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 NO. 79-62-606

REDFIELD DIVISION OF OUTDOOR SPORTS IND.
DENVER, COLORADO

JULY 1979

I. TOXICITY DETERMINATION

A health hazard evaluation was conducted by the National Institute for Occupational Safety and Health (NIOSH) at Redfield Division of Outdoor Sports Ind., Denver, Colorado, on April 25, 1979. Breathing zone air samples were taken for oil mist. Concentrations of oil mist were below the most recent evaluation criteria. The breathing zone samples, as well as the bulk samples, did not contain nitrates or nitrosamines.

The machinists and other personnel using cutting oils were interviewed. Questions were directed towards symptoms occurring due to exposure to cutting oil. Several of the workers had complaints of dermatitis and upper respiratory irritation. Dermatitis was not evident at the time of this survey.

Based on employee interviews and the low levels of oil mist, a health hazard did not exist at the time of this evaluation.

II. DISTRIBUTION AND AVAILABILITY

Copies of this determination report are currently available upon request from NIOSH, Division of Technical Services, Information Resources 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 availabilitv through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. Redfield Division of Outdoor Sports Ind.
2. United Steelworkers Union, Local 5550, Denver
3. U.S. Department of Labor/OSHA - Region VIII
4. NIOSH - Region VIII

For the purpose of informing thirty employees, a copy of this report shall be posted in a prominent place accessible to the employees 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.

NIOSH received such a request from plant management of Redfield Division of Outdoor Sports Ind., Denver, Colorado, to evaluate potential hazards associated with the use of cutting oils. This request was precipitated by employee complaints about a residue forming on equipment in the milling and machining areas. Employees were of the opinion that this residue was caused by airborne oil mist.

IV. HEALTH HAZARD EVALUATION

A. Processes Evaluated

This is a typical milling and machining operation where pieces of aluminum and steel are machined on lathes and other metal cutting machinery, such as saws and drills. During all these processes oils are used both as a coolant and lubricant.

B. Evaluation Design

During this evaluation breathing zone air samples were collected on all workers that would be exposed to cutting oils. All workers were interviewed with questions directed at health problems associated with exposure to cutting oils and oil mist.

C. Evaluation Methods

All breathing zone samples were taken on 37 mm DM-800 filters using vacuum pumps operated at 1.5 liters per minute. Based on the infrared data, these oils were classified as straight cutting oils. All samples were analyzed following NIOSH Method P&CAM #283.

D. Criteria for Assessing Concentrations of Air Contaminants

Three sources of criteria are generally used to assess workroom concentrations of air contaminants: (1) Recommended Threshold

Limit Values (TLVs) and their supporting documentation as set forth by the American Conference of Governmental Industrial Hygienists (ACGIH), 1978; and (2) Occupational Safety and Health Administration (OSHA) Standards (29 CFR 1910.1000), January 1978, and (3) NIOSH Criteria for Recommended Standards. ACGIH TLVs represent the most recent and relevant recommendations and are given prominence in this evaluation.

		Permissible Exposures 8-Hour Time-Weighted Exposures Basis (mg/M^3)	
Substance	TLV	Current OSHA Standard	NIOSH Criteria For Recommended Standard
Oil Mist.....	5	5	--

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

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

E. Toxicology

Cutting Oils and Oil Mist -- There is enormous use of "cutting oils" or "cutting fluids" in industries that cut, grind, or machine metals. Most commonly, as in this hazard evaluation, these fluids are proprietary preparations and are formulated to cool cutting tools and parts and to flush away metal chips and particles to enhance machinability and speed production.

Nomenclature for cutting fluid is not standardized. Commercial cutting fluids can be divided into four categories:

A. Cutting Oils or Straight Oils -- contain mineral oil, fat, and additives. These oils are water insoluble.

B. Soluble Cutting Oils -- contain mineral oil, fat, emulsifiers (may include amines), additives (rarely nitrite), and water.

C. Semi-Synthetic Cutting Oils -- contain mineral oil, water, fat, a soluble base (usually including amines), emulsifiers (may include amines), and additives (usually including nitrite).

D. Synthetic Cutting Fluids -- a soluble base (usually including amines), additives (usually including nitrite) and water.

Various proprietary cutting fluids are produced by over one thousand companies in the United States. NIOSH estimates that 780,000 persons are occupationally exposed in the manufacture and use of cutting fluids. (Reference 1)

Oil mist filter samples collected during this survey were classified as straight chain cutting oils. This was based on infrared data. Since this class of cutting fluids contains neither nitrates nor amines, nitrosamines should not be present in these oils.

One of the classic symptoms of exposure to cutting oils and cutting oil mist is dermatitis.

F. Environmental Results and Discussion

The results of 21 breathing zone air samples for oil mist and employee interviews illustrate that workers were not overexposed to airborne oil mist. All breathing zone samples were below the evaluation criteria used herein (5 mg/M^3). The highest concentration was 3.1 mg/M^3. The other values ranged from 1.0 to 0.1 mg/M^3. To review all data, refer to Table 1. All workers were interviewed with questions directed towards dermatitis, respiratory complaints, and eye irritation. Employees were also asked if they ever observed cutting oil mist in the work areas. None of the workers had complaints which could be attributed to cutting oil.

G. Conclusions

Results of the environmental data, employee interviews, and the physical conditions of the work place illustrate that there was no health hazard during the time of this survey.

V. RECOMMENDATIONS

1. No eating, drinking, or smoking should occur at the work station.

2. Employees should be educated on the hazards of cutting oils.

3. All employees should shower immediately after their tour of duty. This would help eliminate the follicular dermatitis on the workers legs and arms.

4. Workers should report any rashes, warts, and other skin problems to their supervisors.

5. Workers should not wipe cutting oils off exposed portions of their skin with oily or dirty clothes.

VI. REFERENCES

1. Current Intelligence Bulletin 15: Nitrosamines in Cutting Fluids, October 6, 1976, DHEW (NIOSH) Publication No. 78-127, pp. 98-101.

VII. AUTHORSHIP AND ACKNOWLEDGMENTS

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TABLE 1

Breathing Zone Air Concentrations of Cutting Oils

Redfield Division of Outdoor Sports Ind.
Denver, Colorado

April 25, 1979

Sample Number	Location	Job Classification	Time of Sampling	mg/M^3 Cutting Oils
DM-1	Screw Machine	Machinist	6:35 AM - 1:18 PM	3.1
DM-8	Screw Machine	Set Up	6:40 AM - 1:30 PM	0.4
DM-2	Screw Machine	Machinist	6:41 AM - 1:15 PM	0.2
DM-83	All Over Plant	Maintenance	6:45 AM - 1:05 PM	0.1
DM-84	All Over Plant	Maintenance	6:46 AM - 1:40 PM	0.1
DM-85	All Over Plant	Set Up	6:48 AM - 1:20 PM	0.5
DM-86	Screw Machine	Operator	6:54 AM - 1:25 PM	0.2
DM-87	Screw Machine	Operator	6:58 AM - 1:30 PM	0.3
DM-88	Annealing	Annealor	6:59 AM - 1:30 PM	0.1
DM-89	Screw Machine	Chip Puller	7:02 AM - 1:17 PM	0.3
DM-90	Screw Machine	Chip Puller	7:04 AM - 1:30 PM	0.8
DM-91	Screw Machine	Chip Puller	7:05 AM - 1:16 PM	0.2
DM-92	Lathe	Operator	7:07 AM - 1:20 PM	0.2
DM-93	Lathe	Cold Wash	7:11 AM - 1:30 PM	0.3
DM-94	Screw Machine	Saw	7:13 AM - 1:24 PM	*
DM-95	Drill Press	Machine Operator	7:18 AM - 1:30 PM	1.0
DM-96	Drill Press	Machine Operator	7:20 AM - 1:30 PM	0.4
DM-98	Screw Machine	Machinist	7:27 AM - 1:30 PM	0.6
DM-97	All Over Plant	Machinist	7:25 AM - 1:22 PM	0.5
		EVALUATION CRITERIA		5.0
		LABORATORY LIMIT OF DETECTION mg/sample		0.035

* = below laboratory limit of detection