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. 78-88-533

ALCAN ALUMINUM CORPORATION
FAIRMONT, WEST VIRGINIA

OCTOBER, 1978

I. TOXICITY DETERMINATION

NIOSH conducted a health hazard evaluation at Alcan Aluminum Corporation on August 15-16, 1978. The purpose of the evaluation was to evaluate the employee exposures to oil mist in the rolling department. It was determined on the basis of environmental samples that a health hazard due to employee inhalation of mineral oil mist did not exist within the worksite at the time of this evaluation; however, the non-directed medical questionnaire replies disclosed that dermatitis may be a problem at the No. 2 roller mill. This was further confirmed by visual observation of oil splashing and wetting the skin and clothing of the employees.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this report are available 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 availability can be obtained from the NIOSH Publications Office at the Cincinnati address. Copies have been sent to:

a) Alcan Aluminum Corporation
b) United Steel Workers of America Local 1
c) U.S. Department of Labor - Region III
d) NIOSH - Region III

For the purpose of informing the approximately 50 "affected employees," the employer shall promptly "post" for a period of 30 calendar days the Determination Report in a prominent place(s) near where exposed employees work.

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 received such a request from an authorized representative of employees regarding skin irritation, eye infections, nose bleeds, loss of hair and headaches as a result of exposure to rolling oil.

IV. HEALTH HAZARD EVALUATION

A. Plant Process - Conditions of Use

The plant at this location rolls aluminum sheet from aluminum stock, which was produced at their other plants, into thicknesses specified by their customers. There are two rolling mills in this area. On each rolling mill there is an operator, throttle person and a utility person. The employees interchange jobs during breaks. Rolls of aluminum weighing approximately 10,000 pounds are fed into the rolls and by successive passes rolled into the desired thicknesses. This rolling operation produces heat and a coolant consisting of mineral oil, butyl stearate and lauric acid is used. The coolant then is filtered, cooled and recycled. On No. 1 machine the coolant is dispensed by a spray, while on the No. 2 machine the coolant is applied by a system referred to as a "rooster's comb."

B. Evaluation Design

On June 6, 1978, Walter J. Chrostek, NIOSH Regional Industrial Hygienist, conducted an initial walk-through survey and non-directed medical questionnaires were completed on twenty-three (23) employees.

Of the twenty-three (23) non-directed medical questionnaires completed, eleven (11) employees complained about skin rashes and two (2) employees complained about nose bleeds. The majority of the complaints were from employees working on the No. 2 rolling mill.

Two bulk samples were collected. These samples were analyzed for nitrites and nitrosamines which involves a colormetric procedure based on the Griess reaction. These samples were determined to be water insoluble oils free of any trace of nitrites or nitrosamines.

As a result of this initial visit, a follow-up environmental evaluation was planned, and subsequently conducted in August, 1978.

C. Environmental Methods

On August 15-16, 1978, environmental samples were collected to determine employees' exposure to mineral oil mist. Bulk samples of the oil were collected for the purpose of preparing standards for the chemical analysis.

Employee exposures to oil mist were evaluated using personal air sampling equipment. Breathing zone samples were collected on AA filters (37mm, 0.8 pore size), drawing air at a flow rate of 1.6-1.8 liters per minute. The filters were subsequently prepared in 10 milliliters of chloroform and analyzed according to NIOSH's "Oil Mist," P & CAM #159 method.(1)

D. Evaluation Criteria

1. Environmental

Occupational Health Standards for individual substances are established at levels designed to protect workers occupationally exposed for an 8-hour per day, 40-hour per week basis over a working lifetime.

The Occupational Health Standard relevant to this evaluation as promulgated by the U.S. Department of Labor, Federal Register, June 27, 1974, Volume 39, No. 125, Part II, Table 6-1(2) is as follows:

Substance	$mg/M^{3(a)}$
Oil Mist	5

a - approximate milligrams of substance per cubic meter of air.

2. Toxic Substances Medical Data

Prolonged skin contact with oil-based lubricants can cause a folliculitis (oil acne, oil folliculitis) due to hyperkeritosis about the follicles in response to plugging by the oil. An eczematous contact dermatitis (rash) may also be found as a reaction to additives in the oil, or to harsh detergents used to clean the oil off the skin. Occasionally there may be allergic sensitization to some component of the oil. These problems are much less likely to occur if good personnal and environmental hygiene is practiced.

E. Results and Discussion

Atmospheric evaluations were conducted during the 0700-1500 and 1500-2300 shifts on August 15, 1978, and the 0700-1500 shift on August 16, 1978. Fourteen (14) air samples were collected and analyzed. The results of the analysis showed that employee exposures ranged from 0.5 to 1.4 milligrams of oil mist per cubic meter of air. This is below the OSHA permissible exposure limits.

No analysis was performed for lauric acid [3] or butyl stearate[4][5][6] as these materials at present are considered relatively non toxic. Lauric acid is a common constituent of many vegetable oils and, therefore, of most common diets. Limited animal experiments suggested that the toxicity of butyl stearate is low. This material is used as a plasticizer in food wrapping and is metabolized in the body in much the same way as the fat normally ingested in the diet. Furthermore, butyl stearate does not cause skin irritation or dermatitis.

Both machines are equipped with canopy type exhaust ventilation. This building is supplied with a tempered air make-up system. Management during this visit was unable to supply any data about the capacities of these systems. Make-up air may not be important in the summer time, however, it could be critical in the winter when all windows and doors are shut. NIOSH in their technical information "Recommended Industrial Ventilation Guidelines"[7] states that when make-up air is provided that amount should be slightly lower than the amount of the exhaust air. Furthermore, it was noted, utilizing smoke ventilation tubes, that the positioning of the make-up units is such that when the crane is positioned in the vicinity, the make-up air is directed downward, and interferes with the local exhaust system on the roller mill.

Although the atmospheric samples did not exceed the permissible levels, it was noted that excessive solvent was being applied on the No. 2 roller mill. This caused a spashing effect, wetting the clothing of the employees and is probably the major causative agent for the complaints of rashes on the arms and legs of the employees at the No. 2 roller mill. Controlling the amount of coolant applied would be a major factor in eliminating this problem.

F. Recommendations

1. Environmental

a. Evaluate the local exhaust ventilation and make-up air systems. Consideration should be taken during conditions when windows and doors are closed. The balance should be such, that only a slight negative pressure exists.

b. Adjust all the make-up air systems, so that make-up air does not interfere with the local exhaust ventilation system.

c. Make any changes necessary on the No. 2 roller mill to control the collant and prevent splashing.

2. Medical

a. Employees should be encouraged to practice good industrial hygiene habits. Collant wetted clothing should be promptly removed and the skin thoroughly washed.

b. Supply and encourage employees to use protective creams.

V. REFERENCES

1. NIOSH Manual of Analystical Methods, Vol. 1, NIOSH Publication No. 77-157A, April, 1977.

2. Federal Register, Vol. 30, No. 125, Part II, June 24, 1974.

3. Gleason, Gosselin, Hodge, Smith, Dangerous Properties of Industrial Materials, Fourth Edition, 1975.

4. N. Irving Sax, Dangerous Properties of Industrial Materials, Fourth Edition, 1975.

5. Smith, C.C., Toxicity of Butyl Stearate, Dibutyl Sebacate, Dibutyl Phthalate and Methoxyethyl Oleate, A.M.A., Archives of Industrial Hygiene and Occupational Medicine, Vol. 7, Pages 310-318, April, 1953.

6. Morris, G.E. and I.R. Tabershaw, "Cable Rash" A Note on a New Cleansing Mixture, Journal of the American Medical Association, Vol. 121, Pages 192-193, January 16, 1943.

7. Recommended Industrial Ventilation Guidelines, HEW Publication No. NIOSH 76-162, 1976.

VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

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TABLE I

RESULTS OF SAMPLING FOR OIL MIST (MINERAL), MEASURED AT THE
BREATHING ZONE AT THE ROLLER MILLS
ALCAN SHEET AND PLATE
DIVISION OF
ALCAN ALUMINUM CORPORATION
FAIRMONT, WEST VIRGINIA
AUGUST 15-16, 1978
HE 78-88

DATE	SAMPLE NUMBER	LOCATION	JOB DESCRIPTION	SAMPLING PERIOD	OIL MIST CONCENTRATION mg/M^3 (a)
8/15/78	1	No.1 Roll	Throttle Operator	0815-1442	1.1
	2	No.1 Roll	Mill Operator	0820-1442	0.5
	3	No.2 Roll	Throttle Operator	0827-1442	0.6
	4	No.2 Roll	Mill Operator	0825-1448	1.0
	5		Crane Operator	0837-1440	0.8
	6	No.2 Roll	Mill Operator	1506-2245	1.4
	7	No.1 Roll	Mill Operator	1514-2245	1.1
	8	No.2 Roll	Throttle Operator	1505-2245	1.3
	9	No.1 Roll	Ass't Roll Operator	1510-2245	1.4
8/16/78	10	No.2 Roll	Throttle Operator	0740-1435	1.0
	11		Crane Operator	0730-1440	0.9
	12	No.2 Roll	Mill Operator	0725-1448	1.3
	13	No.1 Roll	Mill Operator	0720-1447	0.9
	14	No.1 Roll	Throttle Operator	0715-1443	1.3

(a) mg/M^3 = milligrams of substance per cubic meter of air sampled.

EVALUATION CRITERIA (OSHA)

Oil Mist - $5mg/M^3$