

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

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HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-4-214

ASHLAND DIVISION OF NATIONAL MINE SERVICES
ASHLAND, KENTUCKY 41101

JULY 1975

I. TOXICITY DETERMINATION

It has been determined on the basis of medical interviews, cutaneous examinations and physical examination of plant facilities that a health hazard from exposure to xylene, CB-1 and coolants did not exist at the Ashland Division of National Mine Service Company at the time of this evaluation. At the time of the evaluation no xylene or CB-1 was being used in the production areas. There was definite evidence that the past use of xylene had resulted in dermatitis among a significant proportion of men who utilized the solvent. It was concluded, however, that no unusual incidence of occupational dermatitis was present at the time of the survey (April 29-30, 1975).

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) Ashland Division of National Mine Service Company,
Ashland, Kentucky
- b) Authorized Representative of Employees
- c) U.S. Department of Labor - Region IV
- d) NIOSH - Region IV

For purpose of informing the approximately 170 "affected employees" this report shall be posted in a prominent place readily accessible to workers for a period of at least 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 which alleged that numerous severe cases of dermatitis were occurring as a result of exposure to xylene, CB-1 and coolants in the Machine Shop, Sub-assembly and Line Assembly.

IV. HEALTH HAZARD EVALUATION

A. Condition of Use

The Ashland Division of National Mine Service Company manufactures products used in underground mining which include shuttle cars, locomotives and continuous miners. The materials used include castings, forgings, rolled steel products, transmissions, hydraulic and electric motors and diesel engines. The machining and assembly of certain components require the use of cutting oils, coolants and some cleaning fluids. The cutting oils and coolants are confined to the Machine Shop. The Machine Shop contains 58 machines which perform various drilling, grinding and machining operations. The principal coolant used in the area is a soluble cutting fluid manufactured by the Milacron Corporation and sold under the Trade Name - Cimcool. Because many of the components are made of cast iron, much of the machining can be accomplished without the use of coolants or metal cutting fluids. As a result, the actual number of machines using coolants is limited. The Machine Shop also contained limited quantities of CB-1 which was used for cleaning parts. The Sub-assembly area consists of two sections. Prior to the survey, xylene was widely used throughout these areas in degreasing operations. Xylene was also used in the Assembly area as a degreaser and in the detection of leaks in welded seams. At the time of the survey no xylene or CB-1 was being used in the production areas and as yet no substitute compound had been introduced into these operations.

B. Evaluation Method

A walk-through survey was conducted in the areas of concern. Chemicals used in these areas were identified. Information was also obtained on prior handling and use of chemicals, with particular emphasis being placed on the utilization of xylene and coolants.

Medical interviews were conducted with employees by NIOSH physicians. In view of the large employee population and somewhat diverse nature of the manufacturing processes carried out in the Machine Shop, Sub-assembly and Line Assembly areas of the plant, it was felt that merely interviewing persons known to be experiencing dermatitis problems might bias impressions and the survey results. Therefore, interviews and limited cutaneous examinations were performed on a random basis among as many workers on the first and second shifts as was practical within the study period time constraints. Questioning was carried out in a non-directed manner to elicit complaints and/or symptoms. More specific and directed questions relevant to elicited problems were then asked.

C. Evaluation Criteria

1. Metal working, lubricants, coolants and greases.

Approximately 40% of industrial dermatitis is attributed to cutting oils and other petroleum products. In addition to mineral and vegetable oils, these products contain an almost innumerable variety of ingredients including soap, emulsifiers, detergents, waxes, resins, water conditioners, corrosion inhibitors, deodorants, anti-foaming agents, dyes, and biocides to retard spoilage and rancidity. The oil components are often sulfurized, chlorinated or phosphorized to provide special characteristics such as pressure resistance.

Two major types of dermatitis result from exposure to these products, i.e., primary irritant contact dermatitis and oil folliculitis (oil acne). Oil folliculitis is commonly seen in machinists who utilize insoluble oils. Oils of this type are not utilized to any extent in the plant under consideration.

Primary irritant contact dermatitis from coolants has been increasing in recent years as more and more soluble cutting oils have come into widespread usage. These fluids are often quite alkaline and lead to defatting of the skin with dryness, redness, scaling and cracking. In addition to the alkaline nature of most such coolants, they often contain many additives which may contribute to the irritation. The hands are the usual site of involvement. Allergic contact dermatitis is rarely encountered from lubricants in general although known sensitizers are occasionally included in the formulation of these products. Such cases are usually of a severity which precludes continuation on that particular job.

Because dermatitis is so frequently encountered among workers utilizing various lubricants and coolants, it is regarded by many employees as a "badge of the trade." Workmen commonly, but mistakenly, believe that bacteria in the fluids are responsible. While cutting oils may contain, and frequently do contain large numbers of bacteria and fungi, these are nearly always of species that are incapable of causing infection.

2. Xylene

Xylene which is a potent solvent for lipids readily defats the skin leading to dryness, redness, scaling and cracking. Frequent skin contact with xylene will almost invariably lead to dermatitis. This form of occupational dermatitis (solvent dermatitis) is clinically indistinguishable from primary irritant contact dermatitis due to alkaline substances.

Drowsiness, giddiness, excessive fatigue, headache, sensations of "drunkenness" and other narcotic type effects have been noted in many cases of excessive xylene inhalation exposure. Nausea and vomiting may accompany these symptoms. Cases of anemia resulting from bone marrow depression

once were commonly attributed to xylene but are now thought to have been due to contamination with benzene. Fortunately, such contamination now rarely occurs due to improved refining methods.

D. Evaluation Results and Discussion

A total of 125 first and second shift employees which represented approximately 65% of the total work force in the plant areas under consideration or approximately 92% of the men employed in these areas on the first and second shifts were interviewed and where indicated examined by a NIOSH physician. All workers were male. The average age was 36 years (range 19-64), and the average duration of employment in their present job was 8.9 years (range 1 week to 20 years). From the large number of employees who were interviewed and examined, as might be expected, a fairly large number of diverse dermatologic conditions were encountered. These conditions are listed as follows:

| <u>Condition</u> | <u>No. Affected</u> |
|----------------------------------|---------------------|
| Fungus Infection | 5 |
| Chronic and Subacute Hand Eczema | 3 |
| Lichen Simplex Chronicus | 1 |
| Neurodermatitis | 1 |
| Erythema Annulare Centrifugum | 1 |
| Folliculitis | 1 |
| Cold Urticaria | 1 |
| Atopic Dermatitis | 1 |
| Peyronies Disease | 1 |

Of these conditions, it is felt that the chronic and subacute hand eczemas probably represent occupationally acquired dermatoses whereas the other various conditions are nonoccupationally induced or associated. It should be mentioned that four of the five electrical shop workers who were interviewed gave histories of frequent bouts of fiberglass dermatitis. As might be expected, a rather large number of employees (32) gave a history of past dermatitis. Because of the nondirected question methodology utilized in this study, recalled incidents of dermatitis frequently had occurred many years previously, in fact, in some cases as long ago as ten years. It should be noted in this regard that dermatologic conditions constitute approximately 10% of all medical practices and, therefore, are relatively common in any sizable population. Of the 32 individuals with histories of past dermatitis, a significant percentage (28%) related it to xylene exposure and gave historie

compatible with solvent dermatitis. Another although smaller proportion of individuals relating past bouts of dermatitis attributed their problem to cutting fluid exposure.

During the survey three employees were identified as being currently under medical care for skin conditions and their current medications apparently are sufficient to control their problems. These cases are currently impossible to definitely categorize but may represent occupationally induced dermatitis.

As anticipated from the nondirected approach utilized, a large number of other complaints and symptoms of medical conditions were elicited. Four individuals specifically mentioned symptoms that they had experienced when working with xylene. One individual regularly developed headaches when using this solvent; one shortness of breath, and the other two developed symptoms suggesting very early narcosis. Four individuals gave histories of hypertension, three of duodenal ulcers, three of diabetes and one of past myocardial infarction. One individual with a history of rectal carcinoma was also encountered. None of these latter conditions were thought to be in any way related to the work environment.

Based on the large number of men interviewed and examined, it is concluded that no unusual incidence of occupational dermatitis was present in the National Mine Service Company, Ashland, Kentucky, at the time when the survey was carried out. In fact, the incidence of clinically apparent occupational dermatitis was judged to be substantially less than what might be regarded as "normal" for an industry of this type. This is probably due to the adequacy of washing facilities, to the fact that much machining is accomplished without coolants and to the generally high level of house-keeping found throughout the plant. There was definite evidence, however, that the past use of xylene had resulted in dermatitis among a significant proportion of men who utilized this solvent. There was no evidence of any other type of occupationally induced disorder or disease. Based on the historical evidence of the problem from the use of xylene, it is strongly suggested that management seek a safer substitute if it is eventually determined that a solvent is required.

V. RECOMMENDATIONS

Primary irritant contact dermatitis is frequently associated with poor work practices and inadequate hygiene. Sporadic cases become almost inevitable if sufficient skin contact occurs. The following measures will minimize the problem:

- (1) As much protective clothing as is consistent with job safety should be worn.
- (2) When gloves cannot be worn some protection is conveyed by the frequent and proper application of barrier creams.
- (3) Proper removal of oils is important and waterless hand cleansers are particularly valuable in this regard.

- (4) Workers must be urged to report early signs of dermatitis. This allows prompt medical attention and a review of work habits often permitting rapid healing with little or no lost time. This is extremely important since once the chronic stage of irritant dermatitis is reached, transfer to another plant section is frequently the only solution since chronic cases tend to be quite therapy resistant and long time periods are required to restore the normal resistant characteristics of the involved skin.

VI. AUTHORSHIP AND ACKNOWLEDGMENTS

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