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

HEALTH HAZARD EVALUATION DETERMINATION REPORT
HE 80-110-724

FAIRCHILD INDUSTRIAL PRODUCTS
COMMACK, NEW YORK

JULY 1980

I. SUMMARY

The National Institute for Occupational Safety and Health (NIOSH) received a request to investigate the possible cause of outbreaks of illness (eye, nose and throat irritation, headache, lightheadedness and bitter tase in the mouth) which had occurred March 13-17 and April 2-4, 1980, involving 33 employees at Fairchild Industrial Products Building #76 assembly plant (SIC 3728). Environmental samples were collected on April 8 and 24, workers were interviewed and the plant nurse's notes made during the incidents were reviewed.

Analysis of the samples of airborne contaminants revealed small concentrations (about 2% of permissible levels) of Freon 113, methyl chloroform, isopropyl alcohol, toluene and perchloroethylene throughout the work area of the plant. However, between the time of the outbreaks and the NIOSH visits, changes in the work environment had been made, (e.g. replacement and relocation of the Freon 113 degreaser, limitation of the use of solvents at the work benches and reduction of heating requirements). Hence, it was not possible to replicate conditions which existed at the time of the outbreaks. Review of the plant nurse's notes and of the employee interviews revealed signs and symptoms compatible with solvent exposure.

Based on the employee interviews and the environmental survey NIOSH concludes that an occupational health hazard of exposure to solvents probably did occur at the times of the illness outbreaks. Significant steps have already been taken to alleviate this hazard. Further recommendations to reduce the potential for similar occcurrences are found on page 5 of this report.

II. INTRODUCTION

The NIOSH Region II office received a telephone call on April 4, 1980, from the business representative of local 1470, International Association of Machinists and Aerospace Workers, which represents the workers at Fairchild Industrial Products. The business representative requested NIOSH help in determining possible cuases of two outbreaks of illness (March 14-17 and April 2-4, 1980) at the plant. A formal request for a Health Hazard Evaluation was made by company management with the union representative concurring.* On April 7, the Regional Industrial Hygienist toured the plant and on April 24, the Regional Consultant for Occupational Medicine and the Regional Industrial Hygienist made a follow-up visit and interviewed various employees and representatives of management, including the corporate Industrial Hygienist, who had been called from the California headquarters of the company and the plant nurse. Complaints of eye, nose and throat irritation, headaches, lightheadedness and a "metallic" or "bitter" taste had begun on March 14. On March 17, the workers were sent home early. Two (out of 13) of the more severely affected employees were sent to local hospitals for medical tests, which were negative. Representatives of the local public utility and an industrial hygiene consulting firm conducted tests that evening, several hours after the work site had been evacuated and ventilated. Small amounts of Freon 113 (up to 2 parts per million parts of air (ppm), methyl chloroform (0.9 ppm) and acetone (up to 5 ppm) were found. Sporadic complaints continued for a few weeks. The second incident of widespread complaints occurred April 2-4, and involved 20 workers with symptoms similar to those experienced in March.

III. BACKGROUND

In Building #76 at Fairchild Industrial Products, pressure switches and cockpit voice recorders are produced. The building is approximately 100 feet by 90 feet, with an 18 foot ceiling height. The company occupied the site since 1971 and currently has a work force of 68, including 63 production employees and 5 supervisors. The work performed (hand assembly, soldering, testing) is typical of the industry, and no major changes in procedures or materials have occurred since 1972. Two heating/air conditioning units circulate air throughout the plant. An additional unit services the entrance and bathroom areas. Several windows, at 2nd story height, along the north and east walls may be opened for additional ventilation. Storage and utility rooms occupy the rear (south) of the building. The west wall is common to an adjoining plant which produces cement patch kits and packages cement cleaners.

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*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 in the place of employment might have potentially toxic effects as it is used or may be found.

Two degreasers are used. One degreaser containing methyl chloroform (1,1,1-trichloroethane), unidentified fluorinated solvents and propanol is located in a partitioned-off area and shares an exhaust hood with a "wave solder" machine - this machine is used to do most of the soldering required. The wave soldering machine uses the same solvents as the degreaser for cleaning items to be soldered. The other degreaser contains Freon 113, (1,1,2 trichloro, 1,2,2 - trifluoroethane). This second unit is new and has been located in a storage room in the southwest of the building. It is not equipped with an exhaust hood. The old freon degreaser was in operation at the time of the incidents. It had been cooled by circulating water and had been located under an exhaust hood in the northwest corner of the plant. This unit has been removed, but the hood remains. This northwest corner was identified by several employees as a possible source of odors at the time of the incidents.

Small containers of methyl chloroform, freon, isopropanol and acetone are used throughout the work area. Cotton swabs are used to apply small amounts of the solvents for touch-up cleaning. Reportedly, the use of these solvents at the work benches has been reduced since the incidents.

IV. SAMPLING METHODS

On April 8 after a review of the composition of the solvents used, air samples were collected using activated charcoal and silica gel as the collection media. Samples were collected at work benches throughout the plant where affected employees were stationed. On April 24 additional charcoal tube samples were collected in the work area around the methyl chloroform degreaser. Filter samples for lead and cadmium were collected in the breathing zones of two employees who were soldering that day. An evacuated gas bottle was used to collect an air sample in the crawl space above the entrance foyer where odors had been detected. In addition, Petri dishes were placed throughout the work area to check for molds and fungi.

It should be emphasized that these samples were collected after the incidents of illness, on days when no major complaints were voiced and the odor described by the employees during the incidents was not present. Both incidents occurred during periods of rainy weather and the heating units were in operation during the March incident. During the sampling times, neither heating nor air conditioning was in operation, but a few windows were open.

The adjoining plant was visited, both by NIOSH and by the Suffolk County Department of Health Services. It has been in operation since fall of 1978. After a consideration of the products used (mostly cement and limestone with a few dilute solvents), the currently reduced production and the lack of reported complaints among its employees, the possibility of this plant being a source of contamination to the adjoining Fairchild facility was dismissed.

V. SAMPLING METHODS

Evaluation of the Petri-dish samples did not reveal any pathologic agents or fungi. Nothing could be detected in the grab sample collected in the crawl space above the entrance foyer. No lead and a small amount of cadmium (3.2 ug/M^3) were detected in the filter samples. The lead soldering operations are intermittent and would be expected to involve minimal exposures. Analysis of the charcoal tube samples collected on April 8 and 24 using NIOSH's standard gas chromatography analytical method revealed small concentrations (1 or 2 percent of the OSHA or NIOSH limits) of Freon 113, isopropanol, methyl chloroform, toluene and perchloroethylene throughout the plant (see Tables I and II). The solvent concentrations were ubiquitous and with no apparent relationship to location or proximity to either of the degreasing tanks or to touch-up solvent containers.

VI. MEDICAL

Of the 63 employees in the work areas in question, 33 were symptomatic and were seen in the medical department during the 2 major episodes which occurred March 13 to 17, 1980 (13 workers) and from April 2 to 4, 1980 (20 workers). Ten workers, including 8 who had the severest symptoms, were interviewed individually, and during the walk-through, several other workers were questioned about their symptoms. In addition, a review was made of the nurse's notes describing each worker's clinical manifestations as they occurred during the episodes.

About 30 workers experienced a consistent pattern of symptoms including irritation of the eyes, nose and throat, headaches, and feelings of pressure at the base of the head; at times accompanied by lightheadedness and a "metallic" or "bitter" taste in the mouth. In almost all of the cases, the symptoms occurred after smelling an odor variously described as "chlorine-like" or "cleaning fluid". In most of the cases the symptoms were relieved by leaving the work area and going outside of the building.

No relationship was noted between effects and length of employment or age. Most of the employees in these areas are female (52 of the 63 workers), but 2 of the 11 male workers intermittently experienced similar effects as well. A considerable number of workers were observed smoking in the work area. A toxicologist at Dupont's Haskell Laboratories stated that Freon 113 may break-down to hydrochloric acid when passing through a lit cigarette and cause a bitter taste in the mouth of a smoker.*

Of those with symptoms, most worked in pressure switch assembly, cockpit voice recorder, and in the wire preparation areas.

*Personal communication from H. Teochimowicz, Ph.D.

FAIRCHILD INDUSTRIAL PRODUCTS
75 MALL DRIVE
COMMACK, NY 11735

TABLE I

SOLVENT CONCENTRATIONS
(milligrams per cubic meter of air (mg/M^3))
4-4-80

Location	Sample Volume (liters)	Freon 113	Isopropanol	Methyl Chloroform	Toluene	Perchloro-ethylene
Pressure Test	53	49.5	1.3	6.4	0.4	2.8
Contact Assembly	14	430.	—	8.5	0.7	3.5
P.C. Board Assembly	39	24.2	1.8	8.7	0.5	5.1
Pressure Switch Assembly	64	39.8	5.0	8.1	0.3	4.2
CVR Assembly*	67	35.9	5.9	16.7	1.1	9.3
Corner Bench	49	43.1	1.6	6.3	0.2	3.0
Electronic Testing	37	53.6	1.9	9.4	0.5	3.8
Electronic Assembly	20	48.5	1.0	14.2	1.0	6.9
OSHA Permissible - Limit		7600 TWA	980 TWA	1900 TWA	750 TWA 1125 ceiling	680 TWA 1350 ceilir
NIOSH Recommended - Limit			980 TWA 1960 ceiling/ 15 min.	1900 1900/15 min. ceil- ing	375 TWA 750 ceiling /10 min.	340 TWA 680 ceilir 10 min.

*2.7 mg/M^3 of tetrahydrofuran was identified in the sample. It is an eye and mucous membrane irritant and is used as a resin solvent. The OSHA Permissible Exposure Limit is 590 mg/M^3.

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TABLE II

SOLVENT CONCENTRATIONS*
(milligrams per cubic meter of air (mg/M^3)
(4-24-80)

Location	Sample Volume (liters)	Freon 113	Methyl Chloroform	Isopropanol	Perchloroethylene
Rack near drying table (general air)	210	6.8	15.5	3.4	9.2
Rack near feed end of wave made (general air)	280	7.4[A]	10.5	2.5[A]	10.1
Coat rack near drying table (general air	350	5.4[A]	11.6[A]	3.4[A]	12.5
Wave machine attendant (breathing zone)	46	17.3	47.6	15.2	93.1

*No Toluene was detected in this group of samples.

[A]Analysis of these samples indicated solvent in the "back-up" section of the collection media. Actual concentrations were probably greater than those reported.

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TABLE III

PHYSICOLOGICAL
RESPONSE TO
SOLVENTS

Solvent	Symptoms of Exposure
1,1,2 - trichloro - 1,2,2 - trifluoroethane (Freon 113)	Mild throat irritation, conjunctivitis, drowsiness, loss of concentration, loss of coordination, dermatitis (prolonged use).
1,1,1 - trichloroethane (methyl chloroform)	Eye irritation, mucous membrane irritation, Central nervous system depression (incoordination, disturbance of equilibrium), dermatitis.
Isopropyl alcohol	Eye, nose and throat irritation, Central nervous system depression.
Toluene	Dizziness, headache, weakness, confusion
Perchloroethylene	Eye, nose and throat irritation, dizziness, headache.

A few were in the adjacent test and repair area, but most of these workers experienced their symptoms primarily following a specific spill on April 3, 1980 of a small amount of Freon, kerosene and isopropyl alcohol which was quickly cleaned up.

The pattern of clinical effects noted in the majority of these workers (30 of 33) is consistent with the effects of exposure to significant amounts of solvents found in these work areas, particularly methyl chloroform, Freon 113, isopropyl alcohol, perchloroethylene and toluene. (see Table III).

VII. RECOMMENDATIONS

It should be emphasized that the conditions existing at the time of the two NIOSH visits were not representative of those at the time of the incidents, and the levels of in plant air contamination at the times of these incidents cannot be determined. The following recommendations are based on good industrial hygiene considerations and should act to reduce the potential for further similar occurrences:

1. Adequate general ventilation (heating or air conditioning) should be used at all times in the work area.

2. The unused exhaust hood in the northwest corner should be sealed, as it acts to unbalance the existing ventilation system.

3. The use of small containers of touch-up solvent should be kept to a minimum. Currently used containers should be replaced by ones which incorporate applicators in their lids, and the use of cotton swabs should be eliminated. All containers should be kept closed when not in use.

4. Smoking in the work area should be discouraged. Consideration should be given to establishing a separate, well ventilated smoking area.

5. The eating/break area should be a separate room, apart from the work area, with its own ventilation system.

6. Maintenance and cleaning of the degreasers should be done on a regular basis and should be done after production employees have left for the day.

7. The new Freon degreaser should be equipped with an exhaust hood to remove evaporating vapors at the source.

VIII. DISTRIBUTION AND AVAILABILITY

Copies of this report currently are available upon request from NIOSH Divison of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parking, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), Springfield, VA 22161. Information regarding its availability from NTIS can be obtained from NIOSH's Publication Office at the Cincinnati address. Copies of this report have been sent to:

1. Fairchild Industrial Products
2. Int. Assoc. of Machinists and Aerospace Workers, Local 1470
3. U.S. Dept. of Labor, OSHA, Region II
4. U.S. Dept. of HHS, NIOSH, Region II
5. New York State Commissioner of Health

For purposes of informing the affected employees, the employer shall post this report for 30 days in a prominent place near where employees work.

IX. AUTHORISHIP AND ACKNOWLEDGMENTS

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