

April 30, 1951

Mr. H. W. Elley, Director
Organic Chemicals Department
E. I. Du Pont de Nemours and Co.
Wilmington 98, Delaware

Dear Mr. Elley:

I am sending you herewith an account of the cost of the conduct of the experimental study on the inhalation of lead during the year 1950. Perhaps this should have gone to you sooner, but we had some little difficulty in getting all of our accounts straightened out, partly because of the tardiness of the University in providing us with the statement, that we are quite slow.

As you will note the sum of \$5,483.68 has been charged to the account of your company for this work in 1950. This means, of course, that nearly \$25,000.00 remains of the funds provided in 1950 for the conduct of this work. It appears, therefore, that no appropriation for this purpose will be required in 1951. Our original estimate of the cost of this work was based on the achievement of the full program. It has been necessary for us to go slowly and carefully, and therefore, we have not reached the peak of our activities. During the present year I expect to introduce another subject into the picture, and as time goes on I shall expect to have approximately three subjects under observation at any one time. It requires about six months of preliminary work to put a subject in favorable position for use in these precise experiments. Therefore, we will have to be making preliminary observations on one subject, while the actual experiment is going on on another. The time factor in these experiments, under the various conditions which we expect to create, will be somewhat unpredictable. At any rate our first guess turned out to be fairly sound. After several months of observations on our first subject, under the conditions which we have set up, it is now apparent that something of the order of magnitude of a year will be required to reach a satisfactory level of lead absorption. If then we can follow this subject further until he comes back to the base line, or nearly so, another year or so will be required. We shall then be ready to introduce a new subject under somewhat different conditions. At some time in the course of these experiments we shall probably wish to have two subjects in the chamber at one time. The purpose of this, obviously, is to establish the degree of variability in the physiologic phenomena, as relating to separate individuals. At such a time then, we might have four subjects under observation. That is, one would be in preliminary observations, one would be in the terminal operations after removal from the respiratory chamber, and one or two would be in

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the chamber from day to day. Under these conditions, the cost of the work would about reach the level of my estimate as originally set forth. I thought it better to state the thing realistically, in terms of the maximum, rather than in terms of the minimum cost of the work. So much for the account and its significance.

It seems wise at this time to call your attention to another aspect of our experimental work, in which your people may well have an interest. I refer here to the fact that for several years we have been following the lead concentration in the atmosphere in Cincinnati, on a rather comprehensive basis. Our purpose in performing this work, originally, was to determine the facts in the matter of the contamination of the atmosphere with lead from the exhaust gas of automobiles. For a number of reasons it is important that this information be available. We have also felt that it is necessary for us to make a study of this over a sufficiently long period of time that we would be able to see the variations from a variety of factors. It is also our expectation to study a number of the worst places, with respect to the concentration of exhaust gases, such as garages, tunnels and the like, so as to be able to see the picture in a comprehensive manner. We used Cincinnati as a point of initial studies for obvious reasons. Observations will have to be made elsewhere.

These studies have borne fruit, in the practical sense of the word, already, but they will likely be called upon later to substantiate the position. Numerous questions have arisen concerning the factors responsible for the Los Angeles situation with respect to smog. Lead compounds have been thought of in this connection, and a number of questions have been raised. I think that some observations on this subject are being carried out there. At least a few determinations were made, and it seems possible that the information which we provided tended to indicate that further observations might not be necessary in connection with the smog situation. On the other hand, this question is bound to recur in a number of places, and what we need to know in rather definite fashion, is the actual order of magnitude of the contamination of atmosphere with lead, on the one hand, and the increment of contamination which is provided by lead from exhaust gases, on the other. You may not be aware of it, but as far as Cincinnati evidence is concerned, the lead in the exhaust gas is not the most important factor in the contamination of the air in this city. Indeed the combustion of coal is a more significant factor, while the existence of several lead plants is responsible for the highest contamination found in the city, this being a phenomenon in one section of the city in which these plants are found.

As I indicated above, this was the primary reason for making these observations. However, when we had made them for a while, it seemed to me to be an unduly costly activity for so little return. Therefore, since the entire problem of air pollution was an increasingly important one, we considered it desirable to extend the sampling to cover a number of the materials in the atmosphere. I can send you certain reports on this work for your consideration,

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in case you are interested. My present reason for raising the point is that in my feeling it might be well for your company to share in the expense of the conduct of this work. It seems to me that it is a part of the major problem in which you are concerned, and actually it is for that reason that we have started it, as I indicated above. By the same token, since the expense of this has been borne by others, it seems that your company might wish to accept its share of this expense, on somewhat the same proportional basis as the other work. Incidentally, I am aware of the fact that your company generally has reason to be interested in the problem of air pollution, but to stick to the present issue, I feel quite certain that there is every reason for getting information on materials other than lead, if one is to interpret the data on the lead alone. In any case, it will probably be a year or two, before we reach the level of expense in the conduct of the work on the inhalation of lead, that was indicated in my estimate. This will depend upon a number of factors, but principally, perhaps, the availability of experimental subjects. Good subjects for this purpose are hard to come by, and we may find that we are dealing here with a serious difficulty. I have been looking for a new subject for the last three months, but have not found one as yet. It is true that I have not beaten out all the bushes, but I have certainly kept my eyes open, with no result as yet. I should appreciate having your comments on this problem. The cost of the work done on the air contamination problem in 1950 was \$12,260.42. Thus you will be able to see that if we carry this work on at its present level, your share of this work would be about \$3,000.00. I believe you will agree with me that it is necessary to carry on at least a part of this work from year to year over quite some time. One of the reasons we know nothing about the air pollution problem is that no one has made observations of this type over a long enough period of time to give them significance. In the conduct of this work we should want a reasonably free hand in determining what to do and how to do it. On the other hand, we are quite prepared to be guided in what we do by an understanding from year to year.

There is one other matter which I should like to bring to your attention since it involves expenditure. In the course of this work we have to resort to the use of ^{the} electron microscope for the determination of the size of particles and their characteristics. Up to the present we have sent our material to Battelle Memorial Institute and have had them make the observations at so much per observation. The expense of this has not been great, and under the conditions that existed during the past year we did not feel any justification for investing in an electron microscope. It now begins to appear that the frequency with which we will make use of such equipment will justify our possession of such an instrument. Observation on materials in the atmosphere as well as observations on the materials within our respiratory chamber, under a variety of conditions, make it desirable that we have such equipment in the not too distant future. In view of the rather sizable balance of the funds which your company has provided, I wonder if you

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would consider it appropriate for us to use some designated portion of the balance for the purchase of such new equipment. The instrument would be used, of course, in a number of other activities, but in view of its importance in relation to air pollution and our experimental study, I would feel that we might think of 20 to 25 per cent of the cost as being allocated to this project. I should be glad to have your reaction to this point. It has been our policy over a period of years to consult the sponsors of our work concerning major expenditures for new equipment. In view of the life time of such equipment, it has also been our policy to spread the cost over a number of different projects. It is for this reason that I consult you on this, although I am not, at this time, presenting a specific proportion of the expense for your approval. Incidentally I am not trying to find the means of using up the balance of funds which you have provided us. Rather our purpose is to work slowly and carefully, and to try to control the expense within reasonable and proper limits. You will recognize, however, that a laboratory that operates as this one does, finds some difficulty from time to time in finding the funds for capital expenditures for additions to the building and for special items of equipment. We have to rely upon the understanding and generosity of our major sponsors in these regards, and in their recognition of the fact that without adequate equipment we cannot do the work that would satisfy them as to its quality and quantity.

I should appreciate very much indeed your comments on the two proposals that I have made, and in case you share my feeling that these may be reasonable, I shall present you with the necessary information in detail.

I am preparing a brief report of progress at the request of Doctor Rankin and will send you a copy when this has been done.

Cordially yours,

Robert A. Kehoe, M. D.

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UNIVERSITY OF CINCINNATI
KETTERING LABORATORY
ACCOUNT OF THE EXPERIMENTAL STUDY OF INHALATION OF LEAD

1950

ALARIES (Based on Proportion of Time Actually
Spent on Project)

Robert A. Kehoe	250.00
Lester B. Roberts	4973.04
Melvin Barber	2677.00
Lawrence Schafer	145.26
Roland Burkey	61.32
Francis Sullivan	585.00
Tom Gahegan	4.50
Eldon Parkinson	1200.00
Ralph Hoffer	7.83
Estelle Mergard	412.50
Anton Michels	446.46
Richard Suciello	26.64
Jim Zoller	24.23
Erwin Spettel	37.56
Herbert Schlecht	36.92
Robert Hesterberg	3.04
Donald Hubbard	126.53
Jacob Cholak	285.37
Wm. Sullivan	<u>190.00</u>

\$11,493.25

ISCELLANEOUS EXPENSE

Food and Expenses Incurred in the Collection of Samples by Experimental Subject	488.34
Laboratory Supplies	421.46
Proportion of Secretarial, Library, Wash Boys, Draftsman, Shipping Clerks, Animal Caretakers etc	5,812.60
Proportion of Heat, Gas, Electricity, Telephone, Postage, Animal Supplies, Pensions, Annuities etc	<u>3,719.07</u>

TOTAL \$21,934.72

RECEIPTS 1950 \$30,000.00

E. I. duPont de Nemours and Company's
Share of Expense - 25% 5,483.68

Balance Remaining for Further Work in 1951. \$24,516.32

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