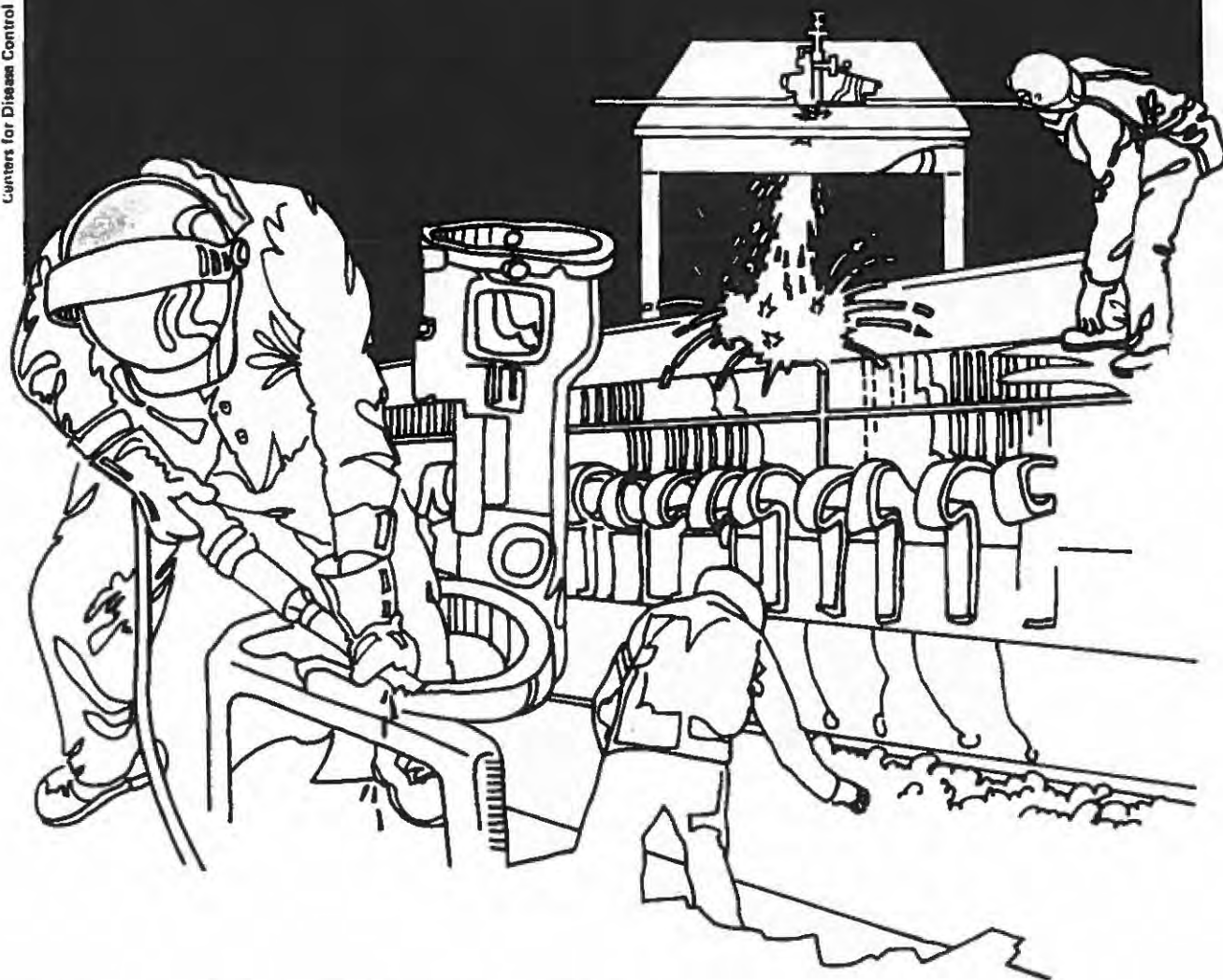


NIOSH



Health Hazard Evaluation Report

HETA 84-286-1512
STANLEY AVIATION CORPORATION
DENVER, COLORADO

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. 660(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.

HETA 84-286-1512
SEPTEMBER 1984
STANLEY AVIATION CORPORATION
DENVER, COLORADO

NIOSH INVESTIGATORS:
Bobby J. Gunter, Ph.D.

I. SUMMARY

In April 1984 the National Institute for Occupational Safety and Health (NIOSH) received a request from plant management to evaluate occupational exposures to noise, lead, and grinding dust at Stanley Aviation, Denver, Colorado, a facility which produces helicopter accessories.

An initial walk-through survey was conducted on May 10, 1984 and a follow-up environmental survey was conducted on May 15 and 16, 1984.

During the environmental survey breathing zone and general room air samples were taken for chromium and lead. These samples were taken from the following areas: metal electroplating, machine shop, paint booth, and in the lead hammer pouring area. All air samples for chromium and lead were below the laboratory limit of detection of 0.005 mg/sample.

Eight-hour time-weighted average (TWA) sound level measurements were taken on four workers in the machine shop. The (TWA) values were 90.5, 93.6, 90.6 and 85 dBA. All these values exceed or equal the evaluation criterion of 85 dBA. All workers were wearing adequate hearing protection and were given annual audiograms. Brief employee interviews did not indicate medical problems.

On the basis of environmental results and employee interviews a health hazard to excessive noise levels existed at Stanley Aviation, Denver, Colorado during this evaluation. Recommendations for controlling this hazard are included in this report.

KEYWORDS: SIC (3471), Electroplating, anodizing, noise, chromium, lead

I. INTRODUCTION

The National Institute for Occupational Health (NIOSH) received a request in April 1984 from Stanley Aviation, Denver, Colorado, to evaluate occupational exposures to noise, grinding dust, and lead. An environmental survey was conducted on May 15 and 16, 1984. The results of this survey were discussed with plant management at the time of the survey and at a later date after environmental results were received.

III. BACKGROUND

Stanley Aviation produces many couplings and other machined parts for the United States Military. In the processes and procedures such as machining, electroplating, anodizing, and painting it is possible for workers to receive exposure to noise, chromium, and lead. After meeting with management and workers at Stanley Aviation and doing a walk-through survey of the facility, the following areas were scheduled for a follow-up environmental survey: machining and grinding area, metal electroplating, painting, and the lead hammer pouring area.

IV. ENVIRONMENTAL DESIGN AND METHODS

A. Environmental

Lead and Chromium breathing zone samples were collected in the Metal Electroplating department, the paint booth, the machine shop, and in the lead hammer pouring area. These air samples were collected on 37 mm. AA filters and analyzed according to NIOSH procedure 7300 using flame atomic absorption spectroscopy.

Noise measurements were taken using dosimeters that measure minute by minute exposures. Cumulative exposures are also calculated that give the hour by hour cumulative noise exposure and the cumulation for the entire work shift.

Workers were interviewed with the only consistent complaint being excessive noise exposure.

V. EVALUATION CRITERIA

A. Environmental

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 become 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 (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, by contrast, are based solely 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 legally required to meet only 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 or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

Environmental Exposure Limits
8-Hour Time-Weighted Average (TWA)

	mg/M ³	
	NIOSH	OSHA
Lead	0.1	0.05
Chromium	0.5	1.0
Chromium VI*	*	*
Noise	85dBA	90dBA

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

* = Carcinogen--no safe level of exposure exists

B. Toxicological

Lead--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.³ The standard also dictates that workers with blood lead levels greater 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--The most toxic route of entry is by inhalation, followed by percutaneous. Chrome (metal) is very corrosive and is a strong sensitizer. Perforation of nasal septum is seen frequently. Chromium VI is also a carcinogen.¹ Adequate ventilation and frequent monitoring of the work environment is necessary to prevent overexposures. No eating and smoking should be allowed in the work area. Workers sensitized should be removed from the workplace.²

Noise 5--Exposure to high levels of noise may cause temporary and/or permanent hearing loss. The extent of damage depends primarily upon the intensity of the noise and the duration of the exposure. There is abundant epidemiological and laboratory evidence that protracted noise exposure above 90 decibels (dBA) causes hearing loss in a portion of the exposed population.

OSHA's existing standard for occupational exposure to noise (29 CFR 1910.95) specifies a maximum permissible noise exposure level of 90 dBA for a duration of 8 hours, with higher levels allowed for shorter durations. NIOSH, in its Criteria for a Recommended Standard, proposed a limit of 5 dB less than the OSHA standard.

Time-weighted average noise limits as a function of exposure duration are shown as follows:

<u>Duration of Exposure</u> <u>(hours/day)</u>	<u>Sound Level, dBA</u>	
	<u>NIOSH</u>	<u>OSHA</u>
16	80	---
8	85	90
4	90	95
2	95	100
1	100	105
1/2	105	110
1/4	110	115*
1/8	115*	---
	---	140 dB

* No exposure to continuous noise above 115 dBA.

** No exposure to impact or impulse noise above 140 dB peak sound pressure level (SPL).

When workers are exposed to sound levels exceeding the OSHA standard, feasible engineering or administrative controls must be implemented to reduce levels to permissible limits. OSHA has recently issued a hearing conservation amendment to its noise standard. For workers exposed at or above a TWA of 85 dB, the amendment will require noise exposure monitoring, employee education, and audiometric testing. Review of audiograms have to be made by an audiologist or otolaryngologist or a qualified physician in their absence. Employees also must be notified of monitoring results within 21 days. Employee records must be kept by the employer for up to five years after termination of employment. Finally, for those employees exposed to noise levels exceeding 90 dBA for eight hours and/or where audiometric testing results indicate a hearing loss, ear protection must be worn.

VII. RESULTS AND DISCUSSION

All air samples taken for lead and chromium were below the evaluation criteria.

Time weighted average noise exposures exceeded the evaluation criteria on three of four workers monitored. The fourth worker monitored had an 8 hour average of 85 which is equal to the evaluation criteria. Other 8-hour (TWA) noise exposures to machinists were 90.5, 93.6, and 90.6 dBA. Workers were interviewed and the only consistent complaint was excessive noise exposure. Workers were wearing hearing protection and yearly audiograms are performed on all workers that are exposed to noise levels exceeding 85 dBA. Results may be reviewed in Tables I and II.

VIII. CONCLUSIONS

Based on environmental data, a health hazard did exist to excessive noise exposures. All other environmental samples were below the laboratory limit of detection.

IX. RECOMMENDATIONS

1. Workers should remove themselves from the proximity of the milling and grinding machines when they are not running the machine.
2. A variety of hearing protection including ear muffs, and plugs should be provided to the workers so they will be more inclined to wear them.

X. REFERENCES

1. National Institute for Occupational Safety and Health. Criteria for a recommended standard--occupational exposure to chromium VI. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1976. (DHEW Publication No. (NIOSH) 76-129).
2. Plunkett, E.R., Handbook of Industrial Toxicology, Chemical Publishing Company, New York 1976, pp. 108-109.
3. Occupational Safety and Health Administration. Occupational exposure to lead--final standard. Federal Register 1978 Nov. 14:63007.

X. AUTHORSHIP AND ACKNOWLEDGMENTS

Report Prepared By: Bobby J. Gunter, Ph.D.
Regional Industrial Hygienist
NIOSH, Region VIII
Denver, Colorado

Field Assistance Anne Albers
Industrial Hygienist
NIOSH, Region VIII
Denver, Colorado

Originating Office: Hazard Evaluation and Technical
Assistance Branch (HETAB)
Division of Surveillance, Hazard
Evaluations, and Field Studies (DSHEFS)
NIOSH, Cincinnati, Ohio

Report Typed By: Loraine Emerson
NIOSH, Region VIII
Denver, Colorado

XI. DISTRIBUTION AND AVAILABILITY

Copies of this 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 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. Stanley Aviation Corporation.
2. U.S. Department of Labor/OSHA - Region VIII.
3. NIOSH - Region VIII.
4. Colorado Department of Health.

For the purpose of informing affected 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 I

Breathing Zone and General Room Air Concentrations
in the Metal Electroplating, Spray Painting, Lead Hammer Pouring
and Machine Shop Areas

Stanley Aviation, Corporation
Denver, Colorado

May 15, 1984

Sample #	Job	time(sampling)	mg/M ³	
			CR	Pb
1	Pouring Lead Hammers	7:05-8:30	*	*
2	Machinist	7:42-2:30	*	*
3	Painter	7:53-2:35	*	*
4	Electroplater	7:57-2:40	*	*
5	General area (Electroplating)	8:00-2:40	*	*
6	General area (Painting)	8:00-2:35	*	*
7	General area (Painting)	8:00-2:35	*	*
Evaluation Criteria			0.5	0.05
Laboratory Limit of Detection milligrams/Filter 0.005			0.005	0.005

TABLE II

Cumulative Noise Exposures on APC Milling Machine Operators
at Stanley Structures

Stanley Aviation Corporation
Denver, Colorado

May 15, 1984

Sample	Location	Job	Sample-time	Cumulative Exposure dBA
5710	Machine Shop	APC Operator	7:30 - 2:25	90.5
5710	Machine Shop	APC Operator	7:30 - 2:40	93.6
5710	Machine Shop	APC Operator	7:30 - 2:30	90.6
5710	Machine Shop	Foreman	7:42 - 2:30	85

Evaluation Criteria

85

DEPARTMENT OF HEALTH AND HUMAN SERVICES
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