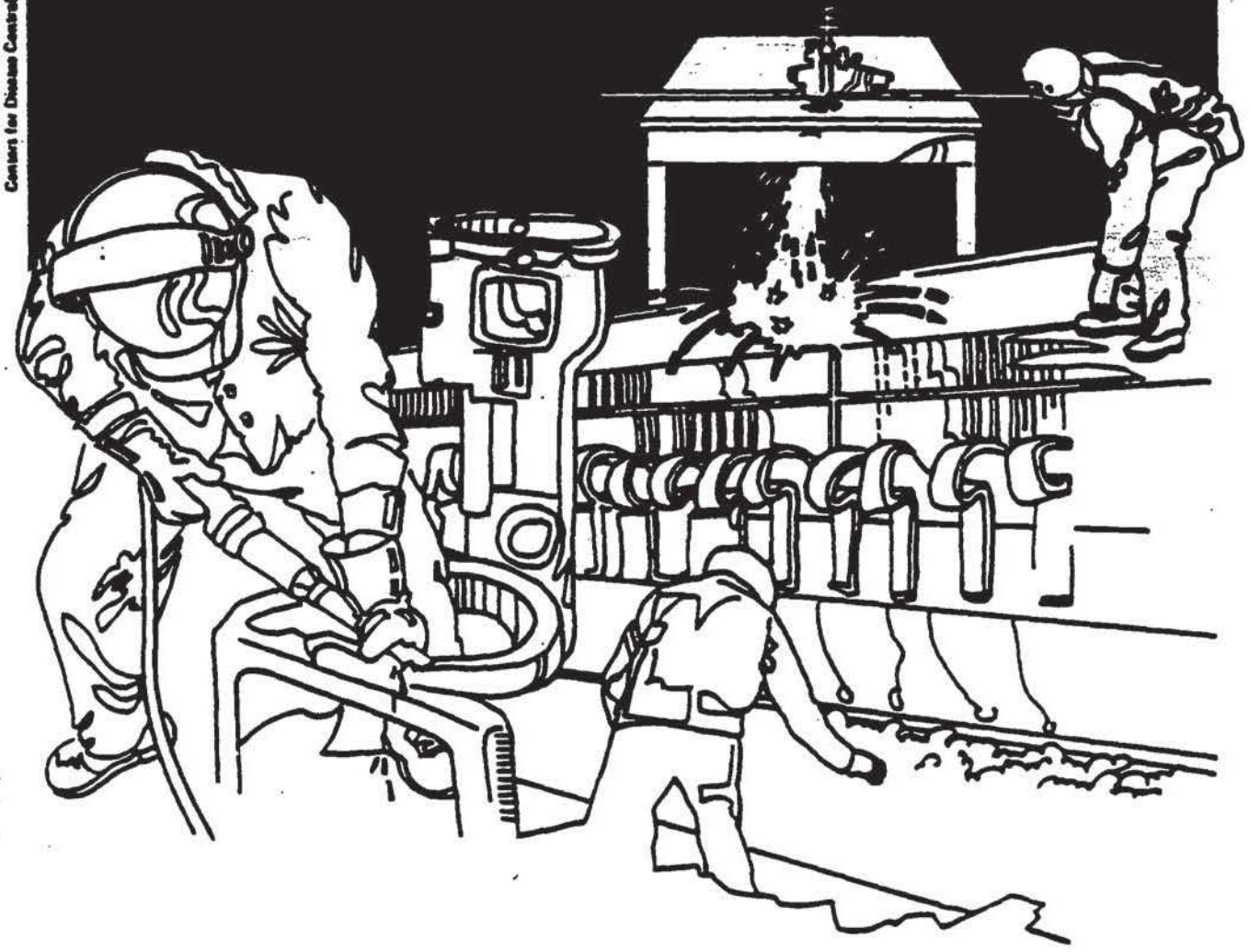
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



Health Hazard Evaluation Report

HETA 84-075-1634
HYDRA-MATIC DIVISION OF
GENERAL MOTORS
YPSILANTI, MICHIGAN

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 84-075-1634
NOVEMBER 1985
HYDRA-MATIC DIVISION OF GENERAL MOTORS
YPSILANTI, MICHIGAN

NIOSH INVESTIGATORS:
William J. Daniels, CIH
Peter Orris, M.D., MPH

I. SUMMARY

On December 5, 1983, the National Institute for Occupational Safety and Health (NIOSH) was requested to evaluate reports of dermatitis and other health problems at the Hydra-Matic Division of General Motors Corporation, Ypsilanti, Michigan. The request concerned employees' exposures to synthetic coolants and additives used in centerless grinding operations in Departments 223 and 224 of Plant 2. The request was prompted by an incident in which the central coolant system had been contaminated by sewage, and high concentrations of chemicals were reportedly added to the system to prevent bacterial growth.

In March 1984, NIOSH investigators conducted an initial survey. During this survey, workers were surveyed for health problems by means of a confidential questionnaire. Of the 75 employees interviewed, 48% complained of frequent sinus congestion, 40%-frequent eye irritation, 37%-frequent rhinitis, 33%-frequent upper respiratory infections, and 32%-daily cough. Dermatologic complaints were voiced by 62% who noted frequent dryness, itching, rash, and pimples. No statistically significant ($P \not< 0.05$) differences in these frequencies were found when grinders were compared with non-grinders within these departments, nor when smokers were compared with nonsmokers.

In light of the subjective nature of this information, additional contacts were made with the company during the following months to determine if information contained in employee medical insurance records would provide any indication of the incidence of respiratory illness among the workers. On January 17, 1985, NIOSH medical investigators met with representatives of the General Motors Corporation and the company's insurance carrier to discuss the contents and availability of these records. Based on information obtained during this meeting, it was determined that further evaluation of this data would not provide additional information which would be useful in this evaluation.

Subsequently, an environmental survey was conducted in March 1985, during which personal and area air samples were collected for total particulate, trace metals, glycol ethers, and other identifiable organic contaminants, in order to document airborne exposures within the two departments. Time weighted average (TWA) concentrations of total particulate in personal samples ranged from 0.71 to 1.4 milligrams per cubic meter of air (mg/M^3). These values were below the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) for nuisance particulate of 10 mg/M^3, and the Occupational Safety and Health Administration (OSHA) standard of 15 mg/M^3 as an 8-hr TWA. Analysis of airborne samples for specific metals revealed iron concentrations in personal samples ranging from 0.04 to 0.05 mg/M^3, which were below the ACGIH recommended TLV of 5 mg/M^3 and the

OSHA standard of 10 mg/M^3 for iron oxide as an 8-hr TWA. Concentrations of lead ranged from below the limit of detection (1.0 microgram/sample) to 0.005 mg/M^3 in personal samples, which were below the OSHA standard of 0.05 mg/M^3, as an 8-hr TWA. Trace amounts of aluminum, magnesium, manganese, titanium, and zinc were detected in the air samples, but their concentrations were far below the corresponding evaluation criteria. No glycol ethers or significant quantities of any other organic compounds were identified in the air samples.

A review of information collected by the Michigan Department of Public Health related to the coolant contamination incident revealed that the company had followed proper procedures in preventing any potential employee health problems following the incident.

On the basis of the data obtained during this investigation, NIOSH did not identify any airborne contaminant concentrations which would present a health hazard in Departments 223 and 224 of the facility. However, based upon the relatively high prevalence of respiratory symptoms which were reported, as well as a relatively high incidence of dermatitis from skin contact with the fluid, recommendations for alleviating these problems are included in section VIII of this report.

Key Words: SIC 3714 (Motor Vehicle Parts and Accessories), cutting fluid, dermatitis, respiratory symptoms

II. INTRODUCTION

On December 5, 1983, NIOSH received a confidential request to conduct a health hazard evaluation at the Hydra-Matic Division of the General Motors Corporation, Ypsilanti, Michigan. The requestor was concerned with employee exposure to machine coolants and additives used in the centerless grinding operations in Departments 223 and 224 of Plant 2. The request had been prompted by an incident in which a sewer had overflowed and was believed to have contaminated the cutting fluid reservoir. The requestor believed that excessive concentrations of chemicals had been added to the coolant system since that time, which contributed to the employee problems, including dermatitis, headaches, respiratory problems, and nausea.

On March 29, 1984, NIOSH investigators conducted an initial survey. An opening conference was held with representatives of the management and local union, during which background information was obtained relating to the basis for the request, the workforce, substances used, and prior inspection and monitoring data. Following a walk-through survey of the area, confidential interviews were conducted with the employees of Departments 223 and 224. Based on the results of the employee interviews, an attempt was made to determine if employee medical insurance records would provide additional information to allow for an assessment of the incidence of respiratory problems among the workers. Following several written and telephone communications, NIOSH medical investigators met with representatives of the General Motors Corporation and Blue Cross and Blue Shield on January 17, 1985, to discuss the contents and availability of employee medical insurance records. Subsequently, an environmental survey was conducted on March 11, 1985, during which air samples were collected for total particulate, trace metals, glycol ethers and other possible components of the coolant. The company and requestor were notified of the sample results by letter on April 30, 1985.

III. BACKGROUND

The Hydra-Matic Division of General Motors Corporation, Ypsilanti, Michigan, is engaged in the manufacture and assembly of automobile transmissions. At the time of the initial survey, approximately 8,200 production and 2,060 salaried workers were employed by the Division's four plants. The areas of concern in this request, Plant 2, Departments 223 and 224, employed approximately 87 workers over 3 shifts.

The major activity of Departments 223 and 224 is the machining of high carbon steel valves used in transmission assemblies. This is accomplished using through-feed centerless grinders. The centerless grinders use two abrasive wheels, one which cuts the part, and the second which acts as a brake to prevent the part from spinning. Each valve undergoes an initial and then a final grinding to obtain the required tolerance of 3/10,000 of an inch.

During the grinding process, coolant is flooded over the part being ground. The coolant from the majority of the department's 60 machines

is recirculated through a 32,000 gallon central coolant sump. In the sump, the coolant is passed through a three stage filtration system, which includes both paper filtration and magnetic separation, before being circulated back to the machines.

Since 1979, the company has utilized 4 different fluids in this system. This included, 2 soluble fluids, 1 semi-synthetic fluid, and the present synthetic fluid - Dascool H 4511™, which was first introduced in 1981. The composition of this fluid was primarily water, with lesser amounts of alkanol amine salts of mixed carboxylic acids, polyalkene glycol, and polyethoxylated alcohols. The fluid is monitored on a regular basis for coolant concentration, pH, and bacterial and fungal counts by a chemist from the metallurgical department. Additions of cutting fluid, one of two different biocides, a rust inhibitor, and a fungicide are made as necessary. All additions to the system are recorded in a log, and concentrations of additives are maintained at concentrations below those recommended by the manufacturers.

In a recent company administered questionnaire, 22% of the respondents had reported having some dermatitis in the past. The plant's medical department had undertaken an aggressive program to monitor and control dermatitis among the employees of these departments. A skin care program was put into place which included employee education, a hand washing station in the work area, the use of a specially designed soap, and the availability of barrier creams.

The original incident which prompted the health hazard evaluation request occurred on September 17, 1983 when a backed-up sewer was believed to have contaminated the coolant in Departments 223 and 224, and it was alleged that employees were experiencing respiratory problems, nausea, headaches, and severe dermatitis as a result of the addition of high concentrations of fluid additives to correct the problem. A complaint was filed with the Michigan Department of Public Health and the incident was investigated on October 5, 1983 by an Industrial Hygienist from the Division of Occupational Health Services, Michigan Department of Public Health. A review of company records indicated that employees had been sent home from their jobs following the incident, and half of the coolant system had been drained and the remainder dosed with biocide to kill any possible contamination. The system had then been refilled and returned to normal operating concentrations. No E. Coli bacteria growth, which is the prime indicator of sewage microbe activity, was noted. The investigation concluded that proper preventive measures and procedures had been followed by the company in handling this incident.

IV. MATERIALS AND METHODS

A. Medical

During the initial survey of March 19, 1984, workers on two shifts were surveyed by means of a confidential questionnaire. The questionnaire solicited specific information on the employees work history, as well as the presence of specific symptomatology related to respiratory and skin problems.

Based on the preliminary results of the medical questionnaires, attempts were made to determine if information contained in employee medical insurance records would provide additional data for determining if excess respiratory illness existed among the workers in these departments compared to employees in other "nonexposed" departments within the plant. Following several written and telephone communications, a meeting was held on January 17, 1985 with representatives of the General Motors Corporation and Blue Cross and Blue Shield. During this meeting, the contents and availability of the individual employee medical insurance records were discussed.

B. Environmental

During the initial survey, company records of environmental monitoring conducted in Departments 223 and 224 were reviewed. A review of this information did not indicate any airborne contaminant levels above the evaluation criteria. In addition, records collected by the Michigan Occupational Safety and Health Administration related to the coolant spill incident were reviewed.

Based on the preliminary results of the medical questionnaires, further environmental monitoring by NIOSH was delayed pending the determination of the scope of the medical evaluation in order to determine if the concurrent assessment of exposures in a control population within the plant would be required. Following a decision not to use a control population in the medical portion of the evaluation, an environmental survey was conducted by NIOSH representatives on March 11, 1985 in Departments 223 and 224 of Plant 2.

Since the synthetic cutting fluid being used was composed primarily of water (containing no oil), sample collection for "oil mist" was not determined to be an appropriate indicator of airborne exposure. In lieu of this, air samples were collected for total particulate, trace metals which might result from the machining process, and the specific components present in the cutting fluid and additives. Personal samples, designed to reflect employee exposure, were collected near the breathing zone of the machine operators. Area samples were also collected in close proximity to the machining operations. The samples were collected using battery-powered sampling pumps connected via Tygon® tubing to the collection media. The number of samples, collection media, pump flow rates, and method of analysis were as follows:

1) Four pre-weighed polyvinyl chloride (PVC) filter samples collected at 1.5 liters per minute (Lpm) for analysis of total particulate weight by gravimetric weighing according to NIOSH Method No. 0500.[1]

2) Four mixed-cellulose ester membrane filter samples collected at 1.7 Lpm for analysis of trace metals by NIOSH method No. 7300.[1]

3) Four activated charcoal sorbent tube samples collected at approximately 50 cubic centimeters of air per minute (cc/min) for analysis of organic compounds, primarily glycol ethers, by gas chromatography/mass spectrometry (GC/MS).

A complete listing of the location and duration of sample collection is presented in Tables 1 and 2.

V. EVALUATION CRITERIA

A. General

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent becomes available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, are based primarily on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is required by the Occupational Safety and Health Act of 1970 (29 USC 651, et seq.) to meet those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits (STEL) or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

B. Cutting Fluids

Cutting fluids, as a whole, are among the leading causes of industrial dermatitis, causing both follicular inflammation and irritative or

hypersensitivity skin reactions. These reactions may be stimulated by the fluid itself, metal parts, or other impurities in dirty oil, or additives, such as biocides, used to prevent fluid decomposition and odor formation.[2] In machinists exposed to either emulsified or aqueous metalworking fluids, the prevalence of dermatitis has been reported as high as 30%.[3]

The abundance of information contained in the literature on the health effects of cutting fluids relates to mineral-type oil mist. The literature has little to indicate that a health threat is posed through the inhalation of synthetic coolants. However, while no environmental limits exist for airborne concentrations of synthetic fluids, specific criteria may exist for additives or components of the fluid mixture, and the presence of these components should be considered separately. Following is a list of the specific contaminants or groups of contaminants which were evaluated in this survey due to their possible presence as components, additives, or impurities in the fluid.

1. Metals - Various metal particles may be present in the fluid as a result of their removal from the work piece or tooling. These small particles can contribute to dermatitis either through direct physical contact or chemical action. If present in sufficient concentration, inhalation of these particles can cause other systemic problems, depending on the particular metal(s) involved. The criteria for two of the metal components found in this survey are listed as follows. The ACGIH TLV for iron oxide is 5 milligrams per cubic meter of air (mg/M^3), while the current OSHA standard is 10 mg/M^3 as an 8-hour TWA.[4,5] The current OSHA standard for lead is 0.05 mg/M^3 as an 8-hour TWA.[4]

2. "Nuisance" Particulate - In contrast to fibrogenic dusts which cause scar tissue to be formed in the lungs when inhaled in excessive amounts, so-called "nuisance" dusts are stated to have little adverse effect on lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control. Excessive concentrations of nuisance dusts in the workroom air may seriously reduce visibility, may cause unpleasant deposits in the eyes, ears and nasal passages, or may cause injury to the skin or mucous membranes by chemical or mechanical action per se, or by the rigorous skin cleansing procedures necessary for their removal.[5] The current OSHA standard for nuisance particulates is 15 mg/M^3 as total dust, and 5 mg/M^3 as respirable dust, for an 8-hour TWA.[4] ACGIH recommends a TLV of 10 mg/M^3 for total dust.[5] There is presently no NIOSH recommended standard for nuisance dust.

3. Miscellaneous Substances - A wide variety of compounds may be present as a result of their incorporation into the original cutting fluid or their use as additives. Derivatives of alcohols and glycols are groups of substances which are sometimes present in synthetic cutting fluids. Two members of the glycol ether family, 2-methoxyethanol and 2-ethoxyethanol, have recently been associated with adverse reproductive effects in animals. NIOSH recommends that exposure to these and other structurally related glycol ethers be minimized where possible. Another class of compounds which may be present in cutting

fluids are nitrosamines. Certain nitrosamine compounds are suspected of causing cancer, and the use of fluids containing nitrosamines or additives which might lead to their formation should be avoided. Other fluid additives, such as biocides, can cause a variety of health effects if present in sufficient concentrations, including irritation of the skin, eyes, and respiratory tract, along with other systemic effects, depending on the particular agent involved. The toxicity of these substances should be carefully evaluated prior to use, and their concentrations in the cutting fluid should be maintained according to manufacturer's recommendations in order to prevent possible adverse health effects.

VI. RESULTS

A. Medical

Confidential medical questionnaires were administered to 75 employees in Departments 223 and 224 on March 29, 1984. Of those interviewed, 55 were men and 20 were women. Forty-two of the men and eight of the women were grinders. These grinders had an average age of 33.3 years, with an average of 8.3 years on this job. The non-grinders averaged 9.6 years on the job and were 40.7 years of age. Over half of the employees were current smokers. The most common respiratory symptoms reported by this group were frequent sinus congestion (48%), frequent eye irritation (40%), frequent rhinitis (37%), frequent upper respiratory infections (33%), and daily cough (32%). Dermatologic complaints were voiced by 62% who noted frequent dryness, itching, rash, and pimples. No statistically significant differences ($P < 0.05$) in these frequencies were found when grinders were compared with non-grinders, nor when smokers were compared with nonsmokers.

Based on the information obtained during communications with General Motors Corporation and Blue Cross and Blue Shield, it was determined that examination of individual employee medical insurance claims to elicit the incidence of various types of respiratory illness would not be productive. This decision was based on several factors, including; the inability to isolate throat and sputum cultures from other types of laboratory evaluations, the inability to isolate the number of chest x-rays from other types of x-rays, the inability to isolate the number of non-emergent from emergent claims for emergency room care, an increasing number of employees enrolling in Health Maintenance Organizations (HMOs) over the study period, and the small size of the population to be studied.

B. Environmental

A review of the environmental data collected by the company did not indicate any airborne contaminant concentrations which exceeded the evaluation criteria. These included samples collected for; total particulate, individual metals, poly- and ethylene glycols, glycol ethers, and nitrosamines. In addition, nitrosamines were not listed as a component of the cutting fluid, nor were nitrite containing compounds reportedly used as additives in the cutting fluid.

The results of the environmental survey conducted by NIOSH are presented in Tables 1 and 2. TWA concentrations for total particulate in personal samples ranged from 0.71 to 1.4 mg/M^3, with a mean of 1.0 mg/M^3. These values are below the ACGIH TLV of 10 mg/M^3 as an 8-hr TWA for nuisance particulate. Due to the fact that the primary component of the cutting fluid mist was water, the levels of total "oil" mist could not be determined. However, visible observation did not indicate substantial mist generation from the machines.

Analysis of the samples collected for trace metals indicated that airborne levels of all metals were relatively low when compared with their environmental criteria. Of the 31 metals analyzed for, iron was detected in the greatest concentrations, with concentrations in personal samples ranging from 0.04 to 0.05 mg/M^3. These values are all below the ACGIH recommended TLV for iron oxide fume of 5 mg/M^3 as an 8-hr TWA. Concentrations of lead in personal samples ranged from below the limit of detection (0.001 mg/sample) to 0.005 mg/M^3. These values are below the OSHA lead standard of 0.05 mg/M^3 as an 8-hr TWA. In addition, trace amounts of aluminum, magnesium, manganese, titanium, and zinc were detected in the air samples, but their concentrations were far below their corresponding evaluation criteria.

Only very small amounts of any organic contaminants were detected in the charcoal tube samples collected. When an area sample collected in close proximity to a machining operation was concentrated by evaporating off most of the desorption solvent, the only substances identified were a series of alkanes (C_{10}-C_{16}) and smaller quantities of toluene and xylene, with the amount of any one substance estimated to be below 10 micrograms/sample. No glycol ethers were identified in the samples.

Visual observation of work practices did indicate some instances of poor employee work habits which led to direct skin contact with the coolant. One example of this was the practice of some employees to reach into the coolant stream to check parts exiting a machine.

VII. DISCUSSION AND CONCLUSIONS

A review of information collected by the Michigan Department of Public Health related to the coolant contamination incident revealed that the company had followed proper procedures in treating the system and preventing any potential employee health problems following the incident.

The results of the medical survey indicated that dermatitis appeared to be an ongoing problem among the employees in Departments 223 and 224. However, the company appeared to have in effect an aggressive dermatitis prevention and treatment program which should hopefully minimize the number of new cases occurring in the future.

The results of the environmental survey did not reveal any airborne contaminant levels exceeding the evaluation criteria. This finding is supported by the results of environmental samples which had been previously collected by the company. However, despite these low airborne contaminant levels, a relatively high percentage of workers

reported a number of symptoms indicative of respiratory irritation. Attempts to further document whether this subjective reporting of symptoms was represented by elevated rates of respiratory illness was unsuccessful. Presently, a large-scale evaluation of the health effects of exposure to cutting and grinding fluids is being undertaken by the Occupational Health Advisory Board of the National Committee on Health and Safety of General Motors and the United Auto Workers. It is hoped that the information obtained from this and similar studies will aid in determining the extent to which respiratory or other health problems might be related to workplace exposure to cutting fluids.

VIII. RECOMMENDATIONS

It is recognized that the company currently has in place a program for dermatitis prevention and treatment, as well as coolant maintenance. However, in order to reinforce the company's current program and further emphasize the need for ongoing efforts on the part of both management and the employees, key elements of a dermatitis prevention program are provided below:

A. Employee Education - Each worker must be made aware through regular training of the importance of the following:

1. Using proper work practices and techniques which avoid sustained contact between the cutting fluid and the skin.
2. Using protective clothing, gloves, splash guards, and any other devices required for the work operation.
3. Frequently practicing personal hygiene, including regular washing of hands, laundering of work clothes, and prompt removal of fluid soaked clothing.
4. Avoiding contamination of cutting fluids with any type of waste matter.
5. Immediately reporting any skin irritation or disorder to the plant medical department.

B. Fluid Maintenance - The company should adhere to the following guidelines for maintaining the coolant supplies:

1. Regular inspection of central coolant systems and individual machines for contamination, and replacement when necessary.
2. Restriction of the addition of cutting fluids and additives to those employees trained in their proper handling and mixing.
3. Examination of the toxicity of any fluid additive prior to introduction into the system.

C. Personal Protection - Barrier creams and protective clothing should be made readily available to employees to reduce the potential for skin contact with the fluid.

D. Medical Program - In addition to the treatment of individual employees' rashes, the medical department should continue to pursue an aggressive program designed to decrease the incidence of dermatitis, including the following:

1. Log of cases, noting time, machine, department, oil used, and type of dermatitis.
2. Follow-up by plant medical personnel to determine the cause of this problem, and recommendations for its correction.
3. Discussions with the employee involved as to recommendations for the correction of the problem.
4. Employee transfer from "wet" to "dry" jobs should be carried out when necessary.

The company should also encourage employees to promptly report any respiratory problems which they feel are related to the grinding activities. Where possible, specific machines or operations causing the problems should be identified so that they can be properly evaluated, with proper engineering controls implemented as necessary.

IX. REFERENCES

1. National Institute for Occupational Safety and Health, NIOSH Manual of Analytical Methods, Third ed. Cincinnati Ohio, 1983. (DHEW publication no. (NIOSH) 77-157-A).

2. Hamilton, A. and Hardy, H. Industrial Toxicology John Wright, PSC Inc. fourth edition, 1983.

3. Rycroft, RJG. Occupational and Industrial Dermatology, Chapter 26: Cutting Fluids, Oil, and Lubricants. edited by Maibach H.I. and Gellin, G.A. Year Book Medical Publishers, Chicago, 1982.

4. Occupational Safety and Health Administration: General industry standards OSHA 2206, OSHA safety and health standards, 29 CFR 1910, USDOL/OSHA, March 11, 1983.

5. American Conference of Governmental Industrial Hygienists, Documentation of threshold limit values, Fourth Ed. ACGIH Cincinnati, Ohio. 1980.

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared by:	William J. Daniels, CIH Industrial Hygienist NIOSH - Region V Chicago, Illinois
	Peter Orris, M.D., MPH Regional Medical Officer NIOSH - Region V Chicago, Illinois
Evaluation Assistance:	Richard S. Kramkowski, P.E. Regional Consultant NIOSH - Region V Chicago, Illinois
Originating Office:	Division of Surveillance, Hazard Evaluations & Field Studies Hazard Evaluation and Technical Assistance Branch Cincinnati, Ohio
Laboratory Support:	Measurement Support Branch Division of Physical Sciences and Engineering Cincinnati, Ohio
	Utah Biomedical Test Laboratory Salt Lake City, Utah

XI. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Services (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH publications office at the Cincinnati, address. Copies of this report have been sent to the following:

A. Requestor
B. Hydramatics Division of General Motors
C. United Auto Workers
C. U. S. Department of Labor, OSHA - Region V
D. NIOSH Regional Offices/Divisions

TABLE 1
RESULTS OF ENVIRONMENTAL SAMPLES COLLECTED FOR TOTAL PARTICULATE
Hydramatic Division of General Motors, Ypsilanti, Michigan
March 11, 1985

Sample Type	Department Number	Sample Time (Minutes)	Sample Volume (Liters)	TWA Concentration Total Particulate
Personal	223	410	615	0.89 mg/M^3
Personal	223	369	554	1.41 mg/M^3
Personal	224	310	465	0.71 mg/M^3
Area #11476	223	347	520	0.77 mg/M3

Evaluation Criteria: Nuisance Particulate - 10 mg/M^3 8-hr TWA (ACGIH)
15 mg/M^3 8-hr TWA (OSHA)

TABLE 2
RESULTS OF ENVIRONMENTAL SAMPLES COLLECTED FOR TRACE METALS
Hydramatic Division of General Motors, Ypsilanti, Michigan
March 11, 1985

Sample Type	Department Number	Sample Time (Minutes)	Sample Volume (Liters)	TWA Concentration Metal Contaminant
Personal	223	375	638	0.005 mg/M^3 Lead 0.04 mg/M^3 Iron
Personal	223	376	639	< LOQ Lead 0.04 mg/M^3 Iron
Personal	224	242	411	< LOQ Lead 0.05 mg/M^3 Iron
Area #11476	223	347	590	< LOQ Lead 0.12 mg/M3 Iron

Evaluation Criteria: Iron Oxide - 5 mg/M^3 8-hr TWA (ACGIH)
10 mg/M^3 8-hr TWA (OSHA)
Lead - 0.05 mg/M^3 8-hr TWA (OSHA)

Abbreviations
mg/M^3 - milligrams of contaminant per cubic meter of air
TWA - Time weighted average
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
< LOQ - Less than the limit of quantitation of 1 microgram/sample.

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
ROBERT A. TAFT LABORATORIES
4676 COLUMBIA PARKWAY, CINCINNATI, OHIO 45226

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

Third Class Mail

POSTAGE AND FEES PAI
U.S. DEPARTMENT OF HI
HHS 396