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

HEALTH HAZARD EVALUATION REPORT
HE 80-61-719

A.M.F. HEAD DIVISION
BOULDER, COLORADO

JULY 1980

I. SUMMARY

In January 1980 the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate occupational exposures to lead (Pb) at A.M.F. Head Division, Boulder, Colorado. This facility manufactures racketball and tennis rackets (Standard Industrial Classification Code 3490). All four workers in the area to be evaluated were questioned about potential sources of lead exposure and about medical problems associated with excessive lead exposure. Each worker was monitored for breathing zone air lead exposures. A general room air sample for lead anaylsis was also obtained. Venous blood samples were obtained from three workers for whole blood lead analysis.

The three workers had lead levels of 15, 14, and 6 micrograms of lead per 100 grams of whole blood (ug Pb/100 g). All breathing zone and general room air samples were below the laboratory detection limit of 0.003 mg/M^3.

On the basis of the environmental and medical data, a health hazard from exposure to lead did not exist at the time of this survey. Recommendations on work practices necessary to control any future hazard are included on page 4 of this report.

II. INTRODUCTION

NIOSH received a request in January 1980 from the health and safety department of A.M.F. Head Division at Boulder, Colorado, to determine if there was a health hazard from lead during the manufacture of racketball and tennis rackets.[1] An environmental and biological survey was conducted on March 25, 1980, to evaluate lead exposures. The requester was notified in April of blood and air lead levels.

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[1]Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 19 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by any employer or authorized representative to employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

III. BACKGROUND

This department of A.M.F. Head Division produces racketball and tennis rackets. The area concerned during this evaluation was a particular process where lead is added to various parts of these rackets for balance. This is done entirely by hand. Therefore, the workers are in constant contact with lead while it is cut to various lengths and added to the racket for balance. There is no heating or grinding of the lead.

IV. METHODS AND MATERIALS

A. Environmental

Lead breathing zone air samples were collected on 37 mm AA filters using vacuum pumps operated at 1.5 liters per minute and analyzed according to NIOSH Method P&CAM No. 173.

B. Medical

Venous blood samples were obtained in vacuum tubes containing EDTA for blood lead determination. Blood lead levels were analyzed by Delves cup method. (References 1, 2)

V. EVALUATION CRITERIA

A. Environmental

The source of criteria used to assess the workroom concentration of lead was the Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1025), January 1978.

	Permissible Exposures 8-Hour Time-Weighted Exposure Basis (mg/M^3)
Lead.....	0.05 (OSHA)

mg/M^3 = milligrams of substance per cubic meter of air

Occupational health standards are established at levels designed to protect individuals occupationally exposed to toxic substances on an 8-hour per day, 40-hour per week basis over a normal working lifetime.

B. Toxicological

Lead -- Inhalation of lead dust and fumes is the major route of lead exposure in industry. A secondary source of exposure may be from lead dust contamination on food, cigarettes, or other objects. Once absorbed lead is excreted from the body very slowly. The absorbed lead can damage the kidneys, peripheral and central nervous systems, and the blood forming organs (bone marrow). These effects may be felt as weakness, tiredness, irritability, digestive disturbances, high blood pressure, kidney

damage, mental deficiency, or slowed reaction times. Chronic lead exposure is associated with infertility and with fetal damage in pregnant women.

Blood lead levels below 40 ug/100ml whole blood are considered to be normal levels which may result from daily environmental exposure. However, fetal damage in pregnant women may occur at blood lead levels as low as 30 ug/100ml. Lead levels between 40-60 ug/100ml in lead exposed workers indicate excessive absorption of lead and may result in some adverse health effects. Levels of 60 to 100 ug/100ml represent unacceptable elevations which may cause serious adverse health effects. Levels over 100 ug/100ml are considered dangerous and often require hospitalization and medical treatment.

The new OSHA standard for lead in air is 50 ug/M^3 on an eight-hour time-weighted average for daily exposure. For this particular industry the current standard is 50 ug/M^3. The new standard also dictates that in four years workers with blood lead levels greater than 50 ug/100ml must be immediately removed from further lead exposure and in some circumstances workers with lead levels less than 50 ug/100ml must also be removed. At present medical removal is necessary at blood lead levels of 70 ug/100 grams of whole blood or greater. Removed workers have protection for wage, benefits, and seniority until they can return to lead exposure areas.

VI. RESULTS

A. Environmental

All breathing zone and general room air samples taken for lead were below the laboratory detection limits. This is due to good local ventilation and proper work techniques such as good housekeeping and proper storage and use of the lead wire. Results may be reviewed in Table 1.

B. Biological

Blood lead levels of the three workers in the racketball and tennis racket area are summarized in Table 2. Blood lead values were 15, 14, and 6 ug Pb/100 g. These low levels indicate that workers are practicing good hygiene and the ventilation in this department is working properly. None of the workers had complaints that could be attributed to lead toxicity.

VII. DISCUSSION AND CONCLUSIONS

A health hazard did not exist at this work place. This conclusion is based on air levels below laboratory detection limits and on the extremely low blood lead values. Values observed during this evaluation were all within normal ambient air levels. Similar blood lead values would be observed in a normal non-lead exposed population.

VIII. RECOMMENDATIONS

1. Smoking, eating, and drinking must be prohibited in the work area.
2. Workers should wash hands thoroughly before eating, smoking, and snuff usage.
3. Continued good housekeeping is essential to maintain low air and blood lead values.

IX. REFERENCES

1. Delves, H.T. Analyst, 95:431, 1970.
2. Barthel, W.F. J.A.O.A.C., 56, No. 5, 1973.

X. AUTHORSHIP AND ACKNOWLEDGMENTS

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XI. DISTRIBUTION AND AVAILABILITY

Copies of this determination report are currently available upon request 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 through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. A.M.F. Head Division.
2. U.S. Department of Labor/OSHA - Region VIII.
3. NIOSH - Region VIII.
4. Colorado Department of Health
5. State Designated Agency

For the purpose of informing all employees, a copy of this report shall be posted in a prominent place accessible to the employees for a period of 30 calendar days.

TABLE 1

Breathing Zone and General Room Air Concentrations of Lead
in Racketball and Tennis Racket Department

A.M.F. Head Division
Boulder, Colorado

March 25, 1980

Sample Number	Job Classification	Sampling Time	mg/M^3 Lead
1	Head Molder	7:45 AM - 1:30 PM	*
2	Molder	8:00 AM - 9:20 AM	*
3	Molder	8:00 AM - 1:30 PM	*
4	Molder	7:45 AM - 1:30 PM	*
5	Molding Area	7:45 AM - 1:30 PM	*
	EVALUATION CRITERIA		0.05
	LABORATORY LIMIT OF DETECTION		0.003

* = below laboratory limit of detection

TABLE 2

Whole Blood Lead Values
in Rackbetball and Tennis Racket Department

A.M.F. Head Division
Boulder, Colorado

March 25, 1980

Sample Number	Job Classification	ug Pb/100 g
1	Molder	15
2	Molder	14
3	Molder	6

Normal Limit = 0 to 20 ug Pb/100 grams of whole blood