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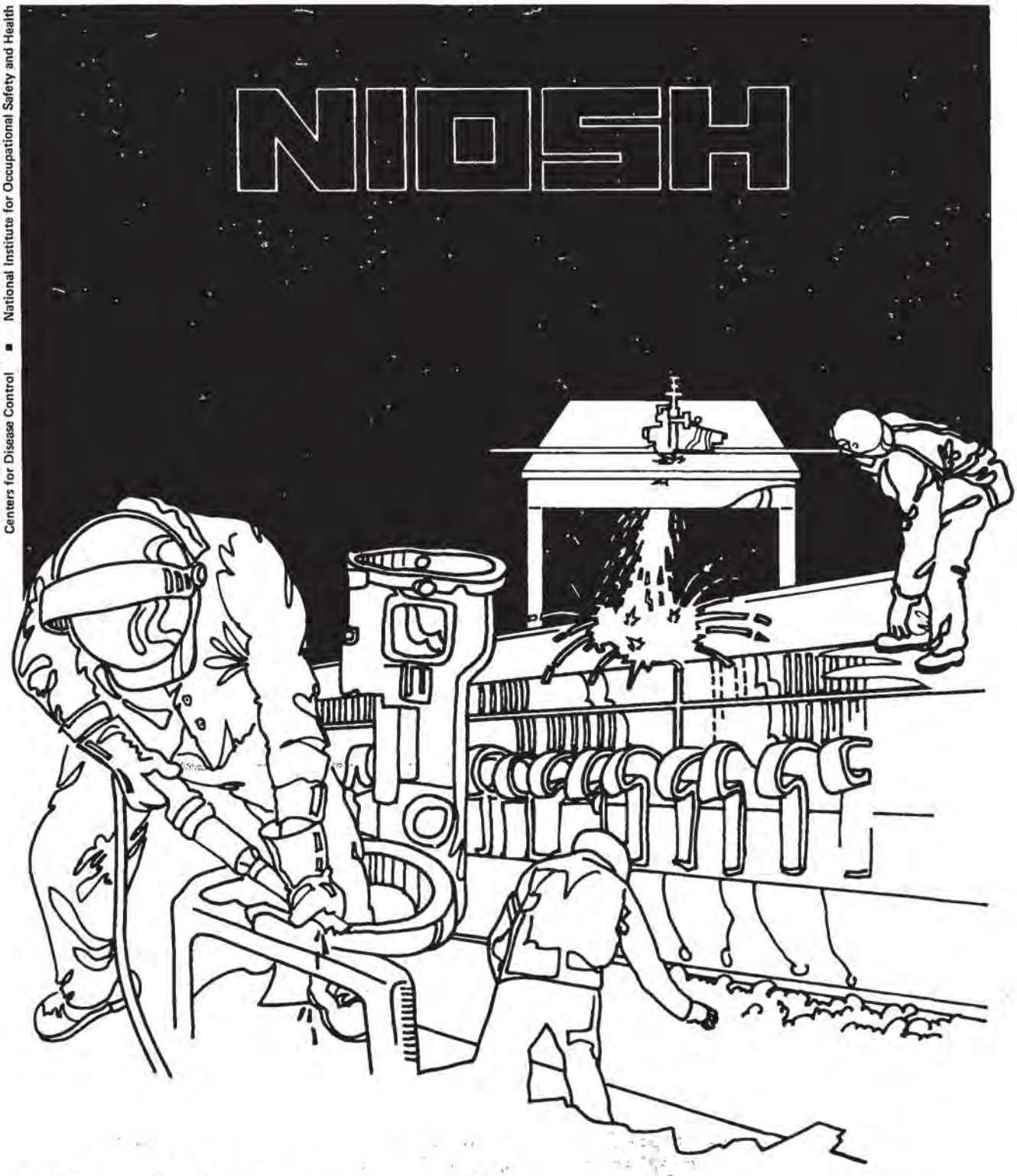

Health Hazard Evaluation Report

HETA 81-185-1007
INRYCO, INCORPORATED
MELROSE PARK, ILLINOIS

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 81-185-1007
November 1981
Inryco, Incorporated
Melrose Park, Illinois

NIOSH INVESTIGATORS:
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I. Summary

On February 9, 1981, the National Institute for Occupational Safety and Health (NIOSH) received a request from an authorized representative of employees, for a health hazard evaluation at Inryco, Incorporated, Melrose Park, Illinois. The requestor was concerned with employee exposures to particulates and vapors from the abrasive blasting and spray painting of fabricated structural steel. The request noted employee complaints of chest pains, mucous membrane irritation, and other respiratory problems believed to be work related. A total of nineteen (19) employees were working in the areas at the time of this study.

NIOSH investigators conducted an initial survey in March 1981, consisting of an opening conference and a walk-through survey of the shot blasting and spray painting areas. A medical survey was conducted in April 1981 during which confidential interviews were administered to nineteen employees. In addition, company medical records and environmental data collected by the Occupational Safety and Health Administration (OSHA) were obtained and reviewed.

Environmental data collected by OSHA indicated that all spray painters were potentially exposed to lead above the OSHA Permissible Exposure Limit (PEL) of 0.05 milligrams per cubic meter (mg/M^3). Eight hour time weighted average airborne concentrations of inorganic lead collected on workers ranged from 0.12 mg/M^3 to 0.34 mg/M^3 with an mean of 0.18 mg/M^3. However, OSHA has determined that Inryco has met the PEL by maintaining an effective respirator program and conducting quarterly air sampling and semi-annual biological monitoring. A review of company medical records subsequent to the OSHA investigation did not indicate elevated blood lead levels.

On the basis of environmental data obtained from OSHA, company medical records of semi-annual blood lead levels, a NIOSH walk through survey, confidential employee interviews and review of the company respirator program, it has been concluded that no health hazard existed from exposure to lead or total particulates during the spray painting and abrasive blasting of fabricated structural steel, at the time of this study.

KEYWORDS: SIC 3441 (Fabricated Structural Steel), abrasive blasting, inorganic lead, lead chromate

II. INTRODUCTION

On February 9, 1981 an authorized employee representative submitted a health hazard evaluation request concerning possible respiratory hazards faced by workers in the spray painting area and the two shot blasting areas at Inryco, Incorporated in Melrose Park, Illinois. The request reported that some of the employees were experiencing chest pains, mucous membrane irritation and other respiratory problems believed to be work related.

NIOSH investigators responded to the request by conducting an initial survey of the plant on March 27, 1981. An opening conference was held followed by a walk-through survey of the spray painting department and the two shot blasting areas (which will be referred to as the large and small shot blasts). Additionally, a medical survey was conducted on April 24, 1981 during which confidential interviews were administered to nineteen (19) employees.

III. BACKGROUND

A. Plant Production and Workforce

The plant covers an area of 428,923 square feet, and has been engaged in heavy structural steel fabrication since 1962. At the time of this study the plant was operating two 8 hour shifts per day, 5 days per week and employed 189 production, 20 maintenance and 83 administrative personnel.

B. Process Description and Employee Duties

The plant is engaged in the fabrication of structural steel for the heavy construction industry. The steel is cleaned of rust and scale by abrasive blasting in an enclosed and ventilated shot blasting operation. This is followed by spray painting of the cleaned steel which takes place in a large indoor bay.

Two employees are required at each of the shot blast units. The two units use the same abrasive and differ only in size and the method employed in transporting the steel through the shot blast. As the steel enters the shot blast, a ferrous alloy shot (Trade name GP-25 Steel Blast Grit) is blasted at the steel under high pressure. A potential health hazard exists from the dusts generated by the abrasive and the materials removed from the surface being cleaned.

Steel requiring additional treatment is moved to the spray painting area and chemically coated by conventional compressed air techniques. The spray paint nozzle is connected via tubing to a pressurized 55 gallon paint drum. A cleaning solvent 1962X (a mixture of isobutyl alcohol, toluene, and an aliphatic hydrocarbon) is kept in a small open can next to the drum and the spray nozzle is placed in this solution when not in use. At the time of the initial survey five employees per shift were classified as spray painters.

INRYCO uses two paints to coat the finished product, a primer (Trade Name: Phenolic Primer) and a alkyd red lead primer (Trade Name: Prime Rite 501). The primer contains 8.8% basic lead silico chromate and the alkyd red lead primer contains 38.7% red lead (97%-Pb_3O_4 and 3% PbO).

C. Engineering, Administrative, and Personal Protective Controls

The shot blasts are completely enclosed and the entrance and exits are baffled with a flexible material to prevent the escape of dusts into the general workroom air. Each unit is individually vented and pass through dust collectors before being discharged to the outside air.

All employees in the spray painting and shot blasting areas are required to wear safety glasses, hard hats, and safety boots with metatarsal guards. Additionally, spray painters are required to wear half mask, NIOSH/MSHA approved paint spray respirators with organic vapor cartridges and two removable prefilters, and are provided with clothes to wear while on the job. Respirators are also made available to other employees upon request.

IV. MATERIALS AND METHODS

During the opening conference detailed discussions focused on process description, engineering controls, health surveillance monitoring, personal protective equipment, work practices, and environmental monitoring for the areas in question. In addition, NIOSH investigators observed work practices and conditions and interviewed all 19 employees working in the areas of the request.

Company medical records of biological monitoring of blood lead levels were obtained from management, and personal air monitoring data gathered by OSHA were obtained and reviewed. NIOSH investigators were unable to conduct an environmental evaluation due to time restrictions brought about by recent employee strikes and the announced closing of the plant.

V. EVALUATION CRITERIA

A. Abrasive Blasting

When abrasive blasting is conducted inside an enclosure, as is the case at Inryco, it shall be exhaust ventilated so there is a continuous inward flow of air through the opening during blasting. All air inlets shall be baffled or located so the escape of abrasives and dust is minimized and there are no visible spurts of dusts. And the ventilation system must clear the enclosure of dust promptly after blasting ceases.[1]

B. Inorganic Lead

The current OSHA standard states that, the employer shall assure that no employee is exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 ug/M^3) averaged over an 8-hour period.[2] It is believed that concentrations below this limit represents conditions under which workers may be repeatedly exposed 8 hours per day, 40 hours per week, without suffering serious adverse health effects. Due to variations in individual susceptibility, some workers may experience effects at levels at or below the threshold limit.

Inhalation of lead dust and fumes is the major route of lead exposure in industry. A secondary source of exposure may be from ingestion of 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 micrograms per 100 milliliters 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/100 milliliters. Lead levels between 40-60 ug/100 ml in lead exposed workers indicate excessive absorption of lead and may result in some adverse health effects. Levels of 60 to 100 ug/100 ml represent unacceptable elevations which may cause serious adverse health effects. Levels over 100 ug/100 ml are considered acutely hazardous and often require hospitalization.

The employer shall remove an employee from work having an exposure to lead on each occasion that a periodic and a follow-up blood sampling test indicates that the employee's blood lead level is at or above 60 ug/100 ml of whole blood. The employer shall return an employee to his or her former job status when two consecutive blood samples indicate that the employee's blood lead level is at or below 40 ug/100 milliliters of whole blood.

C. Lead Chromate

There are 2 recommended standards for chromium (VI). One for carcinogenic chromium (VI) which pertains to occupations and workplaces where there is exposure to chromium (VI) materials associated with an increased incidence of lung cancer. NIOSH recommends that the permissible exposure limit for carcinogenic chromium (VI) compounds be reduced to 0.001 mg/M^3 and that these compounds be regulated as occupational carcinogens. Certain other forms of chromium (VI) are currently believed to be non-carcinogenic: They are the monochromates and bichromates (dichromates) of hydrogen, lithium, sodium, potassium, rubidium, cesium, and ammonium, and chromium (VI) oxide (chromium acid anhydride). The chromium (VI) oxide contained in the primer (Trade Name: Phenolic Primer) used at Inryco falls into this category and is thus considered to be non-carcinogenic. NIOSH recommmends that the permissible exposure limit for non-carcinogenic chromium be reduced to 0.025 Cr (VI) mg/M^3 averaged over a work shift of up to 10 hours per day, 40 hours per week, with a ceiling level of 0.05 Cr (VI) mg/M^3 averaged over a 15-minute period.[3]

D. Total Particulate

The dust generated from the use of the ferrous alloy shot (Trade Name: GP-25 Steel Blast Grit) is considered a nuisance dust. Excessive concentrations of nuisance dusts in the workroom air may seriously reduce visibility, may cause unpleasant deposits in the eyes, ears and nasal passages, or cause injury to the skin or mucous membranes by chemical or mechanical action per se or by the rigorous skin cleansing procedures necessary for their removal. A theshold limit of 10 mg/M^3, or 30 mppcf, of total dust less than 1% quartz, or, 5 mg/M^3 respirable dust is recommended for substances in these categories and for which no specific theshold limits have been assigned.[4] The current OSHA standard for exposure to nuisance dusts is 15 mg/M^3 total dust and 5 mg/M^3 respirable dust.

IV. RESULTS

A. Environmental

Review of the OSHA environmental data showed eight-hour time weighted average values for personal exposures to lead ranging from 0.12 mg/M^3 to 0.34 mg/M^3 with a mean of 0.18 mg/M^3. These results (see Table I) indicate that all spray painters were exposed to lead above the Permissible Exposure Limit (PEL) of 0.05 milligrams per cubic meter (mg/M^3).

A letter the Area Director of the OSHA, Niles office, to the requestor of an OSHA inspection, stated that due to a recent Appellate Court decision regarding portions of the lead standard, companies using spray painting operations which contain lead may meet the PEL of 0.05 mg/M^3 by some combination of engineering controls, work practices and respirator controls. Inryco has accomplished this by maintaining an effective respiratory protection program and doing prescribed air sampling quarterly and biological monitoring semi-annually.

B. Medical

Questionnaires were administered to the nineteen employees in the two shot blast and spray painting areas of the plant. The questionnaire solicited information concerning the employee's occupational, smoking and alcohol, and past medical history. Specific question related to syptomatology of lead exposure and respiratory disorders.

Nine of the nineteen employees indicated some mild problem with shortness of breath and four noted morning cough and phlegm production. Eight of the nine employees with complaints of mild shortness of breath were cigarette smokers and three of the four employees with phlegm production were smokers. One employee with morning cough and phlegm production had been employed in other areas of the plant until approximately 3 weeks before the survey.(Table II)

These findings are consistent with the prevalence of morning cough with sputum production and grade one shortness (shortness of breath due to moderate activities) of breath in the general smoking and non-smoking population do not indicate an increased risk for this population.[5]

None of the employees indicated symptoms associated with lead intoxication. Employee blood lead levels were evaluated for spray painters twice prior to the NIOSH investigation. Additional blood lead levels were obtained on four employees with levels above 40 micrograms per deciliter (mcg/dl). According to company records these levels were assessed by three different laboratories. (See Table III)

On November 8, 1980, 5 employees had blood lead levels between 40 and 60 mcg/dl indicating increased environmental exposure. The repeat samples drawn on four of these employees on December 17, 1980 were all below 40 mcg/dl.

VII. DISCUSSION

At the time of the initial survey the large shot blast was being repaired. The employee representative indicated that there had been a number of instances during which the large shot blast malfunctioned and dusts had been

introduced into the general workroom air. However, he stated that when the large shot blast was functioning properly there was no problem with leakage of dust.

There would appear to be no significant respiratory hazard to employees working in the shot blast area. No significant symptomatology could be associated with the shot blast area in this study. All shortness of breath and cough could most certainly be accounted for by the prevalence of cigarette smoking in this population.

A company study indicates that the spray painters spend an average of three and one-half hours per day involved in actual spray painting. On the basis of data collected from employee interviews it would appear that exposure to lead from the spray painting operation would not pose a significant hazard in this plant. A few spray painters did show an increased transient lead absorption which was unassociated with symptoms. A retest one month later showed that the levels had been reduced to an acceptable level.

Data collected indicates that spray painters are potentially exposed to ambient air concentrations of lead above the OSHA PEL. However, as stated earlier in this report, OSHA has ruled that Inryco has met the PEL by maintaining an effective respirator program and conducting quarterly air sampling and semi-annual biological monitoring.

NIOSH recommends engineering controls as the primary source of employee protection. Respirators should be used only during that period which engineering controls are being installed or tested, when non-routine maintenance or repair is being accomplished, or in emergencies. However, due to the sporadic nature of the operation, the size and variablity of the items to be painted, and the intended closure of the plant, no recommendations for engineering controls are made in this report.

VIII. RECOMMENDATIONS

1. Employees with elevated lead levels should get an additional ZPP and blood lead drawn.

2. Blood lead level surveillance should be continued every 6 months, including ZPP, and 24 hour urinary creatinine clearance.

3. The solvents used in the cleaning of the paint spray nozzle should be kept in a closed container to prevent the evaporation of vapors into the general workroom air to minimize employee exposures and avoid possible fire explosion hazards.

IX. REFERENCES

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2. Code of Federal Regulations, Title 29, Parts 1900-1910, July 1, 1980.

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4. Theshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1980, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio (1981).

5. The Health Consequences of Smoking, A Report to the Surgeon General:1971, DHEW Publication No. (HSM) 71-7513, U.S. Government Printing Office, Washington, D.C. P. 195-205.

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XI. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination 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 Services (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 the following:

A. United Steel Workers Union, Local No. 7771

B. Inryco, Inc.

C. U.S. Department of Labor, OSHA - Region V

D. NIOSH Regional Offices/Divisions

For the purposes of informing the affected employees, copies of the report should be posted in a prominent place accessible to the employees, for a period of 30 calendar days.

TABLE I

OSHA ENVIRONMENTAL DATA OF SEPTEMBER 1980

Worker	Airborne Concentrations of Lead 8 Hour - T.W.A.
South Z Span Painter #1	0.13 mg/M^3
" " " " #2	0.34 mg/M^3
" " " " #3	0.13 mg/M^3
" " " " #4	0.12 mg/M^3
South Y Span Painter #1	0.14 mg/M^3
" " " " #2	0.20 mg/M^3

TABLE II

SYMPTOMS REPORTED BY WORKERS

	Smokers	Non Smokers	All
Grade 1 Shortness of Breath	8	1	9
Morning Cough and Sputum	3	1*	4
Total Employees	15	4	19

*only worked in area 3 weeks.

TABLE III

INRYCO, INCORPORATED, MELROSE PARK, ILLINOIS
LEAD PROGRAM
MONITORING RESULTS - 1980

BLOOD TESTS

	5/7	11/8	12/17 - Retest	
# 1	26	42	34 - 37	Paint Leader
# 2	9	56*	24 - 27	Spray Painter
# 3		16		Spray Painter
# 4		26		Alligator Shear Opr.
# 5	22	34		Spray Painter
# 6		30		Spray Painter
# 7	30	45	29 - 31	Spray Painter
# 8	17	37		**Hooker
# 9	6			Supervisor
#10		38		Loader
#11	10	19		Spray Painter
#12		15		Spray Painter
#13	30			Spray Painter
#14		13		Crane Operator
#15		19		Spray Painter
#16		18		Alligator Shear Opr.
#17	27	43		Spray Painter
#18	11			Dip Tank
#19	24	42	33 - 38	Loader
#20	16	28		Hooker
#21		20		Spray Painter
#22		20		Spray Painter

Laboratory	No. 1	No. 2	No. 3

*49PbP - Alexian Bros. Hospital
56PbP Drawn 11/17/80

**Formerly Spray Painter

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