

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

HEALTH HAZARD EVALUATION DETERMINATION REPORT 74-126-195
MONAGHAN COMPANY
LITTLETON, COLORADO

MAY 1975

I. TOXICITY DETERMINATION

Based on the results of environmental evaluations and confidential employee interviews conducted by the National Institute for Occupational Safety and Health (NIOSH) on October 11 and December 12, 1974, and January 7 and February 19, 1975, it has been determined that a health hazard did not exist. All environmental measurements were well below the NIOSH recommended standards and established Federal standards for ethanol, methyl ethyl ketone, toluene, methylene bisphenyl isocyanate (MDI), tin, lead, and oil mist. Personal observations made by three NIOSH industrial hygienists indicated that there were no apparent health hazards in all areas investigated.

II. DISTRIBUTION AND AVAILABILITY

Copies of this hazard evaluation are available upon request from the Hazard Evaluation Services Branch, NIOSH, U.S. Post Office Building, Room 508, Fifth and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

- (a) Monaghan Company
- (b) U.S. Department of Labor - Region VIII
- (c) NIOSH - Region VIII

For the purpose of informing approximately 100 exposed employees, this report shall be posted in a prominent place readily accessible to workers for a period of at least 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 management at Monaghan Company, Littleton, Colorado, to evaluate the potential hazards associated with the alleged exposures to solvents, oil mist, and soldering fumes generated by the manufacturing of pulmonary function and related equipment. Management also requested that NIOSH evaluate other areas of the plant where possible harmful exposures might exist.

IV. HEALTH HAZARD EVALUATION

A. Plant Process

The Monaghan Company's Instruments Division produces pulmonary function equipment, both for patients to wear and for hospital bedside monitoring. There are several areas in the plant that have hand soldering stations. In these areas possible exposures to tin, lead, and toluene exist. After the electronic parts are hand soldered, final soldering is performed by an automatic wave soldering machine. The parts are then passed through a vapor degreaser containing toluene. In one area of the plant there are numerous lathes and other milling machines which use two cutting oils--one water-soluble and the other not water-soluble. After the various pieces of equipment are assembled, they are packed in an MDI foam. In all these areas, both breathing zone and general area samples were taken.

B. Evaluation Design

At the time of this evaluation, the Monaghan Company employed approximately 250 people, but since evaluation quite a few of the employees have been laid off. Environmental samples were taken throughout the plant. All samples were analyzed in the NIOSH Salt Lake City laboratory, with the exception of oil mist samples which were analyzed by the NIOSH Cincinnati laboratory.

C. Methods

Ethanol, methyl ethyl ketone, and toluene samples were collected on organic vapor sampling tubes and analyzed by gas chromatography. MDI samples were taken with impingers containing Marcali solution and then analyzed spectrophotometrically. Oil mist samples were taken on pre-weighed filters and analyzed spectrophotometrically. Lead and tin samples were taken on AA filters and analyzed by atomic absorption spectroscopy.

D. Criteria for Assessing Workroom Concentrations of Air Contaminants

The three primary sources of criteria used to assess workroom concentrations of air contaminants in this evaluation are: (1) NIOSH criteria for recommended standards for occupational exposure to substances (Criteria Documents); (2) recommended and proposed threshold limit values (TLV's) and their supporting documentation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH) (1974); and (3) 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 and other information footnoted.

<u>Substance</u>	<u>Permissible Exposures 8-Hour Time-Weighted Exposure Basis</u>
¹ Ethanol	1,000.0 ppm ^a
² Methyl Ethyl Ketone	200.0 ppm
³ Toluene	100.0 ppm
⁴ Tin	2.0 ppm
⁵ Lead and Its Inorganic Compounds	0.15 mg/M ³ ^b
⁶ MDI	^c C-0.02 ppm
⁷ Oil Mist	5.0 mg/M ³

^a ppm = parts of vapor or gas per million parts of contaminated air

^b mg/M³ = approximate milligrams of substance per cubic meter of air

^c C = Ceiling Value: Exposures should not exceed this level

¹Reference: The 1974 ACGIH TLV and the current Occupational Safety and Health Administration (OSHA) standard.

²Reference: The 1974 ACGIH TLV and the current OSHA standard.

³Reference: The NIOSH 1973 criteria document and the 1974 ACGIH TLV.

⁴Reference: The 1974 ACGIH TLV and the current OSHA standard.

⁵Reference: The NIOSH 1972 criteria document and the 1974 ACGIH TLV.

⁶Reference: The 1974 ACGIH TLV and the current OSHA standard.

⁷Reference: The 1974 ACGIH TLV and the current OSHA standard.

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 and Discussion

This evaluation was performed in October and December of 1974 and in January and February of 1975. Ten confidential employee interviews were taken. Since some of the employees complained of dry, irritated throats, an additional visit was made to the plant in an attempt to find the cause of these symptoms. At the time of this visit, employees did not complain of irritated throats. There was one employee in the entire plant who had nasal irritation; but we were unable to link this irritation to her job, since she had been employed in the same job for over twenty years and had no prior nasal irritation. All breathing zone and general room samples were well below established Federal standards, TLV's, and NIOSH recommended standards.

V. AUTHORSHIP AND ACKNOWLEDGMENT

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TABLE I

ATMOSPHERIC CONCENTRATIONS OF ETHANOL, METHYL ETHYL KETONE, AND TOLUENE

Sample Number	Location	Time of Sample (min.)	Atmospheric Concentrations			Type Sample
			Ethanol (ppm)	Methyl Ethyl Ketone (ppm)	Toluene (ppm)	
1	Hand Soldering Area	204	N/D	< 0.2	< 0.2	Operator's Breathing Zone
2	Hand Soldering Area	160	N/D	< 0.2	16.8	Operator's Breathing Zone
3	Hand Soldering Area	150	N/D	N/D	N/D	Operator's Breathing Zone
4	Hand Soldering Area	148	2.64	N/D	N/D	Operator's Breathing Zone
5	Hand Soldering Area	153	4.13	N/D	N/D	Operator's Breathing Zone
6	Hand Soldering Area	198	N/D	< 0.2	< 0.2	Operator's Breathing Zone
7	Hand Soldering Area	202	N/D	< 0.2	< 0.2	General Room
8	Hand Soldering Area	188	N/D	N/D	N/D	Operator's Breathing Zone
9	Hand Soldering Area	152	N/D	N/D	N/D	Operator's Breathing Zone
Hygienic Standards			1,000.0	200.0	100.0	

N/D = none detected

TABLE II

ATMOSPHERIC CONCENTRATIONS OF TIN AND LEAD

Sample Number	Location	Time of Sample (min.)	Atmospheric Concentrations Tin (mg/M ³)	Lead ₃ (mg/M ³)	Type Sample
1	Electronics Assembly Area	103	< 0.004	< 0.009	Operator's Breathing Zone
2	Electronics Assembly Area	102	< 0.004	< 0.009	Operator's Breathing Zone
3	Electronics Assembly Area	108	< 0.004	< 0.009	General Room
4	Electronics Assembly Area	14	< 0.004	< 0.009	Operator's Breathing Zone
35	Electronics Assembly Area	93	< 0.004	< 0.009	Operator's Breathing Zone
16	Electronics Assembly Area	83	< 0.004	< 0.009	Operator's Breathing Zone
Hygienic Standards			2.0	0.15	

TABLE III

ATMOSPHERIC CONCENTRATIONS OF OIL MIST

Sample Number	Location	Time of Sample (min.)	Atmospheric Concentrations Oil Mist (mg/M ³)	Type Sample
150	Milling Machine Room	306	0.06	Operator's Breathing Zone
158	Milling Machine Room	95	0.07	Operator's Breathing Zone
149	Milling Machine Room	298	0.06	General Room
160	Milling Machine Room	233	0.20	General Room
148	Milling Machine Room	300	0.0	General Room
Hygienic Standard			5.0	

TABLE IV
ATMOSPHERIC CONCENTRATIONS OF MDI

Sample Number	Location	Time of Sample (min.)	Atmospheric Concentrations MDI (ppm)	Type Sample
1	Equipment Packing Area	30	N/D	Operator's Breathing Zone
2	Equipment Packing Area	25	N/D	General Room
3	Equipment Packing Area	25	N/D	Operator's Breathing Zone
4	Equipment Packing Area	40	N/D	General Room
Hygienic Standard			C-0.02	