

9/14/38

BOSTON OFFICE ENGINEERING

Mr. E. P. Rudolph

Re: The Boston Edison Company, Channing Street Station
Concentration of Lead in Air in Battery Room F.

Samples of air from Battery Room F at the Channing Street Station were collected by the Greenburg-Smith Impinger apparatus using two collecting bottles in a series, on August 30 to September 1, 1938.

Concentration - 14.1 mg. lead per 10 cubic meters.
 These samples, eleven all told, were analyzed at this Laboratory for lead according to the United States Department of Public Health. The procedure used is that known as Fairhall's Method. 7.4 mg. of lead per 10 cubic meters.

Battery Room F is a room 78' long, 41' wide and 12' high, containing 75 negative cells and 75 positive cells. These cells are 85" long, 23" wide, and 44" high. For the exact location of the samples taken, please refer to the diagram of this battery room accompanying this report. 1.4 mg. of lead per 10 cubic meters.

August 30

Sample #1. Taking plates out of old cells and sweeping.

Time of sample - 35 minutes
 Men exposed - 4
 Concentration - 6.6 mg. lead per 10 cubic meters. 0.15

Sample #2. Straightening negative plates. This is a 4-5 hr. operation.

Time of sample - 30 minutes
 Men exposed - 2
 Concentration - 18.8 mg. lead per 10 cubic meters. 0.66

Sample #3. Straightening of positive plates.

Time of sample - 34 minutes
 Men exposed - 2
 Concentration - 39.0 mg. lead per 10 cubic meters. 3.9

Sample #4. General room sample (Battery F).

Time of sample - 22 minutes
 Men exposed - 2
 Concentration - 1.3 mg. lead per 10 cubic meters. 0.13

Sample #5. Burning-in operation.

Time of sample - 24 minutes
 Men exposed - 2 or 3
 Concentration - 6.7 mg. lead per 10 cubic meters. 0.67

Sample #6. Burning-out and burning-in operation.

Time of sample - 38 minutes
 Men exposed - 3
 Concentration - 13.2 mg. lead per 10 cubic meters. 1.32

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Public Health Service Bulletin #235, giving the results of a

Sample #7. Burning-out operation. Storage Battery Plant (1933):

Time of sample - 13 minutes

Men exposed - 1 or 2 exposures, it appears that the

Concentration - 33.2 mg. lead per 10 cubic meters.

6.32

Sample #8. Taking old plates and sweeping (similar to Sample #1).

Time of sample - 38 minutes

Men exposed - 4

Concentration - 14.1 mg. lead per 10 cubic meters.

1.41

Sample #9. General atmosphere of battery room. (R)

Concentration - .05 mg. of lead per 10 cubic meters.

6.1

Sample #10. Sweeping one aisle floor.

Time of sample - 5.5 minutes

Men exposed - 1 or 2

Concentration - 33.2 mg. lead per 10 cubic meters.

9.22

September 1

Sample #11. Acid content of air in Battery T.

Concentration - 8 parts of sulphuric acid per million parts of air.

Sample #12. Junking operation.

Time of sample - 28 minutes (Note: This is a 4-5 hr. operation).

Men exposed - 3 or 4

Concentration - 100.6 mg. lead per 10 cubic meters.

10.06

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INDUSTRIAL HYGIENE

J. J. Viles
F. J. Viles

Co. Boston Edison Company (2), Mr. S. E. Whiting, Mr. J. G. L. Bowman (2)

Comment: The above results show the concentrations of respirable lead in air during the operation described at the times the samples were taken. It is entirely probable that samples taken of the same operation in different rooms - or of the same operation in the same room at different times - would give different results. From experience in sample taking, however, we can say that the second results would be of the same order of magnitude as the first.

In our consideration of what constitutes a dangerous exposure, we have two authoritative statements. The report of the Committee on Lead Poisoning of the American Public Health Association (1930):

".....any condition wherein a worker may ingest or inhale 2 mg. or more of lead per day for 30 days or any workplace breathing atmosphere containing more than 5 mg. of lead per 10 cubic meters, shall be considered prima facie a condition of lead exposure, provided workers are employed 8 or more hours per day for a working period of 30 or more days."

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The United States Public Health Service Bulletin #305, giving the results of a study of Lead Poisoning in a Lead Storage Battery Plant (1933):

"Except for prolonged exposures, it appears that the limit of safety under conditions encountered in this study is an atmospheric concentration of lead dust or fumes of less than 1.5 mg. per 10 cubic meters of air".

These two statements are not inconsistent. The figure of 1.5 mg. lead per 10 cubic meters of air is accepted by all State Departments of Hygiene which have published regulations.

It is impossible to calculate an exact weighted average daily exposure, but assuming an 8 hour day, spent in the room (Battery T), an approximate figure would be 8 mg. per 10 cubic meters of air. This figure is well in the range where chronic lead poisoning may occur.

As the operations contributing to the total exposure are many and varied, it is our opinion that reasonable protective measures can be decided on best after a discussion with the Edison Company officials.

Sample 12.

Station plates out of cells and envelopes.
Time of sample - 25 minutes
Air exposed - 4
Concentration - 5.3 mg. lead per 10 cubic meters.

Sample 13. Brightening negative plates.
Time of sample - 25 minutes
Air exposed - 4
Concentration - 15.8 mg. lead per 10 cubic meters.

Sample 14. YABRU YABRU of positive plates.
Time of sample - 25 minutes
Air exposed - 4
Concentration - 15.8 mg. lead per 10 cubic meters.

Sample 15. Control room sample (Battery T).
Time of sample - 25 minutes
Air exposed - 4
Concentration - 1.5 mg. lead per 10 cubic meters.

Sample 16. Working-in operation.
Time of sample - 25 minutes
Air exposed - 3 or 4
Concentration - 4.3 mg. lead per 10 cubic meters.

Sample 17. Working-out and working-in operation.
Time of sample - 25 minutes
Air exposed - 3
Concentration - 15.8 mg. lead per 10 cubic meters.