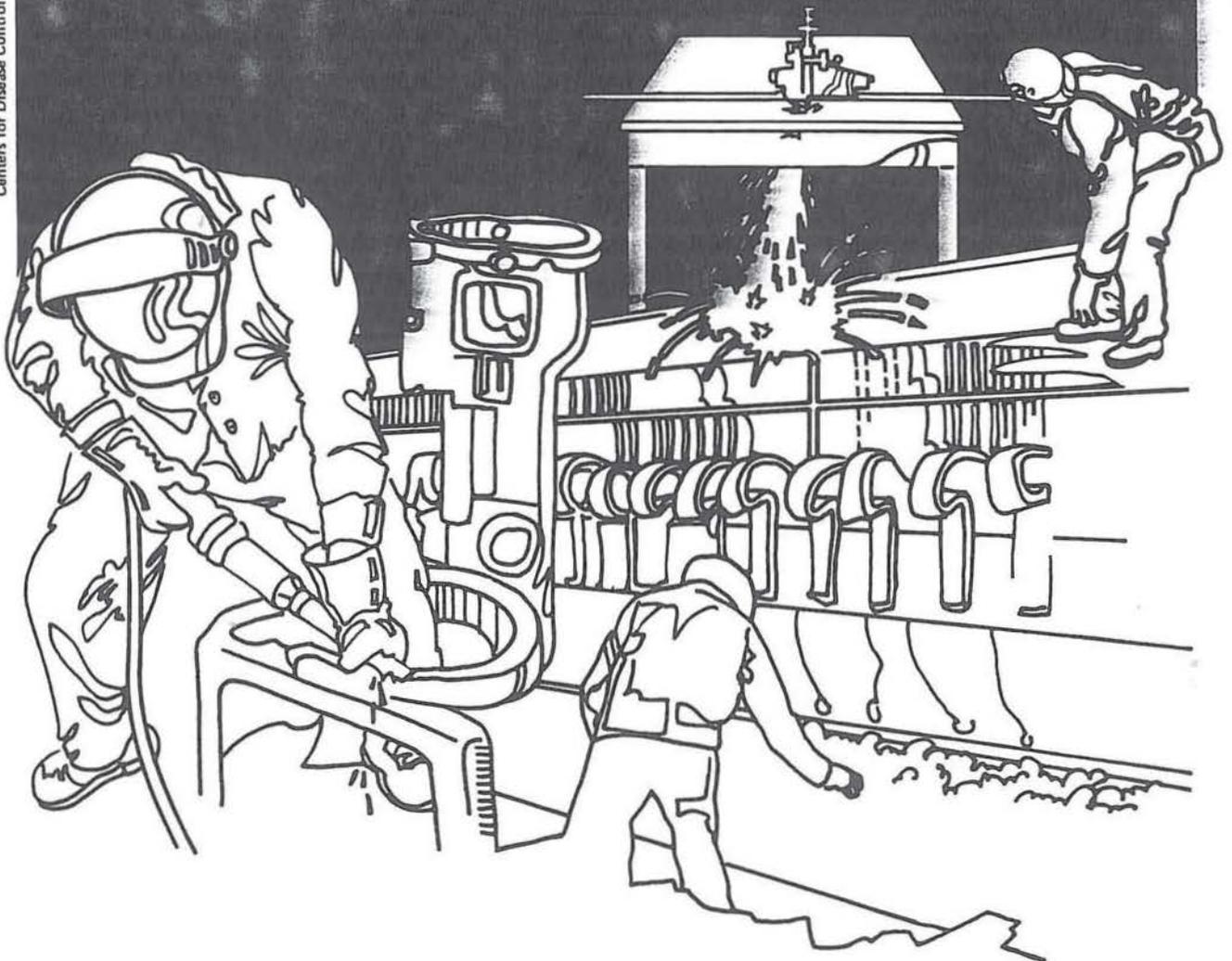


NIOSH



Health Hazard Evaluation Report

HETA 81-149-937
UNITED PARCEL SERVICE
NEWPORT, OREGON

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.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 81-149-937
August 1981
United Parcel Service
Newport, Oregon

NIOSH Investigator:
Arvin G. Apol

I SUMMARY

In January 1981, the National Institute for Occupational Safety and Health (NIOSH) was asked to determine if a hazard of miscarriages and prenatal complications existed for workers at the United Parcel Service (UPS) facility in Newport, Oregon as a result of their exposure to truck exhaust.

On February 10 & 11, 1981, NIOSH conducted an environmental survey at the facility during which time samples were collected for carbon monoxide and lead.

There are 2 clerks who work at this facility. One works from 7:30 AM to 11:30 AM and the other from 4:00 PM to 8:00 PM. Airborne lead samples taken at 3 locations in the facility were all less than the detectable limits of 2 ug/ cu. m. (Oregon State Standard - 50 ug/ cu. m.).

Carbon monoxide (CO) concentrations at 3 sampling locations during the 2 morning shifts sampled were 8-10 ppm and 23-30 ppm. During the evening shift it was 1-2 ppm. (Oregon Standard - 8 hour time weighted-average is 50 ppm; NIOSH recommended standard - 35 ppm with a ceiling of 200 ppm.) After the evening clerk left, the mechanic ran one of the truck engines for 30 minutes while tuning it. During the 4 hour period from 8 PM to midnight, the average carbon monoxide concentration was 30 ppm. This 4 hour period included a thirty minute period when the average CO concentration was 75 ppm.

On the basis of this investigation, NIOSH determined that a hazardous exposure to carbon monoxide and airborne lead present in truck engine exhaust did not exist at the UPS facility. This is based on sample results that showed that airborne lead was not detected and that the average carbon monoxide levels (1 to 30 ppm) were not present in sufficient quantities or duration from the engine exhaust to cause the observed prenatal complications. In addition neither of the affected clerks were smokers. Recommendations to reduce the carbon monoxide concentrations are included in this report.

KEY WORDS: SIC 4212 (Local Trucking Without Storage - Parcel Delivery By Truck) Terminal Facility, Carbon Monoxide, Lead

II INTRODUCTION

In January, 1981 NIOSH received a request to determine if a hazard of miscarriages existed for workers as a result of their exposure to truck exhaust at the United Parcel Service (UPS) facility in Newport, Oregon. NIOSH conducted an environmental survey on February 10 and 11, 1981. An interim report including the environmental results and recommendations was submitted to UPS and the requestor on March 25, 1981.

III BACKGROUND

United Parcel Service performs pick-up and delivery of packages. This facility, a 60 x 80 foot warehouse building, is a distribution center for the Newport, Oregon area. The morning clerk arrives at 7:30 AM. The 6 drivers arrive at 8:00 AM. A semi-trailer is backed up to the building and the packages are unloaded onto a conveyor which passes through the length of the building. Each driver sorts out his packages and loads them into delivery trucks. Four of the trucks are loaded inside the building and two are driven out and are backed up to the side of the building for loading. Between 9:00 AM and 9:30 AM the trucks are driven out of the building to begin the package pick-up and delivery. The clerk leaves about 11:30 AM. The evening clerk arrives at 4:00 PM. The drivers return when their routes are completed which may be from 5:00 to 7:00 PM. They park their trucks outside. A utility man washes the trucks and parks them in the building. The time for this is variable. At 8:00 PM the evening clerk leaves. Some truck maintenance work is performed inside the building. The clerks work at either of 2 counters located on either side of the large vehicle door. Exposure to the truck exhaust occurs when the engines are run inside and continues for a period of time until the carbon monoxide concentrations return close to background levels.

One of the expectant clerks had a miscarriage at 5 months and the second clerk developed prenatal difficulties at 5 months. The concern is whether their exposure to engine exhaust, mainly carbon monoxide and lead, resulted in the prenatal complications.

IV EVALUATION DESIGN AND METHOD

Area air samples were collected for measurement of carbon monoxide and lead which approximated the clerks breathing zone. Carbon monoxide measurements were made using an Ecolyzer connected to a strip chart recorder and long term carbon monoxide detector tubes. The airborne lead samples were collected on 37mm Millipore AA filters at a flow rate of 1.5 lpm and analyzed using atomic absorption techniques.

V EVALUATION CRITERIA

A Environmental

SUBSTANCE	NIOSH	CURRENT
	Recommended Standard 10 HR. TWA*	OSHA & OREGON Standard 8 Hr. TWA
Carbon monoxide	35 ppm 200 ppm (ceiling)	50 ppm
Lead	50 ug/cu. m.	50 ug/cu. m.

*TWA - Time weighted average.

B Toxicity

Lead intake in sufficient quantities by pregnant women may have an adverse effect on the fetus. In the OSHA hearings regarding the proposed standard for Occupational Exposure to Lead, November 21, 1978, "OSHA believes that blood levels in pregnant workers should be kept below 30 ug of lead per 100 ml of blood." Airborne lead exposure less than the detectable limits of 2 ug of lead/cubic meter of air, as found in this survey will maintain blood levels far below 30 ug/ 100 ml.

Carbon monoxide exposure by pregnant women may have an adverse effect on the fetus. It is passed on to the fetus resulting in an increase in the carboxyhemoglobin levels thus reducing oxygen delivery to fetal tissues. L. Longo in his study "Carbon Monoxide Uptake and Elimination in Fetal and Maternal Sheep" states "The present observations suggest that significant increases in maternal and fetal carboxyhemoglobin concentrations, such as in mothers who smoke or who are exposed to excessive air pollution, can significantly reduce oxygen delivery to fetal tissues. A number of epidemiologic studies report that a mother who smokes is nearly twice as likely to deliver a low-birth-weight infant as a nonsmoking mother. The birthweights of infants of mothers who smoke average 150 to 325 g less than paired controls. The incidence of stillbirths and neonatal deaths also increases in these infants, the rates being approximately dose related. The causes of these changes are not known, but probably involve several mechanisms since tobacco smoke contains many chemicals."¹ In this study where pregnant sheep were exposed to carbon monoxide he concluded that, "the findings suggest that the fetus of pregnant women exposed to 30 ppm carbon monoxide in the air for prolonged period or in industrial exposures or excessive air pollution, may be exposed to CO levels that are not innocuous."¹

A person exposed to 50 ppm CO for 8 hours would have a carboxyhemoglobin level of 5.5%. A one-pack-a-day cigarette smoker will have a carboxyhemoglobin level of 5.9%. A smoker who is also exposed to CO in the atmosphere will have a carboxyhemoglobin level in excess of 5.9%. A report of the Surgeon General in "The Health Consequences of Smoking" states in the summary..."there is increasing evidence to support the view that women who smoke during pregnancy have a significantly greater risk of an unsuccessful pregnancy than those who don't."²

VI RESULTS AND DISCUSSION

All the airborne lead concentrations were less than 2 ug/cu m which is far below the standard of 50 ug/cu m. The carbon monoxide (CO) measurements at the clerk's work station are summarized as follows:

<u>Date</u>	<u>Time</u>	<u>Minutes</u>	<u>Carbon Monoxide Concentration</u>
2-10-81	7:55 am - 11:30 am	215	8-10 ppm
2-10-81	4:30 pm - 7:30 pm	180	1-2 ppm
2-10-81	8:00 pm - Midnight	240	30 ppm
	8:10 pm - 9:10 pm	60	71 ppm
	8:20 pm - 8:50 pm	30	75 ppm
2-11-81	7:30 am - 11:30 pm	240	23-30ppm

The carbon monoxide levels vary depending on the amount of time the engines are run in the building. During the morning period on February 10, two trucks were moved outside at 7:50 a.m. From 9:03 to 9:08 a.m. four trucks were started and were driven out of the building. The CO levels peaked at 45 ppm and after 20 minutes had dropped to 14 ppm.

No trucks were run in the building during the evening shift (4:30 - 7:30 p.m.) and the CO levels were 1-2 ppm. The trucks were driven in about 8:15 p.m. after the evening clerk went home. A mechanic then came and worked on one truck. He let the engine run for at least 30 minutes. The CO average concentration from 8:00 p.m. to midnight was 30 ppm; from 8:10 p.m. to 9:10 p.m. it was 71 ppm and from 8:20 - 8:50 p.m. it was 75 ppm. During the February 11 morning shift (7:30 a.m. - 11:30 a.m.) the average CO concentration was 23-30 ppm. From 8:00 a.m. to 8:30 a.m. 2 trucks were moved outside and one was moved to a new position in the building. During this period the CO levels were 43 ppm.

The readings on the strip chart recorder showed that it took about 30 - 45 minutes for the CO concentration to drop 75 %. Because of the slow rate of CO reduction it is important not to run the trucks except to move them in and out and to shut them off if any delay occurs.

Although the CO levels are elevated when trucks are run in the building for a short period of time in the morning and evening, it is estimated that the 8 hour CO average levels would be less than 50 ppm, and probably less than 30 ppm. The more stringent evaluation criteria for CO of 35 ppm and 200 ppm ceiling was not exceeded during the evaluation period.

On the basis of this investigation, NIOSH determined that a hazardous exposure to carbon monoxide and airborne lead present in truck engine exhaust did not exist at the UPS facility. This is based on sample results that showed that airborne lead was not detected and that the average carbon monoxide levels (1 to 30 ppm) were not present in sufficient quantities or duration from the engine exhaust to cause the observed prenatal complication. In addition neither of the affected clerks were smokers.

VII RECOMMENDATIONS

The following recommendations will aid in keeping the CO in the building to the lowest possible level.

1. Do not start the engines until the vehicle is ready to be moved. If a delay occurs, shut off the engine.
2. Do not "warm up" the engine while in the building.
3. Have the night truck washer properly space the trucks at the conveyor so that further movement in the morning is not necessary.
4. Do not bring the trucks into the building until the evening clerk has left.
5. Do not run the engine in the building while performing tuneups etc. If it has to be conducted inside, then a tail pipe exhaust system should be installed. A 4" to 6" diameter hose, tightly fit to the exhaust pipe with an adaptor, can be passed through a hole in the outside wall. In this manner all the exhaust would go directly out of the building.

VIII REFERENCES

1. L. Longo. and E. Hill. "Carbon Monoxide Uptake and Elimination in Fetal and Maternal Sheep." American Journal of Physiology, Vol. 232 1977 H 324-H 330.
2. "The Health Consequences of Smoking." Washington, D.C: U. S. Dept. HEW 1973. DHEW Pub. No. (HSM) 72-7516

IX DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this complete 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 ninety (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. United Parcel Service Newport, Oregon
2. U. S. Department of Labor, Occupational Safety and Health Administration, Region X, Seattle, Washington.
3. Oregon State Accident Prevention Division, Salem, Oregon.

For the purpose of informing the 2 affected employees, the employer shall promptly post this Determination Report in a prominent place(s) near the work area of the affected employees for a period of thirty (30) calendar days.

X ACKNOWLEDGMENTS

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