

oil mist

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

HEALTH HAZARD EVALUATION DETERMINATION
REPORT HE 77-124-479

Interlake Steel, Inc.
Newport, Kentucky

April 1978

I. TOXICITY DETERMINATION

It has been determined on the basis of environmental sampling that the levels of oil mist, welding fumes, mineral spirits, toluene and xylene did not exceed recommended criteria on an 8-hour time-weighted average concentration basis within the worksite area at the time of this evaluation (January 25, 1978). However, results of employee interviews indicated workers are experiencing eye and upper respiratory irritation which they related to the open burning fires used to provide heat. Based on these complaints and on good housekeeping and safety practices, the open fires should be replaced with an appropriate alternative source of heat.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Service, Information 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, Publication Office, at the Cincinnati address. Copies of this report have been sent to:

- a) Interlake Steel, Inc., Newport, Kentucky
- b) Authorized Representative of Employees USW-Local 1870
- c) United Steelworkers of America, Pittsburgh, Pennsylvania
- d) U.S. Department of Labor - Region IV
- e) NIOSH - Region IV

For the purpose of informing the approximately 70 affected employees, the employer shall promptly "post" for a period of 30 calendar days, the Determination Report in a prominent place(s) near where exposed employees work.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669 (a)(6), authorizes the Secretary of Health, Education, and Welfare, following a written request by an 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 National Institute for Occupational Safety and Health (NIOSH), received such a request from an authorized representative of the United Steel Workers, Local 1870, regarding employees exposure to soluble oil.

IV. HEALTH HAZARD EVALUATION

A. Condition of Use

The Health Hazard Evaluation conducted at Interlake Steel was limited to the Pipe Mill. Coils of steel are brought into the Pipe Mill and slit into the appropriate widths. The steel strip then passes through a reforming machine to curve it into a tubular structure and is fed into a continuous automatic welder which joins the two edges to form the pipe. (Local ventilation is present at the welder.) The pipe then proceeds to the cutoff area where the ends of the pipe are removed to produce straight edges or the ends are removed where the weld may be incomplete. (Cutting oil is used throughout the above described operations.) The pipe is then transferred to the blow out area where air pressure (120 psi) is used to remove any cutting oil or scrap from inside the pipe. The pipe is then inspected. The first inspection is a visual inspection. The pipe is then inspected using a hydrostatic tester and then an ultrasonic tester. Adjacent to this area is a repair station where bad sections of the pipe can be cutoff. Once the pipe has passed inspection it is labeled by a stencil method. The pipe then passes through a coating oil to prevent rusting and is loaded for shipment. (The coating oil has a mineral spirit and xylene base.) In addition to the above processes, three overhead cranes operate in the building. One is located above the slitter and welding area, one over the inspection area and one over the coating and loading site. Approximately thirty individuals work in the building per shift.

Throughout the building, during the time of this investigation, drums of coal, coke or wood materials were being burned in order to provide heat in the building. Several workers reported that the fires were being started or periodically renewed using the coating oil resulting in the release of obnoxious fumes into the work area adding to the smoke already being produced by the burning materials.

B. Evaluation Methods

A walk-through survey of the Pipe Mill was conducted on December 7, 1977. Details were obtained on the processes conducted in the building and information was gathered on the substances, such as the soluble oil and coating oil, used in the various operations.

A follow-up survey was conducted on January 25, 1978. Personal breathing zone sample for oil mist were collected using VM-1 filters at a flow rate of 1.5 lpm. Three of the samples collected contained large amounts of particulate matter which can cause difficulty with analysis for oil mist. It was also found, using a bulk sample of the oil, that the oil was insoluble in chloroform, making the analysis for oil mist impossible. As a result, the filters were weighed and the reported results are a combination of oil mist and particulate weight. A personal breathing zone sample for welding fumes was taken on the welder using a VM-1 filter at a flow rate of 1.5 lpm. The filter was weighed to determine total welding fume. The total welding fume concentration was considered to be an adequate evaluation of exposure as no toxic elements were determined to be present in the metal. Therefore, the welding fume was primarily considered to be iron oxide fume and required no analysis for individual constituents. Personal breathing zone charcoal tube samples were collected in the pipe coating area for mineral spirits and toluene, the solvent components of the coating oil. Samples were collected at a flow rate of 50cc/min. and were analyzed by gas chromatographic procedures.

Nondirected medical questionnaires were administered to twelve randomly selected individuals who work in the building to determine if they were experiencing any health problems which they felt were work related.

C. Evaluation Criteria

1. Physiological Effects

Oil Mist: Exposure to oil mists will cause mucous membrane irritation and a chemical pneumonitis from direct contact of the liquid or aerosol with pulmonary tissue. Frequent and prolonged contact with the skin will lead to skin irritation and dermatitis. Due to the low order of toxicity, the standard is recommended as a good industrial practice as well as to prevent the relatively minor changes in the lungs that may occur from exposure.

Welding Fumes: Inhalation of iron oxide fume or dust causes an apparently benign pneumoconiosis termed siderosis. Iron oxide fume does not cause fibrosis in animals' lungs and the same probably applies to humans. Six to ten years of exposure are usually required before x-ray changes occur. The x-ray changes are indistinguishable from other pneumoconioses. Numerous studies of those exposed to welding fumes showed those who had x-ray changes had normal spiograms but lung compliance was reduced and those with the most severe reduction complained of dyspnea.

Toluene: The primary effect of toluene is narcosis. It may produce fatigue, weakness, confusion, lacrimation and paresthesia at lower doses. At higher concentrations euphoria, headache, dizziness, dilated pupils and nausea may occur.

Xylene: Xylene is a primary irritant affecting eyes, mucous membranes and skin. Excessive exposure to high levels can cause pulmonary edema and severe liver dysfunction. Xylene may also cause dizziness, drowsiness and incoordination at high levels.

Mineral Spirits: Effects of single acute exposure to mineral spirits have been reported ranging from headache, nausea, inebriation and stupor to anesthesia and coma. Acute exposures at high concentrations have been known to produce central nervous system depression. Prolonged or repeated exposure has been associated with irritation of the skin and mucous membranes of the respiratory tract and eyes. The TLV for the mineral spirits used is 580 mg/M³.

2. Environmental Standards

To assess the potential toxicity for the concentration of air contaminants found in the place of employment, three primary sources of criteria are used: (1) NIOSH criteria for recommended standards for occupational exposure to substances (Criteria Documents); (2) recommended and proposed threshold limit values (TLV's) and their supporting documentation as set forth by the American Conference of Governmental Industrial Hygienist (ACGIH) (1977); and (3) occupational health standards as promulgated by the U.S. Department of Labor (29 CFR Part 1910.1000).

In the following tabulation of criteria, appropriate values are presented.

<u>Substance</u>	<u>NIOSH Recommended Criteria</u>	<u>ACGIH TLV</u>	<u>OSHA Standard</u>
Oil Mist	-	5 mg/M ³	5 mg/M ³
Welding Fumes	-	5 mg/M ³	
Xylene	100 ppm	100 ppm	100 ppm
Toluene	100 ppm	100 ppm	100 ppm
Mineral Spirits	350 mg/M ³	580 mg/M ³	-

D. Evaluation Results and Discussion

The results of the filter samples collected for oil mist are given in Table I. The concentrations ranged from 0.29 mg/M³ to 1.5 mg/M³. All concentrations are below the recommended level for oil mist of 5 mg/M³. As stated earlier, specific analysis for oil mist was impossible. As a result, the reported values also represent any particulate matter which was present. The TLV for total nuisance dust is 10 mg/M³. Therefore, even when considering both oil mist and nuisance particulate were present, the combined total concentrations are still less than the standards for either of the individual substances, making the separation of the two substances unimportant.

Table I also shows that the welding fume concentration measured on the welder was only 0.76 mg/M³. The standard for welding fumes is 5 mg/M³. The 0.76 mg/M³ level is also below the TLV for iron oxide fume which is also 5 mg/M³.

The results of the environmental samples collected for the coating oil are given in Table II. Results are given for mineral spirits and toluene, the solvents reported to be present in the oil. Xylene was also indentified and run as an additional analysis. The reported concentrations for mineral spirits, xylene and toluene were all below their respective recommended criteria or standards.

Of the twelve employees interviewed, four reported no work related health problems. Six employees reported eye and upper respiratory irritation which they related to the open burning fires used for heat. Two employees reported complaints that they related to the coating oil. One employee reported experiencing dizziness and the other, a dry throat. Based on the employee complaints and good housekeeping and safety practices, the use of open fires should be discontinued and replaced with appropriate alternative source of heat.

V. AUTHORSHIP AND ACKNOWLEDGEMENTS

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Table I

Interlake Steel, Inc.
Newport, Kentucky

January 25, 1978

Oil Mist

<u>Sample Location</u>	<u>Sample Number</u>	<u>Sampling Period</u>	<u>Sample Volume</u> (liters)	<u>Oil Mist</u> (mg/M ³)
Welder	V 4484	8:10 - 15:03	619	0.63
Cutoff Operator	V 4447	8:14 - 15:05	616	1.50
Blow-Out Operator	V 4452	8:16 - 15:05	613	0.29
Crane 26 Operator	V 4464	8:25 - 15:00	592	0.52
Crane 19 Operator	V 4448	8:31 - 15:01	585	0.50

Welding Fume

<u>Sample Location</u>	<u>Sample Number</u>	<u>Sampling Period</u>	<u>Sample Volume</u> (liters)	<u>Welding Fume</u> (mg/M ³)
Welder	V 4466	8:10 - 15:03	619	0.76

Table II

Interlake Steel, Inc.
Newport, Kentucky

January 25, 1978

<u>Sample Location</u>	<u>Sample Number</u>	<u>Sampling Period</u>	<u>Sample Volume</u> (liters)	<u>Toluene</u> (ppm)	<u>M-Xylene</u> (ppm)	<u>Mineral Spirits</u> (mg/M ³)
Crane 20 Operator	CT-1	9:45 - 15:05	15.9	N.D.*	0.1	1.9
Pipe Loader A	CT-2	9:47 - 15:05	12.5	3.0	30	79
Pipe Loader B	CT-3	9:50 - 15:05	5.1	N.D.	2.3	11
Ultrasonic Operator	CT-4	9:55 - 15:04	10.9	2.5	18	60
Pipe Inspector	CT-5	9:57 - 15:03	12.5	3.0	23	67

*N.D. - Not-detected