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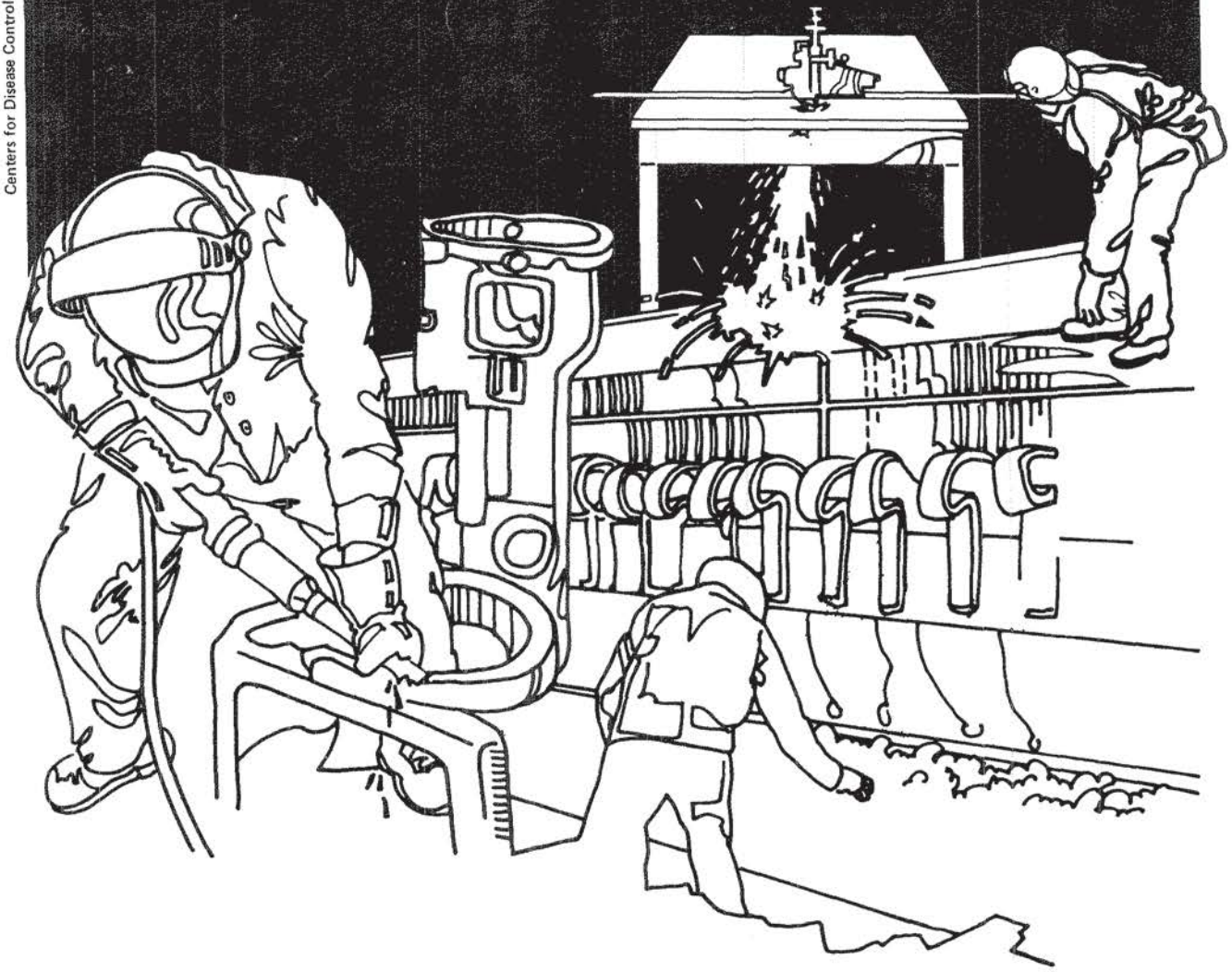

# Health Hazard Evaluation Report

HETA 81-136-867
FAA CREDIT UNION
JFK AIRPORT
JAMAICA, NEW YORK

## PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 81-136-867
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FAA Credit Union
JFK Airport
Jamaica, N. Y.

NIOSH INVESTIGATOR
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## I. SUMMARY

In January, 1981, the National Institute for Occupational Safety and Health received a request from the Federal Aviation Administration to evaluate worker exposures to chemicals generated during the operation of a Qwip telephone facsimile recorder located in the Credit Union, Federal Building, JFK Airport, Jamaica, N. Y. 11430. Employees' symptoms included eye irritation, upper respiratory tract irritation and unpleasant odors.

The manufacturer of the Qwip machine provided information about the composition of chemical emissions generated by the electro-sensitive paper used in the Qwip machine. NIOSH conducted environmental sampling for butyl methacrylate and total hydrocarbons. Samples of airborne contaminants were collected intermittently throughout the week while the Qwip machine was in operation. Concentrations of butyl methacrylate ranged from 0.13 to 0.29 milligram per cubic meter of air ($mg/M^3$) (0.02 to 0.05 parts per million parts of air--ppm); total hydrocarbons ranged from 0.25 to 0.42 $mg/M^3$.

The concentrations of contaminants to which employees are exposed are low. No standard for exposure to butyl methacrylate has been recommended by NIOSH nor established by the Occupational Safety and Health Administration (OSHA). Butyl Methacrylate is a known irritant[1]. Because employees have experienced eye and respiratory tract irritation, and because the Qwip machine is presently located in a small, congested area, NIOSH recommends that the Qwip telephone facsimile recorder be moved to a more open, better ventilated and less populated section of the office. If this cannot be done, the machine should be equipped with exhaust ventilation.

KEYWORDS:
SIC 9160 (Federal Government), Qwip Facsimile Recorder, Butyl Methacrylate, Hydrocarbons.

## II. INTRODUCTION

In January, 1981, the Regional Occupational Safety Manager of the Federal Aviation Administration (FAA) requested that NIOSH investigate complaints of eye and upper respiratory tract irritation and of objectional odors at a Credit Union office, advise the FAA as to the degree of hazard to which the employees may be exposed and to recommend appropriate corrective measures. The office was visited and industrial hygiene samples were collected during the week of January 22nd.

## III. BACKGROUND, STUDY DESIGN AND METHODS

### A. Description of Office Conditions.

Employees of the Credit Union, in the Federal Building, JFK Airport, who work in the area immediate to a Qwip telephone facsimile recorder have complained of "musty" or "acrid" odors and have experienced intermittent, mild eye and upper respiratory tract irritation following its installation in early 1980. The Credit Union office is located on the first floor of the Federal Building at the JFK International Airport. The office area is approximately 70'x 50' with a 10' ceiling. The office air is centrally heated and air conditioned. The Qwip machine is located in a corner of a small interior alcove, approximately 6' x 15'. The shorter wall adjacent to the Qwip machine contains a door leading into the teller area. The opposite, open end of the alcove leads to other offices. Three secretaries work in the alcove. The Qwip machine sends or receives messages via telephone. The main use of the machine is to receive messages (loan applications, etc.) from branch offices. The Qwip machine is approximately 24" x 8" x 6". When the machine is in operation, electro-sensitive paper is attached to a rotating drum. An electrical charge is produced at the tip of a stylus in response to a telephoned message. The charge causes the top layer of the electro-sensitive paper to be vaporized, exposing the darker sub-layer. The lower layers of the paper are not involved in the process and serve as backing. The vaporization of the top layer of the paper results in generating contaminants into the work atmosphere. Transmission of a 8 1/2" x 11" page requires six minutes. Approximately one hour of transmission occurs daily.

### B. Sampling Rationale

The manufacturer of the Qwip telephone facsimile recorder supplied to the Credit Union information about the chemicals generated during the operation of the machine. The chemicals are generated, not by the Qwip machine, but by the electro-sensitive paper used to record

incoming messages. Table 1 lists the compounds generated during the operation of the machine, their approximate concentrations, and the corresponding OSHA permissible exposure limits. The compounds generated during use of the Qwip machine mostly are hydrocarbons and were reported to be found in relatively small concentrations. One of the compounds, butyl methacrylate, is an irritant and was reported to contribute to allergic responses in susceptible individuals.

C. Sampling Methods

A sampling protocol was developed, based on a consideration of the chemicals reported to be generated during the operation of the Qwip machine, the results of a previous survey which NIOSH had conducted at a Qwip installation and the symptoms of the employees who work in the area.

Samples of airborne hydrocarbons and butyl methacrylate vapors were collected by drawing air at a sampling rate of approximately 2 liters per minute through glass tubes containing activated charcoal as the collection medium. The vapors were adsorbed onto the charcoal particles and later analyzed by a standarized NIOSH method. Three samples were collected in the immmediate vicinity of the Qwip machine to characterize the greatest possible concentrations. Two samples were collected on either side of the desk of the nearest secretary to characterize that individual's exposure. Since the Qwip receiver is operated only for about one hour per day, the sampling equipment, was left at the office, with instructions that the sampling pumps were to be operated whenever the Qwip machine was in use. They were to be shut off when the Qwip machine was not in operation, and the glass tubes were to be capped when not sampling. A log was to be kept of sampling times. A week later, the samples were retrieved. A total sampling time of approximately six hours, composed of one half to one hour operating shifts had been achieved. The samples were analyzed by gas chromatography using a modification of NIOSH's P & CAM 127 method.

## IV. EVALUATION CRITERIA

There are no standards for exposure to butyl methacrylate. Animal studies of the effects of butyl methacrylate indicate an LD50 of 2304 mg/kg (intraperitoneal-rat) and LDLo's of 20 gm/kg (oral-rat) and 6.3 gm/kg (oral-rabbit). These levels suggest that butyl methacrylate is of relatively low toxicity. An inhalation study by Deichmann indicates that rabbits, guinea pigs and rats exposed to 500 to 860 parts per million parts of air (ppm) (3000 to 5000 $mg/M^3$) exhibited temporary irritation of the mucous membranes, uneasiness and accelerated respiration.

No standards exist for exposure to "total hydrocarbons". Standards are set for individual hydrocarbons such as toluene and hexane. Exposures to individual hydrocarbons, as identified by the Qwip manufacturer, were less than their standards.

## V. RESULTS AND DISCUSSION

The sampling results are listed in Table 2. Concentrations of butyl methacrylate ranged from 0.13 to 0.29 $mg/M^3$ (0.02 to 0.05 ppm). Concentrations of total hydrocarbons ranged from 0.25 to 0.42 $mg/M^3$.

No attempt was made to identify individual constituents of the hydrocarbon mixture since concentrations of total hydrocarbons were less than any of the individual OSHA permissible exposure limits (see Table 1).

It must be emphasized that the results reported in Table 2 are concentrations generated during operation of the Qwip machine. The machine is usually in operation approximately one hour per day. During the periods when the machine is not in operation, no contaminants are generated. Normal general ventilation would tend to dilute the concentrations of contaminants, so that exposure levels during the normal eight hour work day, 40-hour work week would be less than the concentrations found during the times that the Qwip machine was in operation.

## VI. CONCLUSIONS AND RECOMMENDATIONS

Low concentrations of butyl methacrylate and total hydrocarbons are generated during the operation of the Qwip telephone facsimile recorder. Samples were collected during a six hour period of operation of the machine, consisting of approximately one hour each day during a week's interval. Daily exposure levels would be expected to be lower than the concentrations of the contaminants reported. Nevertheless, the employees of the Credit Union identified the machine as the source of the odors and equated the odors with their symptoms. The machine is located in a confined area near work stations. The manufacturer now includes a health notice with the electro-sensitive paper, cautioning that their equipment "be operated in well-ventilated areas" and "Persons with known skin and/or respiratory sensitivities are advised to avoid the immediate vicinity of the machine during recording." Based on these considerations, NIOSH recommends that the Qwip telephone facsimile recorder should be moved to a more open, better ventilated and less populated section of the office. If this cannot be done, the Qwip machine should be equipped with exhaust ventilation.

## VII. REFERENCES

1. Communication from the manufacturer of Qwip Systems.
2. National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances, Volume 2, page 45, 1979.
3. Deichmann, W.: Toxicity of Methyl, Ethyl and n-Butyl Methacrylate. Journal of Industrial Hygiene and Toxicology 43:343-351, 1941.

## VIII. AUTHORSHIP AND ACKNOWLEDGEMENTS

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## IX. DISTRIBUTION AND AVAILABILITY

For the purpose of informing "affected employees", the employer should post this report for at least 30 days in a prominent place(s) near where employees work.

Copies of this report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22151. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address.

Copies of this report have been sent to:

1. Federal Aviation Administration, Federal Building, JFK Airport, Jamaica, N. Y. 11430.
2. U. S. Department of Labor, OSHA Area Office, Region II
3. New York State Department of Health, Division of Occupational Safety and Health.
4. U. S. Department of Health and Human Services, NIOSH Regional Office, Region II.

TABLE 1

Summary of the Products from QPF Paper Extrapolated to an Eight Hour Day in a 6' x 8' x8' Room

| Compound* | Amounts (ppm) | OSHA Eight-Hour TWA Permissible Exposure Limit (ppm) |
|---|---|---|
| carbon monoxide[a] | 3.0 | 50 |
| ethylene | .48 | -- |
| acetylene/ethane | .31 | -- |
| propene | .23 | -- |
| propyne/allene | .21 | 1000 |
| ethanal | .01 | 100 |
| butene | .23 | -- |
| butadiene | .06 | 1000 |
| butenyne | .04 | -- |
| butyne | .01 | -- |
| butadiyne | .02 | -- |
| pentene | .03 | -- |
| pentadiene | .02 | -- |
| pentenye | .02 | -- |
| pentyne | .01 | -- |
| hexane/hexene | .01 | 100 |
| butanal/acetic acid | .05 | 10[c] |
| hexyne | .01 | -- |
| hexenyne[b] | .01 | -- |
| benzene | .01 | 10 |
| methylmethacrylate | .08 | 100 |
| methlpentanone | .01 | -- |
| toluene | .02 | 10 |
| butylmethacrylate | .15 | -- |
| ozone[a] | -- | 0.1 |
| hydrogen cyanide[a] | -- | 10 |

As identified by Qwip Systems, Inc.

[a]Calculation based on minimal detectable level.

[b]Blank values indicate less than .01 ppm.

[c]Based on acetic acid.

Table 2
Concentration of Contaminants[a]
HE 81-136

January 22-26, 1981

| Location | Butyl Methacrylate ($mg/M^3$) | Butyl Methacrylate (ppm) | Hydrocarbons ($mg/M^3$) |
|---|---|---|---|
| Left, rear of Qwip machine | 0.21 | 0.04 | 0.25 |
| Left, front of Qwip machine | 0.29 | 0.05 | 0.29 |
| Right, rear of Qwip machine | 0.28 | 0.05 | 0.42 |
| Table, right of secretary | 0.13 | 0.02 | 0.25 |
| Table, left of secretary | 0.14 | 0.02 | 0.25 |

[a] Concentrations of contaminants sampled while operating the Qwip receiver intermittently for approximately six hours.

No standards for exposures to butyl methacrylate or "hydrocarbons" have been established.

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