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

HEALTH HAZARD EVALUATION DETERMINATION REPORT 75-189-277
FRONTIER AIRLINES
DENVER, COLORADO

APRIL 1976

I. TOXICITY DETERMINATION

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) on January 6, 1976, at the Frontier Airlines maintenance hangar, Denver, Colorado. At the time of this evaluation, employee breathing zone and general area room air samples were taken for petroleum distillates, acetone, toluene, methyl ethyl ketone (MEK), and hexane. This evaluation was conducted in an upholstery shop where airplane passenger seats are repaired. A health hazard was not documented during this evaluation. Confidential employee interviews on the three workers in this department support the conclusion that there is no health problem related to these contaminants under the present operating conditions.

II. DISTRIBUTION AND AVAILABILITY

Copies of this hazard evaluation determination report are available upon request from NIOSH, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Copies have been sent to:

(a) Frontier Airlines
(b) U.S. Department of Labor - Region VIII
(c) NIOSH - Region VIII

This report shall be posted in a prominent place accessible to the three affected workers for a period of 30 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 received such a request from the Corporate Safety Engineer, Frontier Airlines, Denver,

Colorado, to evaluate the potential exposures to petroleum distillates, acetone, toluene, MEK, and hexane vapors coming from contact cement and vinyl adhesives used in the repair of airplane passenger seats.

IV. HEALTH HAZARD EVALUATION

A. Plant Process

The upholstery shop is located on the second floor of the Frontier Airlines maintenance hangar. Damaged airplane passenger seats are repaired in this area. Approximately 80 seats are repaired each month. The time required for this repair is usually one 8-hour day. Three workers use contact cement, vinyl adhesives, and MEK in the process of repairing the seats. The room has general ventilation but no local exhaust ventilation.

B. Evaluation Design

There are three workers in this area of request. Upholstery of the airplane passenger seats is a one day a month activity which usually requires eight hours or less. Personal air samples and general room samples were taken during the entire time workers were repairing the seats. Sampling times ranged from 68 to 145 minutes.

C. Evaluation Methods

All samples were taken with organic vapor sampling tubes and analyzed by gas chromatography at the Western Area Laboratory for Occupational Safety and Health in Salt Lake City, Utah.

D. Criteria for Assessing Workroom Concentrations of Air Contaminants

The two sources of criteria used to assess workroom concentrations of air contaminants in this evaluation are: (1) Recommended and proposed threshold limit values (TLVs) and supporting documentation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH) (1975); and (2) occupational health standards as promulgated by the U.S. Department of Labor (Federal Register, June 27, 1974, Title 29, Chapter XVII, Subpart G).

In the following tabulation of criteria, the most appropriate value is presented with its reference footnoted.

Substances	Permissible Exposure 8-Hour Time-Weighted Exposure Basis
[1]Petroleum Distillates	2,000 mg/M^3
[2]Acetone	2,400 "
[3]Toluene	375 "
[2]MEK	590 "
[2]Hexane	1,800 "

mg/M^3 = approximate milligrams of substance per cubic meter of air

[1]Reference: Current OSHA standard
[2]Reference: 1975 ACGIH TLV and the current OSHA standard
[3]Reference: 1975 ACGIH TLV

Occupational health standards are established at levels designed to protect individuals occupationally exposed to individual toxic substances on an 8-hour per day, 40-hour per week basis over a normal working lifetime.

E. Evaluation Results, Discussion, and Conclusions

The initial survey was completed, and environmental samples taken, on January 6, 1976. Results of this survey clearly illustrated that workers were not exposed to excessive levels of petroleum distillates, acetone, toluene, MEK, and hexane on a time-weighted basis. Combined exposures to petroleum distillates, acetone, toluene, MEK, and hexane posed no health hazard. Over exposure to these compounds is usually accompanied by narcosis and may produce nausea, headaches, and eye and throat irritation. Levels found during this survey should provide freedom from any central nervous system or other biological effects. Should this upholstery shop be used continuously on an 8-hour day, 40-hour week schedule, an additional evaluation should be performed. Confidential employee interviews were completed on all three workers. Only one of the workers had complaints due to working conditions. His complaints were: headaches and respiratory problems from the glue. It should be pointed out that this worker also smoked approximately 20 cigarettes per day. Since this operation is only done one day per month, the workers do not take all precautions that should be taken when working with these compounds. Such precautions as keeping hands out of the solvents and not smoking while using these solvents would perhaps eliminate all complaints and minimize chapped hands, which was caused by dipping them in solvents.

Recommendations

1. Workers should be directed to use barrier creams which are presently being provided, since during this evaluation dry, chapped hands were noted on several of the workers who were not using barrier creams.

2. Local exhaust ventilation should be installed in the immediate area where the contact cement, vinyl adhesives, and MEK are used in order to eliminate worker complaints and the possibility of potential health and fire hazards.

3. Gloves should be used where possible, since barrier creams are not too effective for these compounds.

V. AUTHORSHIP AND ACKNOWLEDGMENT

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TABLE I

ATMOSPHERIC CONCENTRATIONS OF
ALIPHATIC PETROLEUM DISTILLATES, ACETONE, AND TOLUENE
IN AN AIRPLANE SEAT UPHOLSTERY SHOP

January 6, 1976

Sample Number	Sampling Period A.M.	ATMOSPHERIC CONCENTRATIONS Petroleum Distillates mg/M^3	Acetone mg/M^3	Toluene mg/M^3	Type Sample
1	8:10 - 10:35	49	15	5	OBZ
2	8:15 - 10:35	427	215	27	OBZ
3	8:19 - 10:35	157	47	12	OBZ
4	8:25 - 10:30	*	1	26	General Room
5	8:25 - 10:27	473	*	33	OBZ
	HYGIENIC STANDARDS	2,000	2,400	375	
	LIMIT OF DETECTION (mg/sample)	0.01	0.01	0.01	

*Chemical was found in back-up section of the charcoal tube; therefore, results were not reports.

OBZ = Operator's Breathing Zone

TABLE II

ATMOSPHERIC CONCENTRATIONS OF
TOLUENE, MEK, AND HEXANE
IN AN AIRPLANE SEAT UPHOLSTERY SHOP

January 6, 1976

Sample Number	Sampling Period A.M.	ATMOSPHERIC CONCENTRATIONS Toluene mg/M^3	MEK mg/M^3	Hexane mg/M^3	Type Sample
6	8:32 - 10:31	14	45	185	OBZ
7	8:35 - 10:35	12	21	87	General Room
8	8:37 - 10:30	38	100	311	General Room
9	8:40 - 10:35	10	17	75	General Room
10	8:42 - 9:50	8	23	72	General Room
	HYGIENIC STANDARDS	375	590	1,800	
	LIMIT OF DETECTION (mg/sample)	0.01	0.01	0.01	

OBZ = Operator's Breathing Zone