

April 4, 1963

To: Dr. Kehoe
From: T. Sterling
Subject: Continuation of Chamber Experiment

1. The research outline presented here follows our discussion of two weeks ago. In conjunction with previous work, this investigation should (hopefully) lead to statements concerning the amount of lead retained ~~under atmospheric exposures of any length of time for small particle sizes.~~ *in the lungs during exposure to air containing minute particles of lead (mean diameter 0.05 μ)*
2. All samples of food intake will be eliminated since it is now established well enough that ~~total output is~~ *the fecal output provides* an accurate estimate of total input (less an unknown fraction that may be retained ~~permanently~~ *that in the fecal*) when measured under conditions which we have labelled as practical equilibrium. Also, the crucial part of the analysis will be based on the comparison of practical equilibrium.

The funds saved by not ~~neglecting~~ collecting and not analyzing samples of ingested materials will be ~~used to support four rather than two subjects.~~ *enable the work to be done within the budget.*

- Additional funds may be saved by ignoring part of the fecal samples. Only urine samples need be analyzed continuously. Daily fecal samples will be collected and stored and chemical analyses performed only over those time ranges for which practical equilibria have been established.

3. ~~Four~~ *Two* subjects will be used for the experiment.

A. Pre-exposure

Subjects will spend 3 hrs. in the chamber every second day. Daily urine, ~~and feces~~ *and feces* will be collected and analyzed. This phase of the experiment will last two ~~months~~ *by four*. Fluctuations in fecal lead will be evaluated to see if the subject is suitable.

B. Exposure

Three different concentrations of lead in air will be selected. These will be spaced in equal increments so that concentration B = 2A and concentration C = 3A. Periods of exposure will be 3, 6, and 9 hrs. every second day. Subjects will be exposed as follows:

Time spent in chamber every second day	Concentration	Estimated duration of phase in days
3 hrs.	A	65
3 hrs.	B	65
3 hrs.	C	65
recovery 3 hrs.	none	40

A = 0.015
B = 0.030
C = 0.045

may have to go to 4th or 5th

D = 0.060

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Time spent in chamber every second day	Concentration	Estimated duration of phase in days
6 hrs.	A	65
6 hrs.	B	65
6 hrs.	C	65
recovery 6 hrs.	none	40
9 hrs.	A	65
9 hrs.	B	65
9 hrs.	C	65
recovery _____	—	60 ?

4. The estimated duration of the experiment is two years from time of first exposure. However, a number of possibilities may exist.
 - A. Time to reach equilibrium may be longer than 30 days so that the estimate of 65 days at each concentration may be too small.
 - B. Time of recovery to level of urine of concentration A may be much shorter than 40 days.
 - C. It may be possible to terminate the experiment after 6 hrs. of exposure at concentrations A, B, and C, thus shortening the duration of the experiment by one-third.
5. The successful execution of the experiment demands very close liaison between Mr. Schafer and the computing center. It is especially important that urine samples ~~be~~ analyzed each day. A procedure will be established by which ~~this~~ data ~~is~~ analyzed daily to
 - A. Give an estimate of whether or not a practical equilibrium has been reached, and
 - B. Signal the end of the recovery period.
6. Because of the short time span at each level, subjects will have to be supervised very thoroughly. They should be discouraged from changing food habits, exercising excessively, engaging in activities such as painting or mechanical work. Also consumption of uncooked foods such as fruits should be discouraged.
7. I suggest that a meeting be arranged shortly with Mr. Schafer to iron out all details.
8. I have explored the possibility to use a gamma emitting labelled lead for two additional experiments, as follows:
 - A. Check on lead not analyzed by our precipitation technique. An amount of labelled lead will be put through the electrostatic

precipitation technique. The precipitate and the remainder will be counted.

- B. Check on fraction of lead remaining in the body. Small animals (probably rats) will be given food to which an amount of labelled lead has been added. Food will be presented only one time during each day. Animals will be kept in metabolic cages. The animal and its excreta will be counted before and after feeding. Once the counts obtained from the animal level off, the amount of labelled lead in the food will be doubled. The duration of this experiment will be approximately 4 months and use 6 animals.

cc: Mr. L. Schafer