

U.S. DEPARTMENT OF HEALTH EDUCATION AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY & HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 77-18-415
FRANKLIN MINT
FRANKLIN CENTER, PA
AUGUST 1977

I. TOXICITY DETERMINATION

Due to the transitory nature of the alledged hazard associated with this request, no final determination can be made regarding the source of a number of reported employee illnesses at the Franklin Mint.

A review of 1) environmental and ventilation consultants' reports; 2) results of a) employee questionnaires, b) limited interviews and c) medical examinations indicated no apparent health hazard existed at the time of this evaluation, on January 19 and April 11, 1977.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

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

Copies have been sent to:

- a) the Franklin Mint
- b) Authorized Representative of Employees
- c) U.S. Department of Labor/OSHA Region III
- d) NIOSH Region III

For the purpose of informing the approximately 30 affected employees, the employers shall post the Determination Report for a period of 30 days in a prominent place(s) near where exposed employees work.

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 an employer representative regarding complaints of upper respiratory tract irritation of unknown origin.

IV. HEALTH HAZARD EVALUATION

A. Plant Process - Conditions of Use

The Franklin Mint is a private mint dealing in precious metal coinage and specialty items. The primary area of concern in this investigation was identified in the request to be the "Pick-Pack" area of the packaging department which performs hand packaging and mailing of individual or specialty items. Other operations in this department include high speed automatic addressing, conveyor packaging, and specialty finishing.

At the time of the initial complaints, the "Pick-Pack" area was located adjacent to specialty finishing. A partition approximately seven feet high enclosed three sides of the square work area and provided a back drop for work stations. This same configuration was later moved to a more central location to facilitate production flow.

The specialty finishing area included spray painting, photographic and chemical etching and degreasing.

B. Evaluation Methods

An initial survey was conducted by NIOSH personnel on January 19, 1977 to review conditions and operations in question. At that time, it was decided that medical interviews of workers in the involved area should be conducted to better define the scope of the problem since no apparent source was noted.

During April 11 - 12, 1977, informed consent was obtained, and a directed medical questionnaire was administered to twenty-four (24) workers from the "Pick-Pack" area. The twenty-four (24) employees were selected from a list supplied by the company of those individuals who had experienced upper respiratory tract irritation effects while on the job. A brief physical examination of eyes, nose, throat and lungs was also included. An additional forty-one (41) employees from the surrounding area were informally questioned as to their experiences and the chronology of the problem.

C. Evaluation Criteria

Airborne exposure limits intended to protect the health of workers have been recommended or promulgated by several sources. These limits are established at levels designed to protect workers occupationally exposed to a substance on an 8-hour per day, 40-hour per week basis over a working life time.

For this investigation, the criteria used to assess the degree of health hazard to workers were selected from the following sources:

- a) NIOSH Recommended Standards - airborne exposure limits which NIOSH has recommended to OSHA for Occupational Health Standards
- b) ACGIH Threshold Limit Values (TLV's) guidelines for airborne exposures recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) for 1976.
- c) OSHA Standards - the air contaminant standards enforced by the U.S. Department of Labor (29 CFR 1910.1000, July 1, 1975)

<u>Source</u>	<u>Substance</u>	<u>Standard</u> <u>8-hour TWA</u>
OSHA	Acrolein	0.1 ppm ^(a)
ACGIH	Dichloro Methane or Methylene Chloride	200 ppm
NIOSH	Methyl Alcohol	200 ppm
NIOSH	Nitrogen Dioxide	5.0 ppm
OSHA	Ozone	0.1 ppm
OSHA	1,1,2 Trichloro- 1,2,2 Trifluoroethane	1000 ppm
NIOSH	1,1,1 Trichloroethane or Methyl Chloroform	350 ppm
NIOSH	Toluene	100 ppm
NIOSH	Xylene	100 ppm

a) denotes parts of contaminant per million parts of air

D. Evaluation Results and Discussion

1. Environmental

A review of consultants' reports and environmental sampling results conducted by the company indicated the following:

a) Ferric nitrate/silver etching stack sample results indicated detectable concentrations in equipment exhaust discharges. An NO₂/HNO₃ scrubber was installed to control emissions and re-evaluation by the company indicated satisfactory operation of scrubber.

b) Spray paint/lacquer application spot detector - tube sample results indicated varying detectable concentrations of xylene and toluene in the work areas. Although exposures were not excessive, measures were taken to revamp this area and replace existing equipment.

c) Colight/photo engraving - equipment provided with mechanical exhaust ventilation which discharges into a false ceiling area. Direct reading detector tubes did not indicate any ozone although a faint odor was noted in the area of equipment during walk thru.

d) Food preparation/cafeteria - employees mentioned that at times odors of food being prepared in the cafeteria could be detected in the packaging department. This prompted the thought by Mint personnel of acrolein being generated from over heated cooking oils. Although this was never confirmed, the Mint decided to install activated charcoal filters on the kitchen ventilation to remove odors.

e) Mechanical Design Consultant - Report reviews freon gas decomposition products effects on heating and air conditioning equipment. Report concluded "Being located in the rear corner of the large packaging area, permits the pocketing of contaminants. Normal work activity including the open corridor doors would tend to dissipate a heavy concentration in other areas but this area would remain stagnant." Recommendations were made to rebalance, increase and redirect air flow so as to maintain a positive pressure in this area relative to surrounding areas. At the time of the April visit, this work had been completed and appeared to have a major impact on conditions in the area.

Ventilation changes also made at this time included increasing the height of exhaust stacks to provide better dilution and installing extensions designed to reduce contaminant re-entrainment in the make up or fresh air.

f) Environmental consultants - Area air bag and impinger sample results of the consultants' report indicated that detectable concentrations of 1,1,2-trichloro - 1,2,2-trifluoroethane, 1,1,1 trichloroethane and methanol were found and were well within acceptable limits. No indication of isopropanol, acetone, xylene, or toluene were found. Extremely low amounts of hydrolyzable chloride and fluoride seem to eliminate, "that the eye irritations and other complaints might arise from compounds formed from the interaction of the F-113 1,1,2-trichloro - 1,2,2-trifluoroethane and other halogen compounds with the hot surfaces of the heat exchanger in your space heater".

The consultants then indicated that "If we believe all the analytical data, and if the complaints are real and significant, then we must conclude that the offending agent is either: 1) an unusual compound not readily detected by infrared spectroscopy, 2) an extremely potent lachrymator, present at levels below those at which it may be detected by the infrared techniques employed, probably less than 1 ppm."

2. Medical

Table I presents the symptomatology of the group divided according to job description. The highest number of upper respiratory tract complaints were recorded by the packers (53%). Of that number, however, 28% of these individuals attributed their symptomatology to the colds they had at the time of the evaluation. Physical examinations by NIOSH medical personnel were generally consistent with the workers' assessment.

The symptomatology reported were of upper respiratory tract in nature and most frequently included; eyes, nose and throat burning, nasal congestion, headaches, dizziness, difficulty breathing, and unusual fatigue.

Other complaints included ear infection, swelling of the internal and external ear, and discharge from the ears. The medical investigator had no objective data from medical interviews or physical exams to substantiate these claims.

Physical exams, (see Table II) showed nasal erythema to be the predominant finding (45%). One individual who complained of a burning sensation in the eyes had mild injection of the sclera. Another asymptomatic individual had some non-specific abnormal sound during auscultation of the lungs.

The interviewing process revealed that workers were in accord concerning the most recent outbreaks of complaints. On March 8 and 9, 1977, most employees in the "Pick-Pack" area experienced symptoms of upper respiratory tract irritation. This event coincided with the breakdown of a major ventilation system for the "Pick-Pack" area, which has since been repaired. During the last week in March, 1977, the employees again experienced similar symptomatology. That week was one of mandatory overtime. A possible fatigue factor coupled with the odor from a tarring operation at a nearby construction site, can probably explain the difficulties experienced. Since that time, no further outbreaks have occurred.

Many employees felt that there were several factors which precipitated their upper respiratory problems. Problems seem to occur particularly when the heating system is in operation during the winter, when production is increased at the end of the quarter and when atmospheric pressure is low and humidity is high.

V. CONCLUSIONS

Based on observations of the work practices performed, review of consultants' reports and evaluation of; a) employee questionnaires, b) limited interviews and c) medical examinations, no apparent health hazard was judged to exist. However, due to transitory nature of the problem in the "Pick-Pack" department, environmental levels could not be determined. Therefore, no final determination could be made regarding the source of earlier complaints. Potentially, conditions existed for the occurrence of an environmental condition primarily thru re-entrainment of contaminants in air handling units and insufficient air movement in the "Pick-Pack" area. Thus the conditions may have resulted from exposure to a number of low level contaminants rather than any one contaminant.

More recent complaints were noted in early and late March. The first appears to have coincided with a breakdown of the "Pick-Pack" ventilation/conditioning system. While the second appears to have coincided with a period of mandatory overtime and odors from an adjacent roofing and construction job. Thus, it appears that the occurrence of an odor in the work area may have more recently acted as the triggering mechanism to refresh memories of earlier incidents. As anxiety and fear mount regarding an unknown condition, very real medical conditions such as numbness and tingling of arms and legs, nausea, light headedness, etc. may occur clouding any determination process.

I. RECOMMENDATIONS

1) Continue the program of periodic and routine examination and evaluation of existing and new exhaust systems for potential re-entrainment problems.

2) Whenever possible, avoid sudden demands for long periods of mandatory overtime.

3) Continue the program of health monitoring on a periodic basis.

VII. AUTHORSHIPS AND ACKNOWLEDGMENTS

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TABLE I

FRANKLIN MINT
April 11-12, 1977

Symptomatology

	+	%+	-	%-	Total
Packers	7	53%	6	46%	13
Mail Clerks	3	37%	5	62%	8
Typist	1	100%			1
Material Handler			1		1
Lead			1		1
Total	11	45%	13	54%	24
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Nose	7	29%			
Eyes	3	12%			
Throat	1	4%			
Chest	1	4%			
Headache	1	4%			
Cough	3	12%			
SOB	1	4%			

TABLE II

FRANKLIN MINT
April 11-12, 1977

Physical Examinations

	+	%+
Nasal Erythema	11	45%
Lung Auscultation	1	4%
Scleral Injection	1	4%
Colds Reported	4	16%