

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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 73-165-124

TRANTEX CORPORATION
SPRINGFIELD, MASSACHUSETTS

MARCH 1974

I. TOXICITY DETERMINATION

It was determined by a NIOSH investigator that no health hazard existed from exposure to solvent vapors (ethyl acetate, n-propyl alcohol) at the Trantex Corporation at the time of the survey. This determination is based on employee interviews wherein 17 employees stated they had no health problems related to their work. Air concentrations of solvent vapors were also below existing levels presently considered safe for daily 8 hour exposure.

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

- a) Trantex Corporation, Springfield, Massachusetts
- b) U.S. Department of Labor - Region I
- c) NIOSH - Region I

For the purpose of informing the affected 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.

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 an employer initiated hazard evaluation request from the Trantex Corporation to evaluate the potential hazards associated with the use of solvent vapors at the plant.

IV. HEALTH HAZARD EVALUATION

A. Description of Work Areas

The Trantex Corporation produces several million yards of printed paper per year by a gravure printing process. Essentially there are three main areas of the plant, excluding office areas. (Art Department, Printing Area, Color Match Laboratory) The Art Department produces the various designs which are used in the printing process, the Printing Department prints the paper with the designs produced by the Art Department, and the Color Match Laboratory checks the paper produced to assure that quality colors are produced on the paper. The rolls of printed paper are then sent to various cloth manufacturers where the design is transferred by a heat sensitive process. Ethyl acetate, n-propyl alcohol, and ethyl alcohol are used as solvents in the printing process. During the survey ethyl acetate and n-propyl alcohol were being used. Approximately 200 gallons per week of ethyl acetate and 100 gallons per week each of n-propyl alcohol and ethyl alcohol are used. Vapors from the presses are collected into one duct and exhausted through an outside wall about 5 feet above ground level, on the east side of the building. Three foot exhaust fans are located on the north side of the building which are used to exhaust the solvent vapors from the Color Match Laboratory. Much of the solvent vapors from the press room are blown by a man cooling fan located in the press room and exhausted from the Color Match Laboratory.

B. Worksite Evaluation

1. Environmental Sampling

Employee exposures to the solvent vapors discussed above, were measured by two sampling methods. Namely, a direct reading portable infrared analyzer, and by absorption of the solvent vapors on charcoal tubes¹ which were later analyzed at the Western Area Occupational Health Laboratory.

2. Employee Interviews

Seventeen employees were asked non-directive questions regarding work related and non-work related health problems.

C. Evaluation Criteria

The OSHA Standards for the air contaminants of interest were taken from Part 1910 of Title 29 of the Code of Federal Regulations, Section 1910.93, Table G-1.²

<u>Material</u>	<u>8-Hour Time Weighted Average</u>
2-butanone (MEK)	200 ppm*
ethyl acetate	400 ppm*
propyl alcohol	200 ppm*
ethyl alcohol	1000 ppm*

D. Evaluation Discussion

1. 2-Butanone (Methyl Ethyl Ketone)

Methyl ethyl ketone (MEK) has found wide use as an industrial solvent, and while workers frequently complain about the objectionable odor, there have been relatively few reports of serious ill effects. Maintaining air concentrations of MEK below 200 ppm should prevent any injurious effects and minimize complaints about odor and irritation.³ Methyl ethyl ketone is used at the Trantex Corporation for cleaning equipment in the Color Match Laboratory. One should be cognizant of the potential fire hazard as well as a potential health hazard.

2. Ethyl Acetate

Ethyl acetate is in wide use as a lacquer solvent and has the reputation of being one of the less toxic of the volatile organic solvents. Maintaining air concentration levels below 400 ppm should provide a level with a safety factor from a stand point of health, but may prove mildly irritating to some workers unaccustomed to the exposure.³

*Parts of vapor per million parts of air by volume at 25°C and 760 mm Hg pressure.

3. Ethyl Alcohol

A standard of 1000 ppm has been established for ethyl alcohol. Rather widespread and long industrial hygienic experience with human exposures to ethyl alcohol in the U.S.A. supports the 1000 ppm level. Irritation of the eyes and upper respiratory tract are not noted at concentrations below 5000 ppm, and at 1000 ppm the odor of ethyl alcohol is about threshold.³

4. n-Propyl Alcohol

The principal action of n-propyl alcohol is that of a mild narcotic. The standard for n-propyl alcohol is based on an analogy of the health hazards of isopropyl alcohol. Maintaining air concentrations below 200 ppm should provide a safe atmosphere in which to work.³

E. Evaluation Results

1. Environmental Data

Air concentrations of solvent vapors collected during December 12-13, 1973, at the Trantex Corporation were all below present acceptable levels for these materials. When two or more hazardous substances are present their combined effect must be given consideration. The combined effects of the solvent vapors mentioned in this report were considered in determining compliance with acceptable levels for these materials. Maximum levels of 393 ppm ethyl acetate and 74 ppm n-propyl alcohol were determined. The concentrations vary greatly throughout the working day depending on work activities as shown in Table 1. During the survey ethyl acetate and n-propyl alcohol were being used in the ratio of 3 gallons of ethyl acetate to 2 gallons of n-propyl alcohol. Ethyl acetate is much more volatile and therefore, would be expected to be present in the work environment in greater concentrations than n-propyl alcohol. Dr. Maurice Dyke, a Physical Chemist at the Western Area Occupational Health Laboratory, calculated that the theoretical concentrations for the solvent as used on the day of the survey should be in the ratio of 140 mg/M³ ethyl acetate to 25 mg/M³ n-propyl alcohol.

2. Employee Interviews

None of the 17 employees interviewed mentioned any health problems which they related to their work.

F. Conclusions

No health hazard was considered to exist at the present time. Another health hazard evaluation should be submitted if employees complain of severe eye irritation, nausea, or frequent headaches. Large quantities of solvents are used, and air concentrations may vary from one season of the year to another.

V. REFERENCES

1. White, W.D., D.B. Taylor, P.A. Mauer and R.E. Kupel. "A Convenient Optimized Method for the Analysis of Selected Solvent Vapors in the Industrial Atmosphere," Am. Ind. Hyg. Assoc. J., Vol. 31, March-April, 1970.
2. Federal Register: Wednesday, October 18, 1972.
3. American Conference of Governmental Industrial Hygienists: Threshold Limit Values for Chemical Substances and Physical Agents for 1973.

VI. AUTHORSHIP AND ACKNOWLEDGMENTS

Report Prepared By: Lee B. Larsen
Industrial Hygienist
DTS/SLC

Originating Office: Jerome P. Flesch, Chief
Hazard Evaluation Services Branch

TABLE 1 - Vapor Concentrations of Ethyl Acetate and N-propyl Alcohol
(Wilks Infrared Analyzer Determination)

Location	Date	Time	Vapor Concentration Average ppm		Ethyl Acetate maximum concentration during 30 min. period	Comments
			Ethyl Acetate	N-propyl Alcohol		
Art Room	12-12-73	1030	1	<1	1	
Color Match Lab.	12-12-73	1100-1130	43	4	66	
"	"	1130-1200	46	5	71	
"	"	1200-1230	54	9	82	Workers to lunch, but presses still operating
"	"	1230-1300	54	9	96	
"	"	1300-1330	92	15	96	
Press Room	12-12-73	1330-1400	174	38	180	Presses Rolling
"	"	1400-1430	293	58	343	" "
"	"	1430-1500	375	74	393	" "
"	"	1500-1530	58	10	97	Presses not rolling
"	"	1530-1600	33	9	58	Getting ready for shift change
"	"	1600-1630	19	3	68	Start new shift
"	"	1630-1700	59	10	95	Presses not operating consistently
"	"	1700-1730	115	19	146	" " "
"	"	1730-1800	101	16	128	" " "
"	"	1800-1830	95	16	119	" " "

NOTE: Vapor concentrations from 700-1300 on 12-13-73 were all below 10 ppm ethyl acetate and 2 ppm n-propyl alcohol. The presses were not being operated as material was being prepared for the presses. It was indicated that this was a part of the regular work activities.

TABLE 1 (Continued)

(Samples were collected on Charcoal Tubes)

Location	Date	Time	Vapor Concentration Average ppm			Comments
			Ethyl Acetate	N-propyl Alcohol	Methyl Ethyl Ketone	
Color Match Lab.	12-12-73	1135-1136	43	N.D.	N.D.	Samples collected at 10 liters per minute
"	"	1136-1138	42	N.D.	N.D.	
"	"	1138-1141	57	6	N.D.	
"	"	1141-1147	58	8	3.5	
Color Match Lab.	12-12-73	1446-1526	112	33	3	Sample collected at 0.5 cubic feet per hour
Press Area	12-12-73	1450-1520	101	23	-	Samples collected at 0.5 cubic feet per hour
"	"	1635-1705	44	4	-	