

Report on lead hazard at Heekin Can Company, Norwood plant

Our attention was called to a possible lead hazard at the Norwood plant of the Heekin Can Company through the reference to us by a colleague of a suspected mild case of lead poisoning in one of the employees. A few days later the management of the plant requested that we inspect the plant and give such advice as might seem to be indicated. We did so and found that if a hazard existed it appeared to be at its greatest magnitude in the vicinity of the equipment employed to make and solder the bodies of cans. A lead-tin solder (96 and 4 per cent respectively) had been in use since December, 1941, where formerly a half and half lead-tin solder had been used in making the cans. (For a short period, the solder had contained a small amount of silver.) The solder bath had been maintained at a higher temperature (725-700°F) than formerly (650-625°F) in order to work the alloy. Over the solder baths was a hood which extended to the wiper, a rapidly rotating mechanical device for removing excess solder from the seams. There appeared to be no objectionable fuming under this hood, except for one condition mentioned later. The wiper scattered particulate solder over the floor, and probably distributed some more finely divided material into the air. The wiper was followed by a cooler, a duct from which a blast of air was blown over the seam to set the solder. A strong stream of air was deflected by the cans to about the knee level of the operators, and in addition the fumes at the hood previously described were thrown into eddies whereby they escaped around the apron of the hood.

A workman inspected the cans at the end of this line of equipment, controlled the operation of the machine, and added flux and lead to the bath as need. Apparently a supervisor performed any necessary maintenance work on the machine. The position of the workman was such that he was exposed to a considerable degree to any fumes or particulate material discharged into the air, not only by reason of the eadies referred to above but because of the air stream that accompanied the rapid movement of the cans toward him.

It was found that the ventilating ducts from the solder pots were discharged through the roof of the room in which the long making equipment was installed. Because of the height of the stacks and their design, as well as the height of this roof in relation to the location of windows in other higher parts of the plant, there appeared to be a definite possibility that some recirculation of lead-contaminated air took place, particularly, on the hotter time.

There were extensive deposits of dust, containing (by inspection) metallic particles, on the flat surfaces of packing boxes, shelves and other fixed or movable objects

in the vicinity of the can-making equipment. Much of this was well above the breathing zone of workmen and since it had its origin from low-lying equipment, it was clear that the air breathed by the workman had been contaminated.

Analysis of samples of deposited dust disclosed the presence of high lead concentrations. One analyzed in this laboratory contained approximately 35 per cent lead, while one examined by a plant analyst contained 60 per cent lead. No doubt

other samples from other locations would show varying lead concentrations.

On the basis of these observations the need for measuring the severity of the lead exposure was pointed out and arrangements were made to do this by studying the physical condition as well as the level of lead absorption of a group of men whose work had involved relatively severe and prolonged exposure to the conditions described.

Five men were seen individually and examined. Specimens of blood and urine were obtained from each man for analyses for lead. Two of these men, Leistner and Jeffinger, were referred to us by their own physician. The others were sent by the plant management.

Summary of pertinent findings on the men

	Occupation	mg/l	Lead concentration in blood		Principal Symptoms
			mg/100 grams Spect.	lith.	
	Bath tender	0.03	0.035	0.05	Anxiety, 3 days diarrhea and pain
	Supervisor	0.13	0.08	0.09	Heartburn, nausea, anorexia
	Bath tender	0.07	0.08	--	Fatigue, drowsiness
	Supervisor		0.06	0.08	"Rheumatism" Anorexia
	Bath tender	0.14	0.08	0.083	Heartburn, bloating, weakness, anorexia

Summary of pertinent findings from history, physical examination and laboratory studies

[REDACTED]

This man, a 45 year old bachelor, is a bath tender. He was in the Army for some months until 3-10-43, when he

returned to his job, in class A.I.A.H. Last fall he tried to get released because of sinus trouble. In the middle of April of this year he had a day of diarrhea and slight fever, and since then has had aching soreness in his upper abdomen. The symptoms had improved in the week before he was examined on 5-2-44. He felt he had been poisoned by his work, and that it would interfere with his plans to get married in the near future. He went to see Dr. Sikes, who sent to us for examination a blood smear in which 13 stippled cells per 12,500 red blood cells were found. With this information Dr. Sikes recommended the patient apply for compensation.

At the time of our examination [REDACTED] complained of pain in the right elbow and left calf, and some weakness of the grip of his right hand, with numbness of the little finger; he had not slept well, and felt generally "weakened." He had the habit of eating little meat.

On physical examination he appeared restless, anxious and ill at ease. He appeared poorly nourished but not chronically ill. There was no lead line or abdominal tenderness. He was right handed, but his grip on the right was 25" and the left 24". His muscle power was otherwise good throughout; there was no apparent weakness of the extensors of the wrists. The neurological examination was otherwise negative. Laboratory studies showed no anemia or decrease in red cell volume. The sedimentation rate, white count and differential were normal. The blood and urine lead levels were within normal limits.

The clinical impression was that he was suffering from a mild anxiety hysteria, and subsiding acute gastro-enteritis.

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His anxiety might improve with reassurance as to the nature of his disability, with the recognition by the company of the lead hazard that exists and its effective control, and with a high vitamin, high calory diet, including meat and added B complex. He should be followed by his own physician.

[REDACTED]

This married man, a supervisor of the body maker tenders, is 31 years of age. He also does maintenance on the machines. For two weeks he had been suffering from burning epigastric distress, nausea and weight loss, which he did not attribute to the factory conditions. Dr. Chambers, his family physician, after gastric analysis and X-ray examination informed him his difficulty was due to spasm of the stomach, as an emotional reaction. His treatment has consisted of diet, "shots" and drugs by mouth, with some improvement.

His first baby died at birth, being 3 weeks overdue. His wife was 3 weeks overdue this time, but brought home a healthy baby girl the night before he was examined, 5-4-44. His present deformant (IIA) had been up 3 days; he questioned his right to remain here in place of other men in the plant with less skill but more pre-Pearl Harbor children.

His only previous gastric distress was relieved by proper fitting of glasses. Other symptoms were occasional numbness of the ulnar aspects of digits IV and V of left hand, restriction of vision in right eye to light and dark, and occasional sharp pain in his chest to the left of the rib

margin. He has been considered "nervous" by his wife and friends. The physical examination was normal; there was no lead line, abdominal tenderness, or muscular weakness.

Laboratory studies showed a red count of 4,340,000 cells, a hemoglobin of 12.5 gm, 11 stippled cells per 12,500 red blood cells, a white count of 7,000, and a differential of 45% polymorphonuclear leucocytes, 40.5% lymphocytes, 12% eosinophiles and 2.5% monocytes. The urine was negative. The blood lead was 0.035 mg.%, and urine lead 0.15 mg./liter.

The clinical impression was that he had been suffering from a moderately severe conversion hysteria due principally to concern about his wife, and that he had definite evidence of abnormal lead absorption in the blood and urine lead levels. The anemia was considered to be too slight to be definitely established by a single blood determination. The cause of the absolute eosinophilia was not determined; this is not considered to be a manifestation of lead poisoning. It is thought that he will improve with reassurance, rest and sedation.

[REDACTED]

This 37 year old single man has been a bath tender since 1936. He has been troubled by minor ailments, but has noted that there is considerable dust around his work place, and that several of the other men in similar jobs have not been well; he went to Dr. Snyder for a check to guard against serious damage to himself.

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He had been sleeping 6-1/2 hours at night, feeling tired on rising in the morning, and eating readily after supper at night. He got colds easily, and had been troubled by pruritis ani. He had noted no difference in the way he has felt since the introduction of the high lead solder. His appetite had been good; he had noted no change in his bowel habits, no abdominal cramps, and no weakness of his arms. On physical examination the only significant abnormalities were the changes in the skin around his anus and genitalia usually found with pruritis ani, and certain difficulty with his ears. The blood was not examined for anemia or morphological changes. The blood and urine lead levels were definitely above the normal limits; they were 0.06 m.m.% and 0.23 m.m./l., respectively.

The clinical impression was that he had chronic sinusitis, chronic bilateral otitis media with middle ear deafness, pruritis ani, and no evidence of lead poisoning, but definite evidence of potentially dangerous lead absorption. He should improve as his anxiety lessens about his lead exposure.

[REDACTED]

This 35 year old married body-maker-supervisor had had aching in his joints for 6 months. The joints affected were the knees, elbows, shoulders and occasionally hips. The aches were constant, but not bothersome except after some such exertion as lifting. He had noted hunger one-half hour after eating, with associated sharp midepigastrie pains, and he had been using a physic biweekly for 4-5 years. He

man had anorexia for a year, but no weight loss. He slept well. Occasionally he had had a "laothoring in his chest." For the last year he had had some numbness and tingling of his hands and feet. On physical examination he looked haggard and chronically ill. There was dark pigmentation at the edges of his infected gums. The tongue was slightly reddened. The heart was at the upper limits of normal in size. The mitral first sound was slightly accentuated. There was a soft apical systolic murmur. The neurological examination was negative. There was no reduction in the red count, but there were 3 stippled cells per 12,500 red blood cells. The blood and urine lead levels were above the upper limits of normal.

It was considered that he had definite evidence of lead absorption, as manifested by his blood and urine lead levels and the darkening of his gums. It is quite possible that this absorbed lead has been contributing to his symptomatology, in causing the anorexia and abdominal cramps. His principal disability, the pain in his joints, was not considered a manifestation of lead poisoning, but probably a reflection of some kind of arthritis.

It would be wise to remove this man from exposure, and hospitalize him for study of his heart, gastro-intestinal tract, and joints, in order to establish a definitive diagnosis as to the nature of his disorder. Without such study it would be difficult to state how much his excess lead absorption was contributing to his symptomatology.

 This 35 year old man, a bath tender, had not felt well for 4 or 5 months. Everything he has eaten had "soared on his stomach," and caused considerable bloating. He had had some hypergastric pain, somewhat relieved by defecation. These symptoms had not been relieved by oral therapy by Dr. Harmon. He had the additional complaints of bleeding "like a hog" on defecation, with local pain and soreness. His stool frequency had diminished to once every other day, from twice a day. He had lost his appetite. His hands seemed "dead." He had had a sharp pain in his left upper chest, of 3 weeks duration. In the last 2 months he had not felt well enough to work at night on an outside job.

He was found almost the only satisfactory anodyne, but stated he confined his drinking to weekends. He tended to drink whiskey, as beer nauseated him. He had been having periods of depression.

On physical examination he appeared depressed. His speech was slurred, and there was the odor of alcohol on his breath. He had a slight fever and tachycardia. The hands were a little swollen, and there was pitting edema of the ankles. The sclera and conjunctivae were injected, and there was slight ciliary injection. The corners of the mouth were cracked. The tongue was coated, with its tip a little reddish purple. There was slight darkening of the gum margins, which were severely inflamed. The Rho-Berg was positive. He had no obvious muscular weakness or soreness, and no hyperaesthesia of the skin.

There was no anemia, but a slight absolute lymphocytosis, and 5 stippled cells per 12,500 red blood cells. The blood and urine lead levels were above the upper normal limits.

His principal difficulty appeared to be the usual complications of chronic alcoholism, that is, hepatitis and multiple vitamin deficiency. He had evidence of abnormal lead absorption. It is possible that this has been contributing to his symptomatology.

Although the prognosis in chronic alcoholism is guarded, out of fairness to him he should be treated intensively. It is difficult to say that he did not have sufficient lead in his body to make him feel so poorly, that with his emotional instability, he drank himself into his present state. Out of kindness to the other employees, he should also have a chest X-ray, because of the possibility of pulmonary tuberculosis.

It is recommended that he be hospitalized for a week or two, for intensive treatment of his multiple vitamin deficiency, and further diagnostic measures to determine the state of his lungs, gastro-intestinal tract, and liver.

Summary of findings and recommendations

Certain of the workmen in the Norwood plant of the Heekin Can Company have developed complaints which they considered were due to occupational exposure to lead. The men with complaints had exposure to abnormal amounts of lead, because of the engineering design of the equipment they operated. The evidence of this exposure is seen in

the existence of abnormally high concentrations of lead in the blood and urine of four of the five men examined.

Only one of the men, [REDACTED], had normal blood and urine levels. His symptoms in our opinion appeared to be due to anxiety hysteria and a subsiding acute gastroenteritis, although his own physician thought his lead exposure was contributing to his symptomatology.

[REDACTED] quite clearly was suffering from a conversion hysteria, because of emotional stress not related to his work.

[REDACTED] had evidence of chronic infection in his ears and sinuses, and parotitis ant. His symptoms did not appear to be due to lead poisoning.

[REDACTED] quite possibly has a mild case of lead poisoning, although his principal disability of joint pain was not considered to be due to lead poisoning.

[REDACTED] possibly had slight lead poisoning, but his principal disability appeared to be the result of vitamin deficiency and hepatic damage as a result of alcoholism.

It is recommended that [REDACTED] and [REDACTED] be hospitalized for further diagnostic procedures, and for treatment. Measures are being taken to correct the conditions responsible for the potentially hazardous lead exposure described above. It is believed that such exposure will be cut sufficiently so that the other three men can remain at work while further improvements in engineering design are installed.

It is further recommended that the plant facilities be re-examined critically after the completion of the proposed procedures for the control of the lead exposure, so as to establish the degree of their effectiveness in accomplishing the desired purpose.

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