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Russell F. Christman, *Editor*

September 29, 1982
Ms. No. ES820247U

Dr. Ronald D. Snee
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E. I. du Pont de Nemours and Co.
Wilmington, Delaware 19898

Dear Dr. Snee:

We have received the enclosed correspondence which concerns your article entitled DEVELOPMENT OF AN AIR QUALITY STANDARD FOR COMMUNITY STUDIES which we published in our May 1982 issue. We may be interested in publishing this correspondence, but we believe that you and your coauthors should have an opportunity to reply in print if you care to do so.

Please prepare your rebuttal in duplicate, using double-spaced typing and also complete the enclosed Copyright Transfer form. We shall expect to hear from you at your early convenience.

Very truly yours,

Yvonne D. Curry

Yvonne D. Curry
Editorial Assistant

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American Chemical Society

BOOKS AND JOURNALS DIVISION
MANUSCRIPT OFFICE

October 7, 1982

TO: Dr. Ronald Snee

FROM: Yvonne D. Curry

Dr. Bert Brunekreef address is as follows:

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HUMAN BIOLOGY & ECOLOGY
DEPT OF ENVIRONMENTAL HEALTH
AND TROPICAL HEALTH

Sir: Dr. Snee of E.I. du Pont de Nemours and Co recently proposed a methodology to develop an air quality standard for lead from community studies (1). The methodology can be summarized as follows:

a. specify the acceptable (distribution of) blood lead levels in the population (preferably the population at risk);
b. specify the air lead/blood lead relationship;
c. specify the (distribution of) blood lead (PbB) levels in the population at risk as it can be expected from non-air sources, using the air lead/blood lead relationship;
d. calculate the maximum amount of lead in the air that can be tolerated without violating the acceptable distribution of blood lead levels as specified under a.

In my opinion, the methodology can only be used when a set of assumptions are made that dr. Snee does not make explicit, and I will show that some of these assumptions are not very realistic.

ad a.

Zielhuis has proposed an acceptable - not 'desirable' as dr. Snee mentions - distribution of PbB in 1974 (2). For young children, the population at the highest risk, this Biological Quality Guide is not considered adequate anymore (3,4) and much debate is still going on concerning the health risks of low level lead exposure (5). This situation is not atypical in the environmental health field, and can be handled by applying safety factors or margins of safety. Dr. Snee, however, seems to think that this is not necessary, as his methodology tacitly assumes that it is wise to bring blood lead levels only down to (or all the way up to) the upper limit of what is considered acceptable at a certain moment in time. Essentially this is a policy proposal that can be (and should be) confronted with other established environmental policy principles like 'best practicable means' etc.

ad b.

Dr. Snee has devoted much energy in specifying the air lead/blood lead relationship for both adults and children (6,7). As his analyses appeared in other journals and are only referred to briefly in his recent ES + T contribution, I will only comment on them in a qualitative sense. There is one requirement that an air lead/blood lead relationship has to fulfill if you want to use it in dr. Snee's methodology, and that is that you are absolutely sure that air lead varies independently of lead in other environmental pathways to men, or that the air lead/blood lead relationship takes other environmental pathways into account when independent variation

is not possible or likely.
For children, pathways like soil and dust have been shown to be as important, or maybe even more important than air (8,9). Lead is brought into the air by automobiles and other sources, and its concentration in air depends a.o. on source strength. Independent variation of lead in air is unlikely: where lead in the air is elevated, lead in crops, soil, dust etc. are or become elevated too.
Thus, it is necessary to analyse the air lead concentration as an indicator of the combined environmental pathways.
Dr. Snee does not mention this fundamental requirement, and it is easy to show that his deduction of the air lead/blood lead slope for children from the Silver Valley Lead Study (7) through the use of multiple regression models fails to meet this requirement. The indicator approach would yield a slope close to 3 rather than 1.0, and dr. Snee's analysis of the data in fact simply confirmed once again that for children, air is not the most important environmental pathway.
It is necessary to stress that the relationship between environmental lead and children's blood lead is a very complicated issue because of the many pathways and intervening variables that are involved.
Quantitative relationships between the input of lead in the environment (e.g. through gasoline) and the resulting blood lead levels in children do not exist to date, and it will be difficult to derive them from community studies. An approach that seems to offer more perspective is the use of stable isotopes or stable isotope ratio's. Unfortunately, few studies have followed this approach and even fewer results are available (10,11). It is also unfortunate that dr. Snee has failed to mention these studies with their inherent advantages over the traditional community studies.

ad c.
The assumptions that have to be made here are largely the same as those concerning b. It is interesting to note that dr. Snee uses rather old PbB-data to derive his 'baseline'; these are only valid today when it is assumed that PbB-values remain constant over time - which they obviously do not as the general decline in both adult and child PbB-values in different developed countries shows (12,13,14). Even more important than variations in time are probably variations between population groups of different regional or cultural background (15,16). The methodology assumes that something like a nationwide distribution of blood lead levels, related to non-air sources, can be established.

The reality of course is, that regional and cultural differences will persist, and that the environmental lead problem c.q. the lead exposure problem requires different forms of management for populations with different regional or cultural backgrounds.
Thus, specifying a 'baseline' is a matter of choice - a choice to what extent the high risk subpopulations within the population at risk are to be disregarded in the process of setting a national air quality standard for lead.

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