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U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 75-8-263

HEDSTROM UNION COMPANY
BEDFORD, PENNSYLVANIA

FEBRUARY 1976

I. TOXICITY DETERMINATION

It has been determined that exposure of pressmen, die setters, utility men, welders, platers, painters and maintenance men to heavy metals (arsenic, lead, mercury and bismuth) was not toxic at the concentrations measured during the NIOSH evaluation. This determination is based on: 1) environmental air samples, 2) surface wipe samples, 3) review of biological samples of one affected employee's hair and urine and 4) a review of available literature concerning the toxicity of the substance under consideration.

While it has been determined that the work place exposure is not toxic, localized pigmentation of one employee's skin was observed. No judgement has been made as to the cause of this pigmentation, however, it does not appear to be related to arsenic exposure at the work place. A potential problem at the work place was noted in conjunction with eating habits of some workers and the composition of the paint used on heavy equipment throughout the plant.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this hazard evaluation determination are available upon request from the Hazard Evaluation Services Branch, NIOSH, U. S. Post Office Building, Room 508, 5th and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

a) Hedstrom Union Company, Bedford, Pennsylvania
b) U. S. Department of Labor
c) Authorized Representative of Employees

For the purpose of informing approximately 19 "affected employees," the employer shall promptly "post" the Determination Report in a prominent place(s) near where exposed employees work for a period of 30 calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U. S. Code 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 Naticnal Institute for Occupational Safety and Health received such a request from the employees of Hedstrom Union Company to evaluate exposure to arsenic dust throughout the plant after one employee was treated for arsenic poisoning.

IV. HEALTH HAZARD EVALUATION

a) Plant Process

Hedstrom Union Company is primarily engaged in the manufacture of juvenile toys and wheel goods. Sheet steel is received, cut and stamped into component toy parts. Fabrication operations then include:welding and surface coating (plating and painting) prior to assembly.

b) Evaluation Design

During the initial survey no source of heavy metal exposure was noted either in the affected employee's home or the plant work environment. To determine qualitatively the presence of heavy metals in the work environment, surface contamination samples were collected (wipe samples). Samples were analyzed for arsenic, lead, mercury and bismuth. When detectable amounts of heavy metals were found (see Table I) at various locations in the plant, a revisit was made to collect environmental air samples. Air samples were collected at two locations outside the plant and compared to samples collected at two locations inside the plant. Additional wipe samples and chips of paint used on most equipment were collected for analysis.

c) Evaluation Methods

Wipe samples were collected at various operations throughout the plant by passing a nine centimeter Whatman 40 filter over approximately one-half square foot area. Filters were placed in waxpaper bags prior to shipment to NIOSH laboratories for analysis.

Operators' exposures were evaluated by collecting air samples on 0.8 micron pore size cellulose membranes using MSA Model G battery powered vacuum pumps operating at 1.7 liters per minute. General air samples were collected inside the plant on 0.8 micron pore size cellulose membranes using a Gast Dorr Type S or Millipore Vacuum-Pressure pump operating at 9.0 liters per minute. General air samples were collected outside the plant on Gelman eight by ten inch Type A glass fiber filters using a General Metal Works high volume sampler operating at 50 cubic feet per minute. Samples subsequently were analyzed by atomic absorption for arsenic[1], lead[2], mercury[3] and bismuth[2]. The analytical sensitivity of the methods used varied depending on the amount of sample used.

The report range for each material is:

Arsenic	0.05	to 20	micrograms per sample
Lead	0.4	to 15.0	micrograms per sample
Mercury	0.001	to 2.5	micrograms per sample
Bismuth	5.7	to 21.0	micrograms per sample

d) Evaluation Criteria

The primary sources of environmental criteria considered in this report are: 1) NIOSH Criteria Documents recommending occupational health standards and 2) U. S. Department of Labor/OSHA occupational health standards.

Substance	8 Hour Time-Weighted Average Exposure Standard mg/m^3 (a)	ug/M^3
Arsenic (b)	0.5	500
Lead (c)	0.1	100
Mercury (d)	0.1	100
Bismuth (inert or nuisance) (e)	15.0	

a) denotes milligrams of substance per cubic meter of air. ug/M^3, micrograms per cubic meter (milligram = 1000 micrograms)
b) NIOSH in its 1975 Criteria for a Recommended Standard - Occupational Exposure to Inorganic Arsenic.
c) OSHA in its proposed Occupational Exposure Standard (Federal Register, October 3, 1975, Volume 40, No. 193).
d) NIOSH in its Criteria for a Recommended Standard - Occupational Exposure to Inorganic Mercury.
e) OSHA in its Occupational Exposure Standards (Federal Register, June 27, 1974, Volume 39, No. 125, Title 29, Chapter XVII, Part 1910, Subpart G, Table G-3).

No standards have been established for environmental surface contamination relevant to this evaluation or for lead paint content. Thus, the information obtained from wipe samples can only be used to indicate the presence or absence of a contaminant in the work environment. Federal Law[4] does, however, define a lead paint as any paint containing more than five-tenths of one percent lead by weight in the total non-volatile content of liquid paints or in the dried films of paint already applied. The term "lead paint," as defined, refers to a residential application and is used in this evaluation only as a reference in comparing paint chips collected from equipment in the press department.

e) Evaluation Results

Forty-four surface wipe samples ranged from less than 0.11 to 2.85 micrograms (ugs) arsenic per sample; less than 2.25 to 82.3 ugs lead per sample; less than 0.10 to 3.25 ugs mercury per sample; and

less than 5.7 to 21.0 ugs bismuth per sample. From this data, it can only be concluded that levels of heavy metals could be detected in the work environment.

General air samples collected at locations in the production shop ranged from less than 0.1 to 0.13 ug/m^3 for arsenic, less than 1.1 to less than 3.3 ug/m^3 for lead; less than 0.05 to 0.1 ug/m^3 mercury; and 5.1 to 10.2 ug/m^3 for bismuth. After reviewing the results obtained from the high volume genral air samples, the decision was made not to analyze corresponding personal air samples. This decision was made based on the very low results obtained (generally less than the limit of detection) from the high volume samples and the expectation that the weights found for analytical purposes on the personal air samples would be less than the weights found on the high volume samples.

High volume samples collected at locations outside the plant were all found to contain 0.7 ug/m^3 or less for lead; less than 0.25 ug/m^3 for bismuth; while results for arsenic and mercury were all less than 0.1 ug/m^3.

Paint chips collected at various locations around the plant were all found to be less than 0.75% arsenic; less than 0.6% lead; less than 0.05% mercury; and less than 0.25% bismuth.

No attempt was made to distinguish paint from surface contamination since once in the atmosphere they would act together.

f) Discussion of Results and Conclusion

Detectable level of four heavy metals were found in the work environment when wipe samples were collected. Air samples indicated that air concentrations were well within present standards. When results from general air samples are compared to results of samples collected using high volume samples positioned outside the plant and in a nearby town, no significant difference is noted. From this information, it is concluded that levels of heavy metals found generally represent a background level that could be expected throughout this geographic area.

The localized abnormal coloration noted on one employee's arms and neck differs from the classic pigmentation associated with arsenic poisoning which is normally uniform while covering the entire body. The elevated urinary level noted could have been the result of a shrimp dinner while subsequent levels were lower and consistent with dietary intake.

Although no paint tested was definitely found to contain more than 0.5% residential lead limit, one sample was noted as having less

than 0.6% lead. Thus, this sample could contain as much as 0.5% lead and be classified according to P.L. as ä "lead paint." Because this act refers to residential conditions no recommendations regarding removal or covering of paint will be made. However, under normal production conditions, paint can be expected to be chipped and worn off with time producing a potential source of lead and heavy metal exposure. To minimize this exposure, efforts should be made to require workers to eat lunches in the designated areas provided rather than at the work station as was the practice of some employees at the time of this evaluation.

V. REFERENCES

1. Physical and Chemical Analytical Method #139, NIOSH.

2. ibid; #173.

3. ibid; #175

4. Public Law 910695, January 31, 1971, "Lead-Based Paint Poisoning Prevention Act as Ammended by P.L. 93-151, November 9, 1973.

VI. AUTHORSHIP AND ACKNOWLEDGEMENTS

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Table 1
Surface Wipe Samples
Hedstrom Union Company
Bedford, Pennsylvania
HHE 75-8

Sample Number	Location	As	Pb	Hg	Bi	Remarks
		(ug each element/sample)				
W-1-2*	Lunch Room	<0.11	<3.35	<0.10	9.4	Hands before collection of samples
W-2-2		0.13	<2.25	<0.10	6.7	Lunch room table
W-21-2		0.13	<2.37	<0.12	11.9	Hand after collection of samples
W-1-1	Press Shop	1.44	75.3	3.25	<10	Press 258, Die Surface
W-2-1**		<0.50	14.3	<0.15	<10	Press 116, drive motor platform
W-4-1		<0.50	<5.0	<0.15	<10	Press 116, oil tray
W-5-1		2.85	81.5	<0.15	15	Press 115, roll feed
W-6-1		0.50	<5.0	<0.15	<10	Press room, time clock
W-15-2			17.7		<7.5	Press 251, storage area
W-16-2			75.4		<7.5	Press 53, control box
W-17-2			48.1		<7.5	Press 252, frame
W-18-2		0.90		<0.12		Press 114, storage area
W-19-2		0.69		<0.13		Drawing Machine
W-20-2		0.70		<0.15		Press 117, motor mounts
W-7-1	Deburring	1.05	11.8	<0.15	<10	Top of deburring supply hopper
W-7-2		0.34		<0.12		Plasticon hopper
W-8-2		0.17		<0.15		Almco control panel
W-9-2		0.15		<0.14		Almco pump housing
W-10-2			7.22		<5.7	Control panel
W-11-2			2.36		<7.5	Deburring feed belt
W-12-1	Welding	1.52	5.4	<0.15	21	Welding booth "D"
W-13-1		1.57	7.0	2.75	<10	Welding booth, middle along aisle
W-12-2			13.3		<6.3	Welding booth "D"
W-13-2		0.10		<0.15		Welding booth, middle along aisle
W-14-2		0.17		<0.16		Welding continuous feed equipment
W-8-1	Maintenance	0.50	29.0	<0.15		Welding booth, middle along aisle
W-9-1		0.50	32.3	<0.15	<10	Charging room atop charger
W-3-2		0.12		0.11		Heating grate
W-4-2		0.19		<0.15		Furnace hood
W-5-2			21.8		<7.4	Storage cabinet
W-6-2			22.1		8.7	Doall band filer

Table 1 (Cont.)
Surface Wipe Samples
Hedstrom Union Company
Bedford, Pennsylvania
HHE 75-8

Sample Number	Location	As	Pb	Hg	Bi	Remarks
		ug each element/sample				
W-14-1	Press Room	1.0	5.0	<0.15	<10	Sheet Stock, U.S. Steel
W-15-1	Storage	1.31	49	<0.15	<10	Sheet Stock, National Steel
W-16-1		1.16	30.1	<0.15	<10	Sheet Stock # 2 roll, edge comb
W-17-1		1.47	82.3	.88	20	Sheet Stock #9 roll, edge comb
W-18-1		0.55	<5.0	<0.15	<10	Sheet stock, Bethlehem
W-19-1		1.29	35.5	<0.15	<10	Sheet stock, Precision Steel
W-20-1		<0.50	<5.0	<0.15	<10	Sheet stock, Pitts-Wheeling
W-10-1	Plating	<0.50	49.5	<0.15	<10	Oxyvat acid salt tank, ground bar
W-11-1	Dept. 32	<0.50	<5.0	<0.15	<10	Tire room, spray booth
W-21-1		<0.50	<5.0	<0.15	<10	Blank
W-22-1		<0.50	<5.0	<0.15	<10	Blank
W-22-2		<0.17	2.0	<0.10	10.2	Blank
W-23-2		<0.16	<3.15	<0.10	8.8	Blank

*All samples ending with -2 were collected on 4/22/75.
**All samples ending with -1 were collected on 9/4/75

Table 2
Hedstrom Union Company
Bedford, Pennsylvania
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Section A
Outside Ambient Air Concentrations

Sample Number	As[a] ug/m^3	Pb ug/m^3	Hg ug/m^3	Bi ug/m^3	Location/Remarks
H-1	<.01[b]	<.07	<.01	<.2	Bedford Holiday Inn
H-2	<.01	<.05	<.01	<.25	Outside Personnel Office of Hedstrom Union Company

Section B
Environmental Air Concentrations

Sample Number	As[c] ug/m^3	Pb[d] ug/m^3	Hg[e] ug/m^3	Bi[f] ug/m^3	Location/Remarks
M-1	<0.1	<1.8	<0.1	6.0	Press shop, General air
M-2	<0.1	<1.9	<0.06	5.6	Press shop, General air
M-3	<0.1	<3.3	<0.09	10.2	Deburring operations, General air
M-4	.13	<1.1	<0.05	5.1	Deburring operations, General air

Section C
Paint Scrapings Composition (%)[g]

Sample Number	As %	Pb %	Hg %	Bi %	Location/Remarks
C-1	<.003	<.4	<.02	<.075	Press 115 feed, green paint
C-2	<.002	<.3	<.02	<.075	Press 115 feed, orange paint
C-3	<.075	<.6	<.05	<.25	Press 252, orange paint
C-4	<.01	<.3	<.01	<.025	Press 252, green paint

a) ug/m^3 denotes micorgrams of elements per cubic meter of air
b) < denotes less than
c) Threshold Limit Value, based on a time weighted average for an 8 hour working day 2.0 micrograms per cubic meter of air.
d) Threshold Limit Value-- 8 hour working day 0.1 milligrams per cubic meter of air
e) Threshold Limit Value-- 8 hour working day 0.05 milligrams per cubic meter of air
f) Threshold limit value-- 8 hour working day 10 milligrams per cubic meter of air
g) % denotes percentage, micrograms element per milligram of sample