

Memorandum on the occurrence of lead poisoning among employees of the Magnus Metal Division of the National Lead Company in a foundry at 1029 West Seventh Street, Cincinnati 3, Ohio

Summary

A lead hazard now exists at the foundry of the Magnus Metal Division of the National Lead Company that has led to our seeing nineteen cases of lead poisoning. The occupations of the affected men varied throughout the foundry. Many of the men were not working with materials that give rise necessarily to hazardous exposure to lead. The duration of the exposure of the sick men was, on the whole, relatively brief. The principal manifestations of illness were loss of weight, appetite and strength, with colic and anemia. Under the conditions of the plant organization, with reference to medical facilities, four weeks, on the average, were required to establish the diagnosis of the illness complained of. The failure of prompt recognition of the illness has worked great hardship on the men, by aggravating their illness, by leading in many cases to its improper treatment, and by costing them considerable sums of money in medical and hospital bills. Most of the sick men have not returned to work, and none of them can return to their former jobs with safety, until the conditions which caused their illness are brought under control. In all cases the men presented physical and physiological evidence of overwhelming lead exposure. A number had illnesses that made the definitive diagnosis difficult. The State Department of Health has hindered rather than helped the company in the recognition of this hazard, and so far as we can establish up to the present time, the State Industrial

Commission has not allowed any claim for compensation, despite the fact that at least one was made as early as December of 1946. The lack of prompt compensation has worked a great economic hardship on the affected men and their families.

Considering the extent of the lead absorption of the men who have been examined, and the relative shortness of the period of the exposure of a number of them, it is apparent that provisions for the control of the occupational lead exposure in the plant were not planned or executed with the wisdom and skill that might properly be expected of an experienced and efficient industrial organization. In fact the entire performance, in terms both of environmental control and medical supervision, has been characterized by a rather remarkable degree of incompetence.

Recommendations

1. Medical Examinations and Control of Hazard

Every man in this plant should be examined before he is allowed to continue work. This examination should be adequate to establish the state of his health and the extent of his lead exposure.

Men permitted to continue at work or to be newly employed in this plant should be maintained under careful hygienic (safety) supervision and medical care so as to prevent the occurrence of further cases of lead poisoning.

2. Engineering Control of Hazard

The faulty operating conditions that have led to

the severe lead exposure in this plant, should be corrected as promptly as possible by carefully designed plans based upon detailed knowledge of the loci and severity of present lead exposures.

3. Medical Supervision

A system of pre-employment and periodic health examination of the men should be established that is adequate both to protect the men against injury and to allow the diagnosis of lead poisoning, if present, to be established with the minimum of delay.

4. Hygienic Supervision

A system of hygienic supervision of the plant should be established that is adequate to appraise and control the lead hazard to which the men are exposed. This system should meet the requirements of the State Health Department without being dependent upon the State for its effectiveness.

5. Health Compensation

An insurance schedule should be established that will adequately compensate the men for industrial disease as soon as the diagnosis is proved.

6. Value of Survey to Parent Company

The study of this virtual epidemic of industrial lead poisoning and the means of its control should be of great value to the National Lead Company, since its numerous plants scattered over the country may have similar hazards. The information gained thereby, should, if properly applied,

be the means of preventing the repetition of this situation elsewhere. It would appear either that this organization lacks the knowledge and technique that would have prevented the occurrence of this virtual epidemic, or that it acted hurriedly and without coordination of responsibility in setting up and operating this plant, without having information as to its condition. Certainly, there is no valid excuse in these times for the operation of so dangerous a plant without well organized and effective precautionary measures for the avoidance of occupational illness among the men.

Observations (see Table)

Number of affected men

Out of an average daily plant population of 120 men, nineteen employees with a definitive diagnosis of lead poisoning have been studied at the Kettering Laboratory between November, 1946 and March, 1947. It is not known to us how many other men have had lead poisoning, diagnosed by other physicians, or not diagnosed at this time.

Age

The men ranged in age from 22 to 57, with a median age of 40.

Color

Ten of the men were white, and 9 colored.

Occupation

Four were molders, 3 grinders and chippers, 2 worked in the "shake-out," 2 as pot-tenders, 2 as metal workers,

2 as foremen, 1 as a furnace tender, 1 as a pourer, and 2 others on miscellaneous jobs.

Previous Lead Exposure

Four of the men had worked in a lead trade for years; one had had lead palsy intermittently for 9 years. Three of these men became ill early in the winter. The fourth, who had been in the Armed Services for several years and had had only 14 months exposure since his return, became ill later in the winter.

Time Employed by Magnus Metal

The median time of employment before incapacitation with lead poisoning was five months, with the range extending from many years to seven weeks.

Time of Onset of Illness

The time of onset of illness cannot be set arbitrarily, because different symptoms of poisoning characteristically appeared in sequence, and were so gradual and indefinite in their onset in some instances as to be hardly noticeable. With this reservation in setting a definite time of onset of the illness, it may be said that one man had lead poisoning when he was hired, one developed it in November, three in December, seven in January, five in February, and two in March. Since it is not known whether these men are actually representative of the plant population or of the effects of the environmental exposure upon the plant population, no conclusions can be drawn as to the changing severity of the epidemic from this monthly incidence.

Type of Poisoning

All of the men had general symptomatology such as loss of weight, loss of appetite and loss of strength. All had a mild to moderate anemia. One had a severe bilateral wrist drop, with an incapacitating tremor. Twelve had severe, incapacitating colic. Five had mild colic. Two had no colic.

Date of Diagnosis

The diagnosis was established in from 10 days to 2 years (sic!) after the onset of the illness, with the median about 4 weeks.

Time of Return to Work

The time at which any of these men should be permitted to return to work is a bit indefinite. Generally speaking, it would depend upon the subsidence of symptoms and signs of poisoning. However, until the lead hazards are brought under control these men would be exposed to undue danger by returning to work. Under the present conditions, they should be kept out of exposure until they have returned to approximately normal levels of lead concentration in blood and urine. The problem is further complicated by the lack of light work at the plant, and absence of evidence at this writing, that the hazardous exposure has been controlled. At present 7 of the men have returned to work, five in the same plant. We have been informed that at least one of these men has been incapacitated again since returning to work.

Evidence of Exposure

Lead line - All of the men who had teeth had also a lead line.

KE 02288

Lead concentrations in blood and urine -

The median blood lead concentration was 0.19 mg.%, and the urine 0.29 mg. per liter. These values are eight and twelve times the normal levels, respectively, and are as high as any we have seen heretofore in any group of men with occupational lead exposure, even in certain instances in which no effort had been made at any time to control obviously hazardous conditions. Several men have had blood and urine lead levels as high as to be exceptional in our previous experience.

Stippling - The stippled erythrocytes in the blood ranged from 2,000 to 20,000 per million erythrocytes, with a median value of 10,000. The blood of normal persons rarely shows more than 1000 stippled erythrocytes per million, while persons with well controlled lead exposure rarely have more than 1,500 to 2,000.

Complicating Illnesses

Eight of the men had complicating illnesses or conditions, which on occasion added to the difficulty of establishing the diagnosis. One man had an appendectomy because of a mistaken diagnosis.

Incidental Observations

The first patient was reported to the State Department of Health on 12-17-46. Following this an inspector representing the Ohio Industrial Commission visited the plant and reported that he saw no very significant lead hazard there. We have heard of no official action on the part of the State Department of Health, or of the Industrial Commission since

the eighteen subsequent cases have been reported, despite the fact that in every case the diagnosis has been substantiated by evidence that is wholly beyond question.

From the Kettering Laboratory of Applied Physiology, College of Medicine, University of Cincinnati, Cincinnati, Ohio

Memorandum by
Henry W. Ryder, M.D.

Approved Robert A. Kenoe
Robert A. Kenoe, M.D.
Director

March 24, 1947

Observations on Magnus Metal								Employees with Lead P	
Name	Age	Color	Occupation	Previous Lead Exposure	Time with Magnus Metal	Onset of Illness	Severity	Date of Diagnosis	Return to Night Work
Tomlinson		W	Metal worker	Years	Years	1938	+++ wrist drop +++ tremor anemia wt. loss	Feb. '47	March
Griffis	46	W	Loader	no	6 months	Nov. '46	+++ colic anemia wt. loss	12-17-46	Feb.-Mar. '47
Kirkpatrick		W	Weighing foreman	years	years	Dec. '46	+++ colic anemia wt. loss		February
Fleischer	55	W	Handyman	years	years	Dec. '46	+++ colic anemia wt. loss	5-6-47	
Allison	57	W	Shake-out	no	3 months	Dec. '46	+++ colic anemia wt. loss	5-6-47	
Chadwick	32	W	Molder	no	5 years	Jan. '47	+++ colic anemia wt. loss	2-17-47	
Epps	750	N	grinder	no	5 months	Jan. '47	+++ colic anemia wt. loss	2-17-47	March
Potter	35	N	molder	no	30 months	Jan. '47	+++ colic anemia	2-28-47	
Rowland	33	W	Molder	no	4 years	Jan. '47	+++ colic anemia	2-13-47	
Wilson	28	N	Pot tender	no	4 months	Jan. '47	+++ colic anemia	2-27-47	March
Bailey	35	W	grinder	no	6 weeks	Jan. '47	+++ colic anemia	2-28-47	
Johnson	29	W	Asst. Foreman	years	14 months, recently	Jan. '47	± wt. loss anemia	2-17-47	(no time lost)
Garrison	42	N	Chipper	no	2 years	Feb. '47	+++ colic	2-28-47	
Edwards	42	N	Sawyer	no	3 months	Feb. '47	+ colic anemia wt. loss	2-17-47	
Blummer	41	N	Furnace tender	no	4-1/2 years	Feb. '47	+++ colic anemia wt. loss	2-24-47	
Pencer	32	N	Courer	no	3 months	Feb. '47	colic anemia	2-28-47	March
McArthur	22	N	Shake-out	no	4 months	Feb. '47	colic, anemia	3-6-47	
Jackson	34	N	Pot tending	no	7 weeks	Mar. '47 (11 weeks)	colic anemia	(3-24-47)	
Montgomery	40	N	Molder	no	9 weeks	Mar. '47 (13 weeks)	colic anemia	(3-24-47)	

(Continued)

KE

02291

Observations on Magnesium Metal

Employees with Lead Poisoning

Onset of Illness	Severity	Date of Diagnosis	Return to Light Work	Initial Urine Pb, mg./L.	Initial Blood Pb, mg.%	Stippling, thousands per million RBC	Complicating Illness
1938	+++ wrist drop +++ tremor anemia wt. loss	Feb. '47	March	0.20	0.26	11	yes
Nov. '46	+++ colic anemia wt. loss	12-17-46	Feb.-Mar. '47	0.25	0.12	3	yes
Dec. '46	+++ colic anemia wt. loss		February	0.04	0.32		
Dec. '46	+++ colic anemia wt. loss	3-6-47		0.28	0.16	2	no
Dec. '46	+++ colic anemia wt. loss	3-6-47		0.68	0.14	13	no
Jan. '47	++++ colic anemia wt. loss	2-17-47		0.13	0.54	12	no
Jan. '47	+++ colic anemia wt. loss	2-17-47	March	0.17	0.17	2	no
Jan. '47	+++ colic anemia	2-26-47		1.5	0.42	11	no
Jan. '47	+++ colic anemia	2-13-47		0.53	0.13	6	Appendectomy
Jan. '47	+++ colic anemia	2-27-47	March	0.44	0.13	11	no
Jan. '47	+++ colic anemia	2-26-47		0.34	0.22	10	yes
Jan. '47	± wt. loss anemia	3-17-47	(no time lost)	0.60	0.11	11	no
Feb. '47	+++ colic	2-26-47		0.52	0.52	4	yes
Feb. '47	+ colic anemia wt. loss	3-17-47		0.22	0.11	2	no
Feb. '47	+++ colic anemia wt. loss	3-24-47		1.1	0.36	20	yes
Feb. '47	colic anemia	2-23-47	March	0.14	0.20	2	no
Feb. '47	colic, anemia	3-6-47		0.44	0.20	6	no
Mar. '47 (1 week)	colic anemia	(3-24-47)		0.22	0.13	6	yes
Mar. '47 (3 weeks)	colic anemia	(3-24-47)		0.18	0.27	8	yes

(Geometric) mean and standard error
0.29 ± 19% 0.19 ± 13%

KE 02292