

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HAZARD EVALUATION AND TECHNICAL ASSISTANCE
REPORT NO. TA 76-77

WESTERN FORGE CORPORATION
COLORADO SPRINGS, COLORADO

OCTOBER 1976

Study Requested By:
Mr. Bob Nass, Safety Engineer
Western Forge Corporation

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16. Abstract (Limit: 200 words) <p>On June 18, 1976, a request was submitted to the National Institute for Occupational Safety and Health (NIOSH) by Mr. Bob Nass, Safety Engineer, Western Forge Corp., Colorado Springs, CO. Mr. Nass requested technical assistance for evaluating perchloroethylene, trichloroethylene, hexavalent chromium, toluene, methylene chloride, isobutyl acetate, acetone, MEK, and asbestos in the workplace. All these substances are used in the production of various automotive tools such as screwdrivers, pliers, torque wrenches, and so forth. The Region VIII Industrial Hygienist visited the plant on June 25 and August 6, 1975 and conducted sampling for all of the above substances.</p>					
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I. INTRODUCTION

On June 18, 1976, a request was submitted to the National Institute for Occupational Safety and Health (NIOSH) by Mr. Bob Nass, Safety Engineer, Western Forge Corporation, Colorado Springs, Colorado. Mr. Nass requested technical assistance for evaluating perchloroethylene, trichloroethylene, hexavalent chromium, toluene, methylene chloride, isobutyl acetate, acetone, MEK, and asbestos in the work place. All these substances are used in the production of various automotive tools such as screwdrivers, pliers, torque wrenches, and so forth. The Region VIII Industrial Hygienist visited the plant on June 25 and August 6, 1976, and conducted sampling for all of the above substances.

II. BACKGROUND INFORMATION

The Western Forge Corporation has plants in Colorado Springs and Canon City, Colorado, and technical assistance was provided in both of these plants. Exposures to solvents, hexavalent chromium, and asbestos were monitored during this technical assistance.

III. TOXIC PROPERTIES

A. Asbestos

Exposures to asbestos fibers have long been known to produce a fibrotic condition of the lungs (asbestosis) and cancer of the lungs and cancer of the lining of the chest cavity (mesothelioma).

B. Hexavalent Chromium

Hexavalent chromium is thought to cause lung cancer and cancer of the upper respiratory system.¹

C. Toluene, Methylene Chloride, Trichloroethylene, Isobutyl Acetate, Acetone, MEK, and Perchloroethylene

Toluene, methylene chloride, isobutyl acetate, acetone, and MEK are all moderately toxic from an industrial hygiene viewpoint, with OSHA standards ranging from 375 to 2400 mg/M³. The response of the body to these solvents is usually a narcotic effect which disappears after leaving the exposure.

At concentrations exceeding the OSHA standards, liver and kidney damage may occur. It should be noted that these are some of the safer solvents in terms of health effects on the worker.

IV. PLANT OPERATION

A. Processes Involved

The Western Forge Corporation manufactures screwdrivers, pliers, lug wrenches, torque wrenches, and so forth. The process of manufacturing these tools involves various operations such as vapor degreasers, metal electroplating, and painting. These processes are in continuous operation for at least eight hours a day. An asbestos rod is milled once a month for about one hour. This process was also evaluated.

B. Environmental Sampling Methods and Results

Environmental monitoring for isobutyl acetate, acetone, MEK, trichloroethylene, perchloroethylene, toluene, and methylene chloride was done using organic vapor charcoal sampling tubes and Sipin low volume pumps operating at approximately 50 cubic centimeters per minute for approximately three hours. All sample results were well below the most recent evaluation criteria. Results of these samples may be reviewed in Tables I, III, and IV. Hexavalent chromium samples were collected on filters using an MSA Model G pump operating at 2 liters per minute; sampling time was approximately four hours. Results of these samples were all below NIOSH limits of detection (Table II). One asbestos sample was collected on the worker milling the asbestos rod, showing an exposure of 0.7 fibers per cubic centimeter. The asbestos exposure on a time-weighted average basis would be approximately 0.09 fibers per cubic centimeter. Again, this rod is milled only once every month for approximately one hour.

Results of all environmental sampling showed that workers were not exposed to potentially toxic levels of the above-mentioned contaminants.

V. RECOMMENDATIONS

1. A NIOSH-approved respirator should be provided to the worker milling the asbestos rod, even though levels found were below the most recent evaluation criteria. It is the opinion of the Industrial Hygienist that any exposure to asbestos could be hazardous. This area should also be screened off from other workers during this operation so that they will not receive an exposure.

2. The hand cleaning operation at Canon City where plastic handles are stripped from pliers should be ventilated and more adequately maintained to prevent industrial hygiene and fire hazards.

VI. REFERENCE

¹Industrial Hygiene and Toxicology, 2nd edition, 1963, pg 1020, Interscience Publishers, Vol. II, Patty (ed).

TABLE I

ATMOSPHERIC CONCENTRATIONS OF
ISOBUTYL ACETATE, ACETONE, AND MEK

Western Forge Corporation
June 25, 1976

Sample Number	Location	Job Classification	Time of Sample	Atmospheric Concentrations (mg/M ³)			Type of Sample
				Isobutyl Acetate	Acetone	MEK	
1	Screwdriver	Handle Assembly	9:05-11:20 A.M.	8	24	196	BZ
2	Screwdriver	Handle Assembly	9:07-11:21 A.M.	7	26	284	BZ
3	Screwdriver	Handle Assembly	9:10-11:22 A.M.	7	24	4	BZ
4	Screwdriver	Handle Assembly	9:11-11:25 A.M.	*	34	*	BZ
Evaluation Criteria							
				700	2400	590	
(mg/sample) NIOSH Limit of Detection				0.01	0.01	0.01	

mg/M³ = approximate milligrams of substance per cubic meter of air

BZ = breathing zone

* = below the NIOSH limit of detection

TABLE II

ATMOSPHERIC CONCENTRATIONS OF
HEXAVALENT CHROMIUMWestern Forge Corporation
June 25, 1976

Sample Number	Location	Job Classification	Time of Sample	Atmospheric Concentrations ($\mu\text{g}/\text{sample}$)		Type of Sample
				Hexavalent Chromium		
1	Metal Electroplating	Electroplater	8:30 A.M.-1:21 P.M.	< 0.4		BZ
2	Metal Electroplating	Electroplater	8:28 A.M.-1:20 P.M.	< 0.4		BZ
3	Metal Electroplating	Electroplater	8:30 A.M.-1:23 P.M.	< 0.4		BZ
4	Metal Electroplating	Electroplater	8:35 A.M.-1:30 P.M.	< 0.4		BZ
5	Metal Electroplating	Electroplater	8:40 A.M.-1:23 P.M.	< 0.4		BZ
Evaluation Criteria				100 $\mu\text{g}/\text{M}^3$		
NIOSH Limit of Detection				0.4 $\mu\text{g}/\text{sample}$		

 $\mu\text{g}/\text{M}^3$ = approximate micrograms of substance per cubic meter of air

BZ = breathing zone

TABLE III

ATMOSPHERIC CONCENTRATIONS OF
TOLUENE, METHYLENE CHLORIDE, AND TRICHLOROETHYLENE

Western Forge Corporation
August 6, 1976

Sample Number	Location	Job Classification	Time of Sample	Atmospheric Concentrations (mg/M ³)			Type of Sample
				Toluene	Methylene Chloride	Trichloro- ethylene	
2	Plastisol Tank	Plastisol Operator	9:45 A.M.-12:50 P.M.	70	122	34	BZ
6	Plastisol Tank	Plastisol Operator	11:20 A.M.-12:50 P.M.	57	100	23	BZ
Evaluation Criteria							
NIOSH Limit of Detection				375	360	535	
				0.01	0.01	0.01	

mg/M³ = approximate milligrams of substance per cubic meter of air

BZ = breathing zone

TABLE IV

ATMOSPHERIC CONCENTRATIONS OF
TRICHLOROETHYLENE AND PERCHLOROETHYLENE

Western Forge Corporation
August 6, 1976

Sample Number	Location	Job Classification	Time of Sample	Atmospheric Concentrations (mg/M ³)		Type of Sample
				Trichloro- ethylene	Perchloro- ethylene	
1	Stamp Machine and Plastisol Area	Stamp Machine Operator	9:40 A.M.-12:50 P.M.	13	97	BZ
3	Stamp Machine and Plastisol Area	Stamp Machine Operator	9:48 A.M.-12:50 P.M.	34	83	BZ
4	Stamp Machine and Plastisol Area	Stamp Machine Operator	9:55 A.M.-12:50 P.M.	11	44	General Room
5	Stamp Machine and Plastisol Area	----	10:00 A.M.-11:20 A.M.	16	157	BZ
				Evaluation Criteria	535	670
				NIOSH Limit of Detection	0.01	0.01

mg/M³ = approximate milligrams of substance per cubic meter of air

BZ = breathing zone