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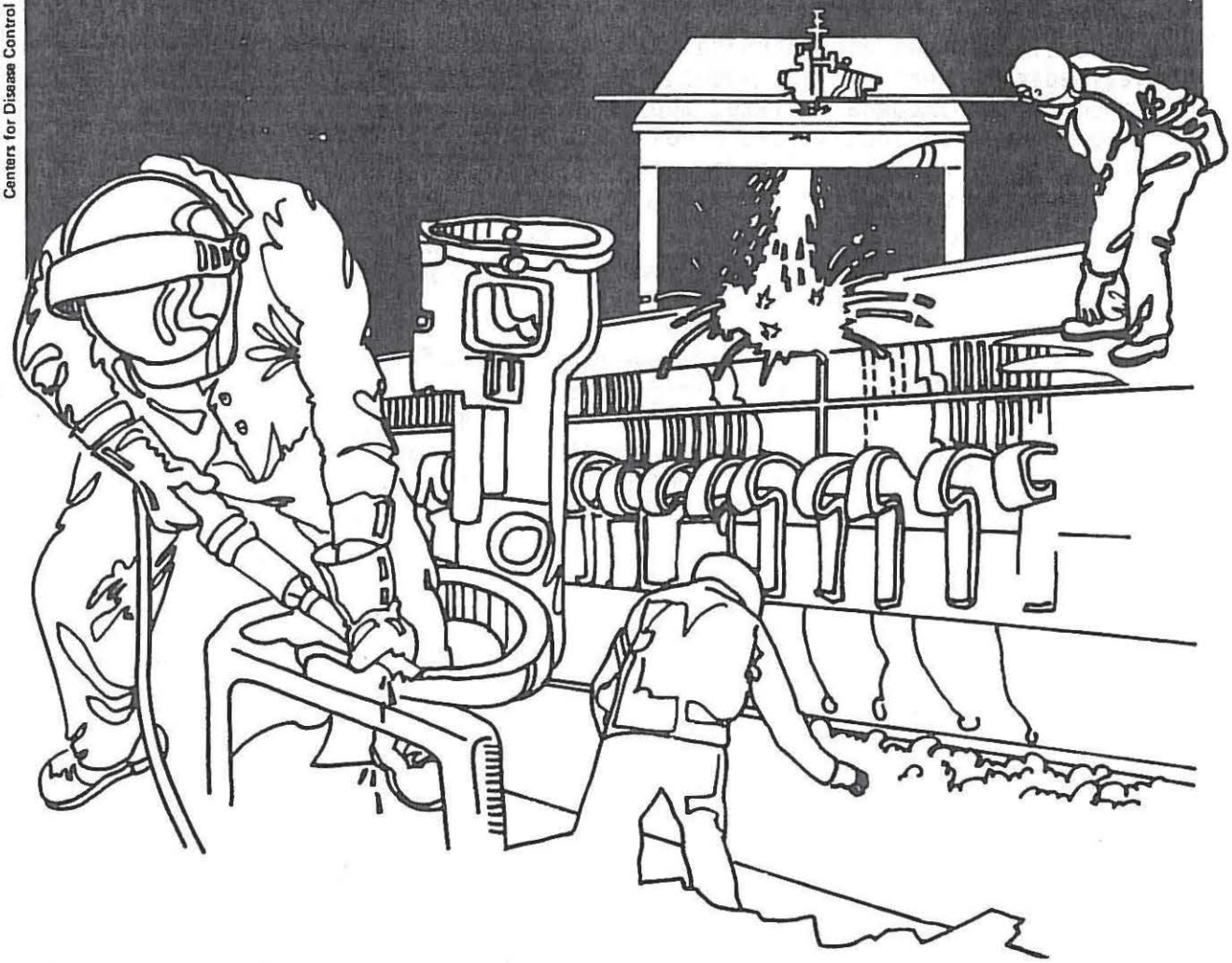

Health Hazard Evaluation Report

HETA 83-040-1356
DRIVE TRAIN INDUSTRIES, INC.
CASPER, WYOMING

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.

HETA 83-040-1356
AUGUST 1983
DRIVE TRAIN INDUSTRIES, INC.
CASPER, WYOMING

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I. SUMMARY

In November 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request to conduct a health hazard evaluation at Drive Train Industries, Inc., Casper, Wyoming. The company produces and refurbishes parts and equipment for both small and large motorized vehicles. The request concerned exposures to asbestos, stoddard solvent, total welding fumes, iron oxide, lead, crystalline silica and noise.

On March 22, 1983, NIOSH investigators conducted an industrial hygiene survey to determine airborne concentrations of the contaminants listed above.

The exposure concentration of asbestos measured in the operator's breathing zone were all less than 4500 fibers per filter which is equivalent to 0.03 fibers per field, and is the NIOSH limit of detection.

Concentrations for stoddard solvent ranged from 5 to 31 mg/M^3; the evaluation criterion is 350 mg/M^3. Total welding fume levels ranged from 0.04-2.0 mg/M^3 which is less than the evaluation criterion of 5.0 mg/M^3. Iron oxide levels ranged from 0.2 to 12.0 mg/M^3; the evaluation criterion is 5 mg/M^3. Lead concentrations ranged from 0.01 to 0.1 mg/M^3; the OSHA standard is 0.05 mg/M^3 for an eight-hour time weighted average. This exposure was for two hours and due to the small percentage of time this operation was performed, was not considered a hazard. Bulk samples were analyzed for crystalline silica; there was neither quartz nor cristobalite present.

Three workers were monitored for the total work shift for noise. One of the workers was overexposed; his cumulative 8-hour exposure was 94.3 dBA. The other 2 workers had 8-hour cumulative exposures less than 85 dBA.

On the basis of the environmental data collected, NIOSH determined that a health hazard from exposure to noise and iron oxide existed at the time of this survey. All other environmental measurements did not indicate excessive exposures. Recommendations may be found in Section VIII.

KEYWORDS: SIC 3714 (Motor Vehicles and Motor Vehicle Equipment), brake drums, clutches, transmissions, drivelines, asbestos, noise, total welding fumes, welding, crystalline silica.

II. INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) received a request in November 1982 from a representative of the employees at Drive Train Industries, Inc., Casper, Wyoming. The request was to determine if there was a health hazard from asbestos during the reconditioning of truck brakes and clutches. Other environmental contaminants were also evaluated including: stoddard solvent, welding fumes, iron oxide, lead, crystalline silica, and noise. The environmental survey was conducted on March 22, 1983. Results of the environmental evaluation were discussed by telephone to the requester in April, 1983.

III. BACKGROUND

Drive Train Industries, Inc., Casper, Wyoming rebuilds and repairs various truck parts such as brakes, clutches, drivelines, transmissions, and other mechanical parts used in truck driveline systems. A large percentage of brakes and clutches, as well as a portion of the other products produced at Drive Train, are refurbished and relined with some asbestos material.

IV. ENVIRONMENTAL DESIGN AND METHODS

Various operations and departments were evaluated by NIOSH. These included the brake, driveline, and clutch operations, as well as the transmission, and tear down operations.

The normal processes for remanufacturing any of these parts are similar. Once the old core is received it is torn down, and the parts are cleaned. The old core is machined, and parts are replaced as necessary. During these processes the workers are exposed to chemical and physical hazards.

Drive Train's main headquarters in Denver, Colorado, has been aware of the potential for asbestos exposures to their employees for several years. Since 1977 they have performed asbestos environmental monitoring, and medical screening for exposed workers. The company has also installed local exhaust ventillation in order to reduce the asbestos and other airborne contaminants. Drive Train provides physical exams for all employees that work around asbestos. These exams include pulmonary function and chest x-rays.

Personal samples were taken on all of the employees at this location. The following is a description of the techniques used:

A. Asbestos

Three personal air samples were collected for asbestos on AA filters (open faced) and counted on a phase contrast microscope according to NIOSH Method P&CAM 239.

B. Stoddard Solvent

Six Stoddard samples were collected on organic vapor charcoal sampling tubes and analyzed according to NIOSH physical and chemical method number 127.

C. Welding Fumes and Iron

Welding fume and Iron samples were taken on preweighted filters and analyzed by weight difference and NIOSH P&CAM 173 respectively.

D. Lead

Lead samples were collected on AA filters and analyzed according to NIOSH P&CAM 173.

E. Crystallina Silica

Crystallina Silica samples were collected on FWSB preweighed filters and analyzed according to NIOSH P&CAM 259.

F. Noise

Three personal noise level measurements were taken using Metrosonic noise dosimeters which register on a memory cell the dose or noise level received during the exposure period. The data can then be displayed as a read-out (hard copy) for each minute at the end of the exposure period. The read-out describes the accumulated exposure for each hour and is described as the average noise exposure for each hour evaluated.

Noise levels and sound pressure levels were also evaluated around the work sites using a Bruel & Kjoer® (B&K) Precision Sound Level Meter equipped with an octave band analyzer.

V. EVALUATION CRITERIA AND TOXICOLOGY

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 for time weighted averages (TWA) exposures to which most workers may be exposed to average airborne concentrations of a substance during a normal 8 to 10 hour day, 40 hour week for a working lifetime without experiencing adverse health effects. 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.

It is 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.

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. 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. However, it should be recognized that evaluation criteria may change over the years as new information on the toxic effects of an agent become available. Both NIOSH criteria and recommendations and the ACGIH TLV's usually are based on more recent information than are the OSHA standards. Therefore, the NIOSH criteria and ACGIH TLV's for some chemical and physical agents may be lower than the corresponding OSHA standards.

Substance	Evaluation Criteria	Source
Asbestos	0.1 fibers/cc greater than 5 microns in length	NIOSH
	2 fibers/cc greater than 5 microns in length	OSHA
Stoddard Solvent	350mg/M^3	NIOSH, OSHA
Welding Fumes	5 mg/M^3	1981 ACGIH TLV
Iron oxide	5 mg/M^3	1981 ACGIH TLV
Lead	0.05 mg/M^3	OSHA
Silica	0.1 mg/M^3 respirable	NIOSH
	0.3 mg/M^3 total mass	NIOSH
	30mg/M^3 divided by % SiO_2 + 2	OSHA
Noise (see page 7)	85 dBA	NIOSH
	90 dBA	OSHA

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mg/M^3 = milligrams of substance per cubic meter of air.
dBA = decibels measured on the A scale.

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

B. Toxicological

Asbestos 1 Chronic exposures to asbestos may cause asbestosis. Exposures have also been shown to cause a greater incidence of cancer of the colon, plura, and other critical body organs.
Stoddard Solvent is used as a degreasing agent and in many industrial applications for cleaning of greasy and oily metal parts. Exposures above 350 mg/M^3 will cause narcosis. Dermatitis is seen frequently in workers over exposed to this solvent.2

Welding fumes may cause metal fume fever with prolonged exposures. Heavy metal poisoning may also occur depending upon what the welder is welding and the type of welding rod or wire used. Maintaining exposure below 5 mg/M3 will protect most workers from developing medical problems.

Iron oxide is usually the major contaminant of welding fume especially when welding on oxidized iron. Exposure to iron oxide fume will produce metal fume fever. Prolonged exposures may result in a coating of lung interior referred to as Siderosis.

Lead 3,4 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 in most workplaces is 50 ug/M^3 on an eight-hour time-weighted average for daily exposure.4 For this particular industry the current standard is 50 ug/M^3. The new standard also dictates that workers with blood lead levels greater than 60 ug/100g must be removed from further lead exposure if confirmed by a follow-up test and starting from

March 1, 1983, workers with average lead levels of 50 ug/100g or greater must also be removed. Removal is also possible on medical grounds. Removed workers have protection for wage, benefits, and seniority until they can return to lead exposure areas.

Crystalline silica usually referred to as free silica, is defined as silicon dioxide (SiO2) molecules arranged in a fixed pattern as opposed to a nonperiodic, random molecular arrangement defined as amorphous silica. The three most common crystalline forms of free silica encountered in industry are quartz, tridymite, and cristobalite, with quartz being by far the most common of these.

NIOSH, in its recommendations for a free silica standard, has proposed that exposures to all forms of free silica be controlled so that no worker is exposed to respirable airborne concentrations greater than 0.05 mg/M^3, as averaged over a 10 hour working day, 40 hour work week. This recommendation was designed to protect workers from silicosis, a pneumoconiosis due to the inhalation of silicon dioxide-containing dust. Exposures to free silica greater than one-half the recommended standard or "action level" should initiate adherence to the environmental, medical, labeling, recordkeeping, and worker protection guidelines as contained in Chapter I of the NIOSH criteria document, "Occupational Exposure to Crystalline Silica." The current federal or OSHA standard for respirable free silica exposure is an 8 hour time-weighted average based upon the 1968 ACGIH TLV formulas of 10 mg/M^3 divided by the percent SiO2 plus 2 (10mg/M^3/%SiO2+2) for respirable quartz. One-half this amount was extablished as the limit for cristobalite and tridymite. As can be seen from the Calculation, the OSHA regulation is based on the percentage of free silica contained in the respirable particulate exposure, whereas the NIOSH recommended standard applies directly to the airborne concentrations of respirable free silica.

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:

Duration of Exposure (hours/day)	Sound Level, dBA NIOSH	OSHA
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 audio- grams 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.

VI. ENVIRONMENTAL RESULTS AND DISCUSSION

Six Breathing Zone and General Room Air samples were collected for asbestos. All fiber counts were below 4500 fibers per filter or 0.3 fibers per field which is considered the limit of detection. Asbestos exposure was not a health hazard at the time of this survey. Six air samples were collected and analyzed for stoddard solvent. Values ranged from less than 0.1 mg/M^3 to 340 mg/M^3 with average for all six samples of 64 mg/M^3.

The welder was monitored for iron oxide and welding fumes. The iron oxide concentration was 12, 1, and 0.2 mg/M^3. One of the samples exceeded the evaluation criteria of 5 mg/M^3. Lead analyses was performed on mechanics with 3 AA filters. The average concentration was 0.03 mg/M^3, below the OSHA standard of 0.05 mg/M^3. The bulk sample analyzed for Crystalline silica showed that there was no silica present.

Continuous eight-hour noise monitoring on the three workers did show that one worker was over-exposed to noise with an eight-hour average of 94.3 dBA.

VII. CONCLUSIONS

Based on the environmental data, a health hazard did exist to excessive noise exposures and one elevated Iron oxide sample. All the other chemicals measured were well within the most recent evaluation criteria and do not pose a health hazard.

VIII. RECOMMENDATIONS

Adequate hearing protectors should be provided by management which would consist of either earplugs of earmuffs.

IX. REFERENCES

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XI. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standard 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. Drive Train Industries, Inc., Casper, Wyoming
2. Drive Train Industries, Inc., Denver, Colorado
3. U.S. Department of Labor/OSHA - Region VIII.
4. NIOSH - Region VIII.
5. Wyoming Department of Health.
6. State Designated Agency.

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 1

BREATHING ZONE AND GENERAL ROOM
AIR CONCENTRATIONS OF STODDARD SOLVENT

Drive Train Industries, Inc.
Casper, Wyoming
March 22, 1983

Sample #	Location	Job	Sampling Time	mg/M^3 Stoddard Solvent
D-1	All areas	Mechanic	8:15 - 11:55	6
D - 2	Degreaser	Area sample	8:15 - 12:00	23
D - 3	Degreaser	Area sample	8:15 - 12:00	31
D - 1A	All areas	Mechanic	11:55 - 3:50	8
D - 2A	Degreaser	Area sample	12:00 - 4:00	5
D - 3A	Degreaser	Area sample	12:00 - 4:00	22
Evaluation Criteria				350
Laboratory Limit of Detection mg/sample				0.1

TABLE 2

GENERAL ROOM AIR CONCENTRATIONS OF TOTAL
PARTICULATE (WELDING FUME) AND IRON OXIDE

Drive Train Industries, Inc.
Casper, Wyoming

March 22, 1983

Sample #	Location	Sampling Time	Total (welding fume) Particulate	Fe2 03
9317	Welding areas	8:20 - 4:00	1	0.35
9298	Welding areas	8:20 - 4:00	1	0.4
Evaluation Criteria			10	5
Laboratory limit of detection			0.01	0.001

TABLE 3

BREATHING ZONE AND GENERAL ROOM
AIR CONCENTRATIONS OF LEAD AND IRON

Drive Train Industries, Inc.
Casper, Wyoming

March 22, 1983

Sample #	Location	Job	Sampling Time. (hours)	mg/M^3 Lead	mg/M^3 Iron
C - 3	All over	Mechanic	8:04 - 10:20	0.1	12
C - 5	All over	Mechanic	11:20 - 4:00	0.01	1
C - 6	Area	General Room	10:50 - 4:00	0.002	00.2
Evaluation Criteria				.05	5
Laboratory limit of Detection mg/sample				.001	.001

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