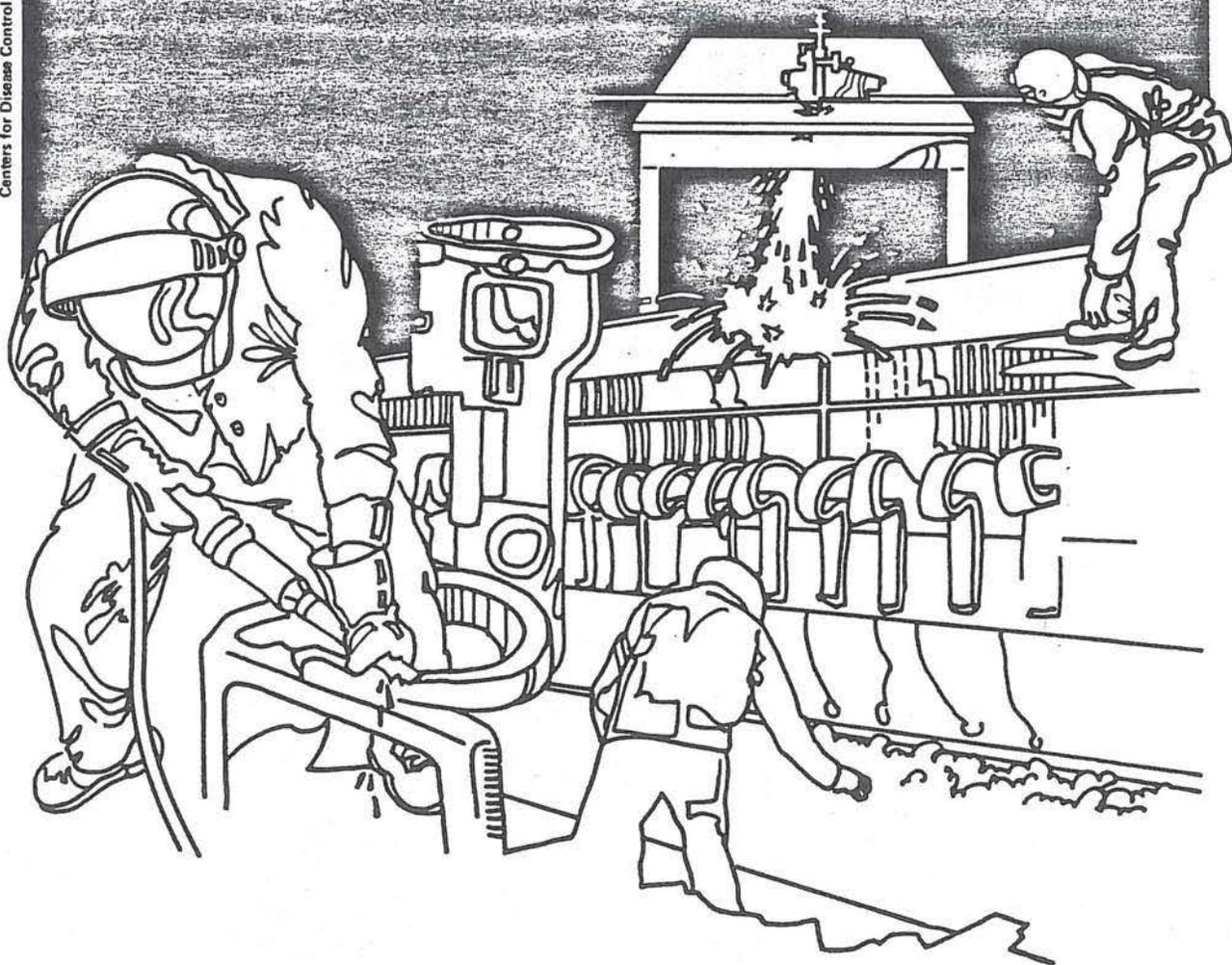


NIOSH



Health Hazard Evaluation Report

HETA 81-426-1062
XOMOX CORPORATION
CINCINNATI, OHIO

HETA 81-426-1062
MARCH 1982
XOMOX Corporation
Cincinnati, Ohio

NIOSH INVESTIGATOR:
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I. SUMMARY

On August 10, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request from the safety coordinator, XOMOX Corporation for technical assistance in determining lead exposure in the paint spray booth at this plant. On October 14, 1981 NIOSH conducted environmental measurements in that area to determine employee exposures to lead and hexavalent chromium.

The two paint spray operators were exposed to airborne lead in concentrations ranging from 10 to 80 $\mu\text{g}/\text{M}^3$ (micrograms per cubic meter of air) for an 8-hour time-weighted average (TWA). The OSHA standard for occupational exposure to lead is 50 $\mu\text{g}/\text{M}^3$ (TWA). These two employees had blood levels below 30 $\mu\text{g Pb}/100 \text{ ml}$ (micrograms of lead per 100 milliliters of blood); the upper limit of normal for blood lead in adults is 40 $\mu\text{g Pb}/100 \text{ ml}$. Analysis of personal air samples for hexavalent chromium ranged from less than detectable limits to 0.38 $\mu\text{g}/\text{M}^3$. The current OSHA standard for hexavalent chromium is 100 $\mu\text{g}/\text{M}^3$ ceiling value. NIOSH recommends 1 $\mu\text{g}/\text{M}^3$ ceiling value.

The operators wore NIOSH approved high efficiency air purifying respirators for airborne lead while performing their duties. The fact that a respirator was worn was not taken into consideration in calculating potential exposures. It can be assumed that exposures of these persons making proper use of prescribed respiratory protection were materially reduced from the calculated values. However, the use of respiratory protection should only be used as an interim control measure until the airborne lead levels are reduced below 50 $\mu\text{g}/\text{M}^3$ through engineering and administrative control.

The two paint spray operators interviewed reported no current health problems.

Based on the results of this survey, NIOSH has determined that one operator was exposed to airborne concentrations of inorganic lead above the OSHA PEL. However, blood lead levels for both exposed operators were within current blood lead criteria. Recommendations to aid in providing a safe and healthful working environment are presented in this report.

KEYWORDS: SIC 3494 (Valves and Pipe Fittings) Inorganic lead, hexavalent chromium, paint spray and valves.

II. INTRODUCTION

On August 10, 1981 NIOSH received a request from the safety coordinator, XOMOX Corporation, Cincinnati, Ohio to conduct an environmental survey at the paint spray booth at this plant. The purpose of the survey was to determine if employees were overexposed to inorganic lead and hexavalent chromium.

III. BACKGROUND

XOMOX Corporation manufacture all types of valves for commercial use. The evaluation was limited to the paint spraying operation which consisted of two spray painters. This department is involved with painting valves and miscellaneous associated components using conventional compressed air spraying techniques. The department consist of one water wash spray booth and one low temperature drying oven. Valves suspended from an overhead automatic conveyor system are manually painted as they pass through the spray booth. The two spray painters alternate duties including unpacking and packing the valves and associated components in boxes.

IV. EVALUATION METHODS

Two personal breathing zone samples for lead were collected on mixed cellulose ester filter using MSA Model G, battery-operated vacuum pump at a flow rate at 2.0 liters/minute (LPM) and analyzed according to NIOSH Method No. S-341.

Personal breathing zone samples for chromium (VI) were collected on 5.0 um (pore size) polyvinyl chloride filters using MSA Model G, battery-operated vacuum pump at a flow rate at 2.0 LPM and analyzed according to NIOSH P&CAM Method No. 169.

Two paint spray operators were interviewed by NIOSH industrial hygienist to elicit symptomatology possibly related to health problems arising from their work environments.

V. EVALUATION CRITERIA

LEAD¹

Toxicological

Inhalation (breathing) of lead dust and fume is the major route of lead exposure in industry. A secondary source of exposure may be from ingestion (swallowing) of lead dust deposited on food, cigarettes, or other objects. Once adsorbed, lead is excreted from the body very slowly. Adsorbed lead can damage the kidneys, peripheral and central nervous systems, and the blood forming organs. Chronic lead exposure is associated with infertility and with fetal damage in pregnant women.

Blood lead levels below 40 ug/deciliter whole blood are considered to be normal levels which may result from daily environmental exposure. The new Occupational Safety and Health Administration (OSHA) standard for lead in air is 50 ug/M³ calculated as an 8-hour time-weighted average for daily exposure.¹ The standard also dictates that workers with blood lead levels greater than 60 ug/deciliter must be immediately removed from further lead exposure and, in some circumstances, workers with lead levels of less than 60 ug/deciliter must also be removed. Removed workers have protection for wage, benefits, and seniority for up to 18 months until their blood levels decline to below 50 ug/deciliter and they can return to lead exposure areas.

CHROMIUM (VI)²

NIOSH recommends two standards for chromium (VI): one addresses the noncarcinogenic forms, the other the carcinogenic forms associated with an increased incidence of lung cancer. NIOSH defines "noncarcinogenic chromium (VI)" as chromium (VI) in monochromates and bichromates (dichromates) of hydrogen, lithium, sodium, potassium, rubidium, cesium, and ammonium, and chromium (VI) oxide (chromic acid anhydride). NIOSH recommends 25 ug/M³ for an 8-hour time-weighted average. NIOSH defines "carcinogenic chromium (VI)" as any and all chromium (VI) material not included in the group above, such as zinc, lead, and calcium chromates. NIOSH recommends 1 ug/M³ ceiling value and the current OSHA standard is 100 ug/M³ ceiling value. Therefore, the chromium (VI) as lead chromate evaluated at XOMOX Corporation under this hazard evaluation is considered to be carcinogenic chromium (VI). Other effects such as skin ulcers, irritation and ulceration of the nasal mucosa, kidney damage, liver damage, and erosion and discoloration of the teeth, have been reported and have resulted from contact with many different chromium (VI) materials.

VI. RESULTS AND DISCUSSION

Results of the environmental samples collected on October 14, 1981 for airborne lead and chromium VI are presented in Table I. One personal sample for lead was (80 ug/M³) above the recommended environmental criteria. Hexavalent chromium ranged from less than detectable limit to 0.38 ug/M³.

The paint spray booth has an average face velocity of 110 linear feet per minute (FPM) which should be adequate to control concentrations of lead and chromium VI generated during the spraying operation. By comparison, the average air velocity over the open face of this type of spray booth is 100 FPM. However, on occasion (as was done during the period of sampling) the paint spray operator, while spraying the valves, works his way to the end of the conveyor. The conveyor is not under the influence of the ventilation system and this probably results in operator exposure above the OSHA PEL.

A review of the company medical records revealed the two paint spray operators had blood levels below 30 ug Pb/100 ml. The upper limit of normal for blood lead level is 40 ug Pb/100 ml.

Interviews with two workers performing the paint spray duties reported no health problems on the day of the survey.

Based on the environmental sampling results, one of two samples exceeded the OSHA standard of 50 ug/M³. However, none of the blood lead levels exceeded the OSHA standard of 40 micrograms Pb/100 ml of whole blood, due to the respiratory protection plan. Personal air samples for hexavalent chromium ranged from less than detectable limits to 0.38 ug/M³. The OSHA standard is 100 ug/M³ ceiling value; NIOSH recommends 1 ug/M³ ceiling value.

VII. RECOMMENDATIONS

1. The paint spray operators should be instructed to spray paint the valves and accessories inside the ventilated enclosure at all time. The paint spray booth has an average face velocity of 110 feet per minute (FPM) which should be adequate to control concentrations of lead and chromium VI generated during the spraying operation. Respiratory protection should only be used as an interim control measure until the lead levels are reduced below 50 ug/M³ through engineering and administrative controls.
2. Good personal hygiene and good work practices should be observed by all employees. Washing of hands before smoking, eating and drinking will help reduce contamination.

VIII. REFERENCE

1. Occupational Safety and Health Administration. Occupational Exposure to Lead-Final Standard. Federal Register 1978, November 14:53007.
2. National Institute for Occupational Safety and Health. Criteria for a recommended standard ... occupational exposure to chromium (VI). Cincinnati, OH: National Institute for Occupational Safety and Health, 1975. (DHHS (NIOSH) publication no. 76-129).

IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

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X. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Publication Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. Information regarding its availability through NTIS can be obtained from NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. XOMOX Corporation, Safety Coordinator
2. NIOSH, Region V
3. OSHA, Region V

For the purpose of informing the two affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

TABLE I

RESULTS OF BREATHING ZONE SAMPLES FOR LEAD AND
HEXAVALENT CHROMIUM IN THE SPRAY PAINT AREAXOMOX CORPORATION
CINCINNATI, OHIO
HE 81-438

October 14, 1981

<u>Job</u>	<u>Sampling Period</u>	<u>Sample Volume Liters</u>	<u>Air Concentration - ug/M³</u>	
			<u>Lead</u>	<u>Chromium VI</u>
Spray Paint Operator (A)	0821-1537	800	10	0.38
Spray Paint Operator (B)	0821-1537	800	80	L.D.
Environmental Criteria (ug/M ³), 8-hour TWA			50	1
Limit of Detection (ug/filter)			3	0.2

L.D. = Less than Detectable Limits

The 8-hour TWA PEL for inorganic lead has been reduced from 200 ug/M³ to 50 ug/M³ (29 CFR 1910.1025). Pending current litigation of the 50 ug/M³ lead standard, employers must achieve the 200 ug/M³ level through engineering and administrative controls, and must protect workers at the 50 ug/M³ PEL through any combination of controls, including the use of proper respirators.