

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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 73-147-134

FILE COPY

H.F. BARROWS COMPANY
NORTH ATTLEBORO, MASSACHUSETTS

May 1974

I. TOXICITY DETERMINATION

Based upon information obtained during investigations conducted on October 15, 1973, and February 7-8, 1974, it is determined that:

1. No hazard exists to employees working in the plating area exposed to ammonia, hydrogen cyanide or acid mist. This determination is based upon (1) employee interviews in which relatively few complaints were expressed and no adverse health effects were evident, (2) air sampling of ammonia and hydrogen cyanide which indicated exposures were well below the Federal Standards contained in 29 CFR 1910.73, dated October 18, 1972.

2. A potential hazard exists to employees engaged in the painting of jewelry. This determination is based upon (1) employee interviews in which complaints were expressed of central nervous system effects consistent with exposures to solvent constituents, (2) air sampling results which indicate a possibility of combined exposures to solvents and alcohols in excess of Federal Standards.

For the purposes of informing the effected 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.

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 Bldg., Room 508, 5th and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

- a) H.F. Barrows Company
- b) U.S. Department of Labor - Region I
- c) NIOSH - Region I

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 the H.F. Barrows Company regarding various plating and painting operations in it's jewelry manufacturing process.

IV. HEALTH HAZARD EVALUATION

On October 15, 1973, NIOSH representative, D. Jeff Burton conducted a preliminary investigation at the H.F. Barrows Company, North Attleboro, Mass. A follow-up environmental survey was conducted on February 7-8, 1974. The H.F. Barrows Company had requested the hazard evaluation to determine if its employees were exposed to potentially toxic levels of contaminants involved in the manufacturing process. The H.F. Barrows Company is engaged in the manufacture of fine gold and silver jewelry. The company has approximately 60 production people. Most of these production people are skilled workmen and have worked in the jewelry industry for many years.

Investigations and personal interviews with the employees produced the following pertinent information:

1. Plating Operation:

The Plating Operation is a small 3 to 4 man operation. Of major concern was potential exposure to ammonia, hydrogen cyanide and acid. Air sampling, Table I, indicated time-weighted, airborne levels of these compounds were well below Federal Standards. Interviews with employees working in and around the plating area elicited such comments as "very agreeable work conditions", "never smell any cyanide", "occasional irritation from ammonia". Of particular interest is one employee, age 73, who has worked for the H.F. Barrows Company since 1921, and appears to be in good health. Local exhaust ventilation is provided for plating operations along the north wall, and for the acid baths. The acid tank ventilation performs superbly. The local exhaust ventilation provided for the plating tanks appeared marginal, capturing approximately 50% of the evolved steam. A large wall fan is located on the east wall of the plating operations. This fan tends to move air across the plating operation and out of the building. There appeared to be a high negative pressure within the building thus perhaps hindering proper operation of ventilating systems.

2. Painting Operation:

Four to five persons are engaged in the painting and applying of glue to jewelry pieces. The constituents of solvents and alcohols used are shown in Table 2. Employees expressed complaints of the odor and adverse effects following the painting operations. Complaints expressed were dizziness, headache, nausea, "stomach ache", and "just sick". This occurs "once every week or two". No complaints were made on the days of air sampling. On the days of air sampling, only one person was engaged sporadically painting jewelry. Thus, the exposure was not at the level expected when two or three or four persons are engaged in painting. The calculated time-weighted average for exposure to alcohols and solvents was well below the Federal Standards on February 7-8. It is anticipated that on the days that three to four people are painting, exposure levels would be much closer to the Federal Standards.

3. Silver Soldering:

Analysis of the two types of silver solder used in silver solder operations on the south side of the building indicate cadmium levels of 19.3% and 22.0% respectively. Employees use silver solder often and with no local exhaust ventilation. No air samples were taken on the days of February 7-8. Due to the long half-life in the body and the insidious nature of cadmium intoxication, it is widely recognized that the safe use of cadmium-containing silver solder requires the installation and use of local exhaust ventilation.

F. RECOMMENDATION

The following recommendations are made:

1. Consideration be given to the installation of local exhaust ventilation at the lacquer area. While no specific health hazard has been proven, local exhaust ventilation would minimize the probability of adverse health effects, improve the comfort of employees, and perhaps improve work output.

2. Make-up air to the plant environment should be improved by installation of louvers in the doors or by some other means.

VI. AUTHORSHIP AND ACKNOWLEDGMENTS

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TABLE I - SUMMARY OF EXPOSURE LEVELS; NH₃, CN

Substance	Type of Sample	No. of Samples	Average Airborne Levels mg/M ³	Federal Standard
NH ₃	Personal, impinger	6	2.9	35 mg/M ³
NH ₃	Area, impinger	3	6.7	
HCN	Personal, impinger	6	0.01	10 mg/M ³
HCN	Area impinger	3	0.01	
Calculated TWA exposure, 8-hr. shift, NH ₃ :				
			Stringers - 2.1 mg/M ³	
			Platers - 6.7 mg/M ³	

TABLE II - SUMMARY OF EXPOSURE LEVELS; SOLVENTS, ALCOHOLS

Solvent Constituents: 49% Toluene, 17% butyl acetate, 21% amyl acetate, 11% MIBK

Alcohol Constituents: 94% ethyl alcohol, 4% MIBK

Maximum Exposure Encountered (of 19 personal samples, all taken on Charcoal Tubes):

	Exposure	Federal Standard
Ethanol	120 ppm	1000 ppm
MIBK	5.4 ppm	100 ppm
Toluene	14.0 ppm	200 ppm
Butyl Acetate	3.6 ppm	150 ppm
Amyl Acetate	4.2 ppm	100 ppm

Per cent of allowable (for above exposure) = 27%