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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-97-257

C. S. BRAININ COMPANY
MT. VERNON, NEW YORK

JANUARY 1976

I. TOXICITY DETERMINATION

Airborne concentrations of oil mist in the range present in the area of the profile milling machine at the C. S. Brainin Company on July 29 and 30, 1975, present neither a chronic nor an acute health hazard to the employees in that area. Respiratory irritation and dermatitis experienced by the milling machine operator seems to be due to his individual sensitivity to the cutting oil. Recommendations to reduce both skin contact and respiratory irritation of this operator are outlined in Section IV E of this report.

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) C. S. Brainin Company, Mt. Vernon, New York
b) Authorized Representative of Employees
c) U.S. Department of Labor - Region II
d) NIOSH - Region II

For the purpose of informing the approximately seven "affected employees" the employer shall 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 an 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 such a request from an authorized representative of employees at the C. S. Brainin Company regarding workers' exposure to oil mist in the profile milling machine area.

IV. HEALTH HAZARD EVALUATION

A. Plant Process - Conditions of Use

The work area in which the health hazard request originated is involved in the milling of various alloys by revolving cutters. The cutters are enclosed by a plexiglass guard that lowers over the operation as the workpiece moves into position. As the cutters perform their operations they are lubricated by cutting oil sprayed onto the interface, and although the operation is enclosed by the machine guard, there are openings in the system through which oil mist could escape. The exposed employees include the operator of the milling machine and the approximately half dozen other workers performing assembly and other operations at a distance of ten to twenty feet away from the milling machine.

B. Evaluation Method

Air sampling pumps were placed on the operator of the profile milling machine and in six locations throughout the workroom. These pumps were operated for almost the entire workshift, and the resulting filter samples were analyzed by fluorescence for oil mist. In addition, a bulk sample of the cutting oil was taken to be analyzed for various toxic components. Representatives of employer and employees were questioned informally concerning the operation and possible effects of the oil felt by workers. Visual observations and ventilation measurements were made. Contact was made with the dermatologist who treated the operator of the profile milling machine.

C. Evaluation Criteria

Criteria on which this toxicity determination is based include toxicological studies of oil mist, general toxicological information related to lubricating oils and other hydrocarbons, symptomatology exhibited by employees specifically involved in this case, and the report of the determatologist treating the operator of the profile milling machine. A threshold limit value for oil mist of 5,000 µg per cubic meter is suggested by the ACGIH.[4]

Studies on five species of animals have failed to indicate any pulmonary damage attributable to mineral oil mist concentrations in the range of 100 to 1000 times that found in this evaluation.[1,2,3,4] Frequent and prolonged skin exposure has been linked with dermatitis,[5,6] Oil acne or oil folliculitis is a common dermatologic problem among machinists who utilize straight or insoluble oils as cutting fluids. The characteristic lesions result from a mechanical blockage of the pilofollicular (hair) canal. Initial blockage results in blackhead formation which is followed by papular lesions, varying degrees of inflammation and finally cyst formation. Workmen commonly believe that these lesions result from bacteria in the oil, but the microorganisms which commonly contaminate oils are nearly always nonpathogenic. The distribution is characteristic--the backs of the fingers, forearms, abdomen and anterior thighs are the usual sites of involvement. Persons with adolescent acne frequently are worsened by contact with

insoluble oils and such oils occasionally contain sufficient chlorinated compounds to initiate chloracne or worsen pre-existing acne. Most oils today contain very little chlorine. Skin cleansing with harsh soaps or detergents can also result in dermatitis particularly in persons who have unusually dry skins or atopic (personal or family history of asthma, hay fever, etc.) backgrounds.

D. Evaluation Results and Discussion

Observations did not indicate a high amount of oil in the work area. The machine in question uses a small quantity of oil in the milling process, and this is fairly well contained by the plexiglass machine guard. There is local exhaust ventilation, but it is not very effective due to the machine guard. The oil being used at the time of the survey was "special grade A lard cutting oil," obtained from Consumers Oil Company, Inc. Atmospheric oil concentrations ranged from 16 to 34 micrograms per cubic meter of air (see Table 1). Positioning of general ventilation fans caused air to move across the milling machine into the operator's breathing zone. The cutting oil was found to contain a very small amount of chlorine (0.9 mg per gram of oil), but due to the nature of the process and the amount of chlorine involved, it seems unlikely that any decomposition products would be present in measurable quantities.

TABLE 1

Sample No.	Description	µg oil mist/ M^3 air
1	Personal sample on milling machine operator	34
2	At breathing zone level, approx. 7 feet behind machine	16
3	At breathing zone level, approx. 8 feet in front of (towards front of building) machine	21
4	On table of kick press, near breathing zone of kick press operator	18
5	At breathing zone level, approx. 8 feet to right of machine	23
6	On assembly table, in breathing zone of workers	22
7	At breathing zone level, directly above machine	27

Employees other than the milling machine operator had no complaints about oil in the air or on their skin. The dermatologist treating the milling machine operator diagnosed an underlying dermatitis which "was aggravated by the materials he handled at work." The dermatitis cleared with only occasional small applications of appropriate medications.

E. Recommendations

In an effort to reduce respiratory irritation of the profile milling machine operator, it is recommended that consideration be given to relocating the general ventilation fans in the work area so that when they are in use air is not pushed across the milling machine and into the operator's breathing zone in such a way that it could pick up oil and carry it towards the operator. If further reduction is desired, an enclosure could be designed for the profile milling machine similar to that for the grinders in which the local exhaust ventilation is connected directly to the enclosure.

Due to the size of the workpiece, the use of gloves has been found to be not feasible. The use of forceps of suitable design to facilitate this operation should be encouraged, along with the use of barrier creams such as Ply No. 5 or Kerodex No. 51 as long as the creams themselves do not cause undue dryness or irritation.

V. REFERENCES

1. Hendricks, NV, et al, "A Review of Exposures to Oil Mist", Arch. Env. Health 4(1962) 21

2. Wagner WD, Wright PG, Stokinger HE, "Inhalation Toxicology of Oil Mists", Am. Ind. Hyg. Assn. J. 25(1964) 158

3. Lushbaugh CC, Green JW, Redeman CE, "Effects of Prolonged Inhalation of Oil Fogs on Experimental Animals", Arch. Ind. Hyg. 1(1954) 237

4. Documentation of the Threshold Limit Values for Substances in Workroom Air, 1971, American Conference of Governmental Industrial Hygienists

5. Industrial Hygiene and Toxicology, Vol. II, Ed. Patty, 1963

6. Occupational Health and Safety, International Labour Office, Geneva, 1972

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