NATIONAL ZINC COMPANY, INC.

BARTLESVILLE, OKLA.

December 3, 1958

Robert A. Kehoe, M. D.
The Patterson Laboratory
College of Medicine-Eden Avenue
Cincinnati 19, Ohio

Dear Dr. Kehoe:

We have enclosed a sheet showing all the analytical results on blood and urine of men working in our Cadmium Plant. Quite naturally some questions have come up. We think we know the answers to some of them, but would appreciate your comments.

1. It is noted that repeat samples for lead in blood on each of the three men were considerably lower, in spite of the fact that their working conditions had not changed during the short interval between samples.

   a. How rapidly can the blood lead level change?
   b. Should our conclusions and actions be based on the original high results or the repeat nearly normal results?
   c. Is it reasonable to take repeat analyses only on those who show high results or might we expect some of the low ones to show up high if repeated?
   d. How soon should we resample the three men who have shown one high result?

2. Repeat samples for Cadmium showed an even greater variation than for lead.

   a. How much of this variation can be ascribed to the method of analysis?

3. If we consider the plant as a unit using the repeat samples, the average lead concentration in blood is 0.045 mg. Pb/100 gm. with a standard deviation of 0.0104, and the average cadmium concentration in blood is 0.017 mg. Cd/100 gm. with a standard deviation of 0.0155.

   a. Do these figures allow any comparison with other similar plants; and if so, how does our plant rank with others known to you?
   b. How often should we check the entire personnel of our cadmium plant for lead and cadmium in urine and blood?
   c. Do the results when considered along with the results of atmospheric samples indicate a need to improve working conditions with respect to dust and fume control?
   d. Should we have occasion to check an individual who clearly is to have metal poisoning or one we suspect of having metal poisoning, what is the most reliable procedure to follow? We might take immediate duplicate blood samples, or we might take the check samples after a specified time interval.
   e. Should the possibility of contamination in taking the samples be considered the cause of the two cadmium in urine results that are above 1 mg. Cd/liter?

We have also enclosed the results of our own recent survey of atmospheric concentrations of lead and cadmium in the plant. You will note

that with the exception of one sample the lead concentrations are within the limit. The results seem to make it advisable to remove the grinding and screening operation from the general plant area.

Thank you for your cooperation in completing this survey. Generally we all feel that it has been worth the time, effort and money expended on it.

Very truly yours,

James L. Hart

James L. Hart
Chemical Engineer

JLH/eb

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CADMIUM DEPARTMENT

Repeat Blood Samples

	Sample Date	Pb mg/100 gm	Cd mg/100 gm
[redacted]	8-19-53	0.07 ✓	0.035
	11- 3-53	D 0.05 ✓	0.005
[redacted]	8-21-53	0.075 ✓	0.041
	10-13-53	0.055 ✓	0.010
[redacted]	8-20-53	0.085 ✓	0.055
	10- 9-53	0.050 ✓	0.002
[redacted]	8-12-53	0.065 ✓	0.042
	10- 2-53	0.040 ✓	0.005

cc [redacted]
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CADMIUM DEPARTMENT
ATMOSPHERIC SAMPLES

The following are all general amospheric samples in the area of the job indicated, while the work was being done. But none have been related to the time the operator spends in this area. Therefore, these figures should be considered as maximum exposure.

	Mg/Cu meter Air		
	Pb	Cd.	
Chlorinator Third Floor	0.007	0.037	
	0.116	0.165	grinding and screening operation going on on first floor.
Charger Second floor	0.015	0.103	
	0.005	0.0[illegible]5	
	0.012	0.057	
Furnaceman First Floor	0.070	0.700	
	0.024	[illegible]	
	0.131	0.407	grinding and screening operation going on 1[illegible] feet south of sample area
Melting Pot Operator First Floor	0.04[illegible]	0.158	
	0.033	0.143	
	0.03[illegible]	0.164	
Accepted Limits	0.15 mg/cu.m.	0.10 mg/cu.m.	

James L. Hart
James L. Hart
December 2, 1959

cc [illegible]
[illegible]
[illegible]
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KE 0003738

[redacted]

SOURCE: EMPLOYEES OF NATIONAL ZINC CO[illegible], INC., Bartlesville, Oklahoma
MATERIAL: Blood and Urine
SUBMITTED:
RECEIVED:

Name	Occupation	Years				
[redacted]	Furnace man	2				
[redacted]	Furnace man	15 to 16	53A-6330 53A-6975	0.07	0.095	53A-6331 53A-6976
[redacted]	Chlorinator	6 mos.	53A6521 53A-7152	0.10	0.10	53A-6522 53A-7153
[redacted]	Charger	4 8/12	53A-6276	0.08	0.042	53A-6577
[redacted]	Pressman	3 3/4	53A-6439 53A-7176	0.35	0.38	53A-6440
[redacted]	Pressman	2	53A-7185	0.100	0.08	53A-7186
[redacted]	Pressman	5/12	53A-6278	0.05	0.006	53A-6279
[redacted]	Furnace man	11	53A-6547 53A-7368	0.07	0.12	53A-6548 53A-7369
[redacted]	Chlorinator	11 1/2	53A-6545 53A7370	0.16	0.31	53A-6546 53A-7371
[redacted]	Floorman	4	53A-6523 53A-7103	0.04	0.07	53A-6524
[redacted]	Foreman	4 1/2	53A-6464 53A-7104	0.15	0.38	53A-6465
[redacted]	Chlorinator Charger	1/2	53A-6670	0.16	0.05	53A-6671
[redacted]	Molder	5 1/2	53A-7399	0.06	0.006	53A-7400
[redacted]	Chlorinator and Floorman	1/2	53A6382 53A-7102	0.14	0.041	53A-6383 53A-7103
[redacted]	Molder	7/12	53A-6384 53A-7345	0.14	0.01	53A-6385 53A-7346
[redacted]	Furnace man	2 7/12	53A-6260	0.12	0.052	53A-6261
[redacted]	Charger	4 1/2	53A-6304		1.33	53A-7715
[redacted]	Furnace man	4	53A-6306 53A-7423	0.11	0.70	53A-6307
[redacted]	Tow Motor Operator	5/12	53A-6316	0.11	0.009	53A-6317
[redacted]	Tow Motor Operator	3 wks	53A-6366 53A-7177	0.16	0.015	53A-6367 53A-717[illegible]
[redacted]	Chlorinator	1 1/2	53A-6254	0.12	0.08	53A-6255
[redacted]	Charger	4	53A-6368 53A-7179	0.09	0.02	53A-6369 53A-7180
[redacted]	Charger	4 1/2	53A-6525		0.38	53A-6526

[redacted]	Trac er	4	55A-3225	0.05	0.01	55A-3225	0.03	0.004
[redacted]	Furnace man	4 1/2	55A-3230	0.11	0.017	55A-3321	0.03	0.007
[redacted]	Floorman	4 1/2	55A-3322	0.05	0.004	55A-3323	0.03	0.014
[redacted]	Floorman	4 1/2	55A-3400 53A-7242	0.19	0.19	53A-3437	0.03	0.039
[redacted]	Furnace man	15 to 16	55A-3350 53A-7154	0.51	1.23	55A-3351	0.055	0.045