JAMES O. PIERCE, SC.D.
KETTERING LABORATORY
EDEN AND BETHESDA AVENUE
CINCINNATI, OHIO 45219

Dr. Kehoe -

a copy of my letter to Mr. Harger and Mr. Kline of MBCO is attached. I would like to discuss this with you upon your return.

Jim

mailed on 3/19/66

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Dr. Kehoe's

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James O. Pierce, Sc.D.
Associate Professor of
Environmental Health

JOP:egm

Enclosures

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JAMES O. PIERCE, Sc.D.
KETTERING LABORATORY
EDEN AND BETHESDA AVENUE
CINCINNATI, OHIO 45219

March 19, 1968

Mr. Jack Hargis
Nibco of Texas
Box 727
Nacogdoches, Texas 75961

Dear Mr. Hargis:

The attached letter and tables were under preparation when a very cooperative letter came from Mr. R. W. Satterfield of Lumberman's Mutual Casualty Company. He indicated to me some of the previous history of your foundry and will make the results of his recent sampling program available to me as soon as the analyses are completed. Although these data will not change any of my remarks, I will review them carefully and I will prepare an additional report for you when Dr. Kehoe returns and has had an opportunity to review the situation with me.

I am also enclosing a statement of expenses and charges. No further charges will be made by me for this visit. If any questions arise, please do not hesitate to either write or call. Otherwise, I will be in touch with you following Dr. Kehoe's return to Cincinnati in early April.

Sincerely yours,

James O. Pierce, Sc.D.
Associate Professor of
Environmental Health

JOP:egm

Enclosures

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JAMES O. PIERCE, SC.D.
KETTERING LABORATORY
EDEN AND BETHESDA AVENUE
CINCINNATI, OHIO 45219

March 19, 1968

Mr. Jack Hargis
Nibco of Texas
Box 727
Nacagdoches, Texas 75961

Dear Mr. Hargis:

We have completed our analyses of the samples of air taken during my recent visit to your foundry. The results of these analyses indicate concentrations of lead in the air in excess of the presently recommended threshold limit value in most locations. The findings range from 0.2 mg/M^3 to a high of 1.199 mg/M^3 as compared with the current TLV of 0.2 mg/M^3 of air. The attached tables list the results of these analyses and the locations at which they were taken.

The threshold limit values are based upon a 40-hour week and are used as guidelines for limiting excessive exposures to toxic materials. These values are also representative of the average exposure occurring over the 40-hour week. The results of our samples should be evaluated with this fact in mind.

It is of interest at this point to indicate that the above findings are in agreement with those obtained over the last few years by the Lumberman's Mutual Casualty Company and which they kindly made available to us.

Included in Table 1 are values for the concentration of zinc, reported as milligrams of zinc oxide per cubic meter of air. These latter findings are not as excessive and except in one or two instances are below the threshold limit value of 5 mg ZnO/M^3 of air. However, these results are only representative of the time of our sampling and may not be indicative of the average levels of exposure.

Comparing concentrations of lead in the air with the levels of lead found in the blood of the men working as furnace tenders, stemmers, pour-off men, and weight-shifters, it becomes quite apparent that excessive exposures to lead fume exists in this foundry operation. In all probability, the workers are receiving their principal exposure to lead as a result of the route of inhalation. However, some absorption due to the ingestion of lead by contamination of hands,

food, cigarettes, etc. cannot be ignored. To prevent this latter aspect, it is suggested that smoking not be allowed in the furnace area or in the pouring floor area and that signs be put up at strategic locations indicating the need for washing hands and face before eating lunch in the lunch room area.

The housekeeping appeared adequate and, in my opinion, is not a serious source for lead dusts in the atmosphere. Also, the control measures in existence, such as the local exhaust at the furnaces and pouring stations, were very well maintained. Obviously, however, there is enough fume escaping into the atmosphere from some source which should be more adequately controlled in order to reduce the levels of lead encountered. The source of lead fume is not plainly obvious and must come from a variety of additive sources. One of the major recommendations is to have the stacks from the furnaces raised significantly in order to prevent any exhaust from the furnaces reentering and being recirculated throughout the foundry. I feel quite certain that some portion of the contamination of air by lead is due to fume being recirculated throughout the plant from these exhaust ducts. I also noticed that whenever the furnaces were tilted for pouring melt into the ladle, the doors of the furnace hood were left open and smoke immediately filled the pouring room and core-making areas. This is indicative of the possible spread of potential contaminates and may be partially corrected by returning the furnace to its upright position with the doors of the hood being closed. Obviously, this will slow down the speed at which the workers can fill the ladle upon returning. However, I feel it will be an effort well worth spent. In addition, the men in the furnace area and those on the pouring team should be indoctrinated as to the proper use of existing exhaust systems for the control of fume. These recommendations should be put into effect and samples of air collected following their institution in order to assess their value.

My most immediate recommendation would be to require the use of respirators for all men working in the furnace area and on the pouring floor, excluding, for the time being, the molders and shake-out men. This would include the furnace tender, the stemmer, the pour-off man, and the weight shifter. The type of respirator used should be one designed for use with toxic dusts and fumes and which has been approved by the U.S. Bureau of Mines. Respirators of this type may be obtained from the Mine Safety Appliance Company in Pittsburgh, Pennsylvania, or from the American Optical Company. One of the representatives of either of these companies could provide you with an adequate respirator and instructions on its proper use. I would like to stress the necessity of adequate fitting, adequate cleaning, and frequent changing of the filter cartridge. In order for a respirator to be effective, the recommendations of the manufacturer must be followed closely. I anticipate that the use of respirators will be a temporary measure until such time as the air-borne concentrations of lead can be reduced to an acceptable level.

It is my impression that three men have been removed to other positions where they will not be exposed to lead, due to the recommendation of your insurance carrier. Two of these men were furnace tenders and one was a stemmer. I would also highly recommend that Jones, a weight-shifter, also be moved to another job where his exposure to lead would be reduced to an insignificant level. The levels of lead in blood are all indicative of excessive exposure to lead. The four men listed are of immediate concern and should not be further exposed to lead dusts or fume until such time as their blood lead levels have returned to safe levels. Dr. Kehoe will comment in greater extent on this point following his return to Cincinnati.

Finally, all employees should be placed under the medical supervision of a physician with adequate knowledge and experience in the field of industrial medicine and who is especially familiar with the hazards associated with exposure to lead. This surveillance should include periodic examinations and the analyses of blood and urine for the content of lead.

In summary, I list the following recommendations.

1. Respirators of the proper type should be worn by all men in the furnace area and at pouring operations.

2. The stacks of the furnaces should be raised significantly in order to prevent any exhausted air from reentering the plant.

3. Instructions should be given to all furnace tenders to the effect that the enclosures around each furnace be kept shut at all times except when actual pouring is done.

4. Periodic air samples should be taken at strategic locations in the furnace area and pouring area to insure adequacy of these control measures.

5. Smoking in the furnace and pouring areas should be prohibited.

6. Signs should be posted indicating the need for adequate washing before eating, drinking, or smoking.

7. A medical surveillance program should be set up for all employees and should be under the supervision of a knowledgeable physician.

If these measures do not significantly reduce the levels of lead in the atmosphere and reduce the biological indices of exposure, a more detailed industrial hygiene survey should be conducted.

A supplement to this preliminary report will be written by Dr. Robert A. Kehoe upon his return to the United States.

Sincerely yours,

James O. Pierce, Sc.D.
Associate Professor of
Environmental Health

JOP:egm

Enclosures

cc: Mr. Robert Kline

CONCENTRATION OF LEAD IN AIR*

Mg Pb/M^3

	1-10-61	10-23-61	8-28-64	11-9-65	5-1
Charge Platform					
No. Samples	1	1	1	2	
Range	---	---	---	0.130-0.530	0.001-
Average	0.142	0.038	0.097	0.330	0.
Front of Furnaces					
No. Samples	2	3			
Range	0.136-0.511	0.298-0.403			
Average	0.324	0.339			
Pour-Off					
No. Samples	2	5	1	8	
Range	0.463-0.610	0.072-0.370	---	0.169-1.028	0.200-
Average	0.537	0.204	0.628	0.436	0.
Furnace Tenders					
No. Samples	1		2	3	
Range	---		1.172-1.502	0.288-1.114	0.617-
Average	0.187		1.337	0.821	1.
Weight Shifters					
No. Samples			1	4	
Range			---	0.064-0.424	0.057-
Average			0.191	0.238	0.
Molders					
No. Samples			2	2	
Range			0.088-0.238	0.169-0.310	0.137-
Average			0.163	0.240	0.

Table 1

CONCENTRATION OF LEAD AND ZINC

Location of Sample	Pb Mg/M^3	ZnO Mg/M^3
Sampler attached to furnace tender, breathing zone	0.32	2.34
General room air to furnace area, sampler located in middle aisle	1.19	20.5
General room air of furnace area, sampler located near furnace #5	0.23	1.86
General room air of furnace area, sampler located near furnace #12	0.03*	0.48*
Sampler attached directly to stemmer, breathing zone	0.29	3.06
Sampler attached directly to pour-off man, breathing zone	0.36	4.78
Sampler located on mezzanine above pouring floor, away from furnace area	0.28	2.85
Sampler located on mezzanine above pouring floor, near furnace area	0.20	1.75

*During time of sampling, a large fan was blowing outside air directly toward the sampler.

Table 2

LEVELS OF LEAD IN BLOOD*
Mg/100 g

Name	Job Classification	Results Reported		
		1-3-68	2-28-68**	2-28-68**
[redacted]	Furnace Tender	0.161	0.103	0.08
[redacted]	Stemmer	0.108	---	---
[redacted]	Furnace Tender	0.109	---	---
[redacted]	Stemmer	0.109	---	---
[redacted]	Stemmer	0.145	0.142	0.15
[redacted]	Stemmer	0.086	---	---
[redacted]	Furnace Tender	0.108	---	---
[redacted]	Furnace Tender	0.304	0.379	0.37
[redacted]	Pour-off Man	0.087	---	---
[redacted]	Coremaker	0.074	---	---
[redacted]	Pour-off Man	0.093	---	---
[redacted]	Pour-off Man	0.103	0.112	0.09
[redacted]	Pour-off Man	0.092	---	---
[redacted]	Core Room Supervisor	0.057	---	---
[redacted]	Weight Shifter	---	0.328	0.26
[redacted]	Furnace Tender	---	0.118	0.11
[redacted]	Pour-off Man	---	0.115	0.09
[redacted]	Shakeout	---	0.112	0.10
[redacted]	Molder	---	0.089	0.08
[redacted]	Pour-off Man	---	0.111	0.10
[redacted]	Pour-off Supervisor	---	0.078	0.08
[redacted]	Weight Shifter	---	0.093	0.08

Name	Job Classification	Results Reported		
		1-3-68	2-28-68**	2-28-68**
[redacted]	Molder	---	0.100	0.10
[redacted]	Molder	---	0.078	0.08
[redacted]	Pour-off Supervisor	---	0.090	0.08
[redacted]	Pour-off Man	---	0.098	0.10
[redacted]	Sandman (catwalk)	---	0.065	0.06

*Data in this table were supplied by Mr. Hargis.

**Results of duplicate analyses performed on blood taken from the individuals and sent to two different laboratories.