor, N.A., Hughes, J. Chemical Hazards of the Workplace, J.B. Lippinatt Company, Philadelphia, 1978. NIOSH/OSHA, Pocket Guide to Chemical Hazards, U.S. Department of HEW, PHS, CDC, September 1978. Publication No. 78-210.

7. Proctor, N.A., Hughes J. Chemical Hazards of the Workplace, J.B. Lippinatt Company, Philadelphia, 1978. National Institute for Occupational Safety and Health, Public Health Service, Center for Disease Control, Occupational Diseases - A Guide to Their Recognition. June 1979. DHEW (NIOSH) Publication No. 77-181.

XI. AUTHORSHIP AND ACKNOWLEDGEMENTS

Evaluation Conducted and Report Prepared By:

Paul Johnson
Industrial Hygienist
Industrial Hygiene Section
Hazard Evaluations and Technical Assistance Branch
Cincinnati, Ohio

Originating Office:

Hazard Evaluations and Technical Assistance Branch
Division of Surveillance, Hazard Evaluations and Field Studies
Cincinnati, Ohio

Report Typed By:

Linda Morris
Clerk-Typist
Industrial Hygiene Section
Hazard Evaluations and Technical Assistance Branch
Cincinnati, Ohio

X. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Technical Services, Publications Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia 22161.

Copies of this report have been sent to:

1. Manager, Manufacturing Engineering, Miami Carey
2. Personnel Manager, Miami Carey
3. President, United Steel Workers of America, Local 7546
4. Union Stuart, Local 7546
5. OSHA, Region V
6. NIOSH, Region V

For the purpose of informing the "affected employees," the employer shall promptly "post" the determination report for a period of 30 days in a prominent place near where exposed employees work.