



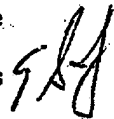
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To: A. J. Pahnke

From: E. S. Jacobs 

CALCULATION OF AIR LEAD STANDARD

Jerry Cole of ILZRO has been attempting to convince EPA to reconsider the air quality standard of lead of 1.5 ug/m^3 . It has become clear that EPA will require "new information" before reopening the procedure. Jerry has passed along the following information as a suggestion of new information and a new approach.

One possible new piece of information is the recently published paper by P. B. Hammond on "The Impact of Air Lead on Blood Lead in Man - A Critique on the Recent Literature". As reported earlier, the primary finding of this paper is that blood lead air lead relationship, alpha, varies with blood lead level and air lead concentration. This is shown in the attached graph from Hammond's paper.

In setting the air lead standard EPA's criteria for safety was to keep 99.5% of the population below 30 ug/dl blood lead. EPA then selected the value of 12 ug/dl blood lead as the mean value for a population without air lead exposure. EPA also calculated that a mean value of 15 ug/dl blood lead was consistent with a distribution of 99.5% of a population below 30 ug/dl . This assumed a geometric distribution of blood lead with a standard deviation of 1.3. EPA then determined the difference between 12 and 15 as an allowable increment of blood lead from air lead exposure. They then assumed an alpha of 2. Therefore, the division of the allowable blood lead increment from air lead by alpha produces a standard of 1.5 ug/m^3 . A major error by EPA was their assumption that the value of alpha was the same for the entire population at all air lead levels. The paper by Hammond clearly demonstrates that this is not the case.

Using the data from Hammond's paper it can be demonstrated that 99.5% of the population would remain below 30 ug/dl if the air lead was increased from 0 to 5 ug/m^3 . The calculation is as follows:

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For a population with a mean blood lead of 12, 99.5% would have a blood lead below 23.6. To determine the impact of 5 ug/m^3 air lead on this group it is necessary to consider not only the air lead but the blood lead level. It can be seen from the attached figure from Hammond's paper that the corresponding alpha for a blood lead level of 23.6 and 5 ug/m^3 air lead is about 0.6. If this value of alpha is doubled to account for the probability that alpha in children may be higher than in adults, the value of 1.2 is obtained. This value when multiplied by the air lead value of 5 gives a blood lead increment of 6 which when added to the 23.6 level for 99.5% of the population with no lead exposure results in a value of 29.6 for the 99.5 percentile exposed to 5 ug/m^3 . Using this rationale it is clear that EPA's criteria for safety could be made by an air lead standard of 5.

I would appreciate any comments or criticisms you may have regarding this evaluation.

ESJ/mbn
Attachments

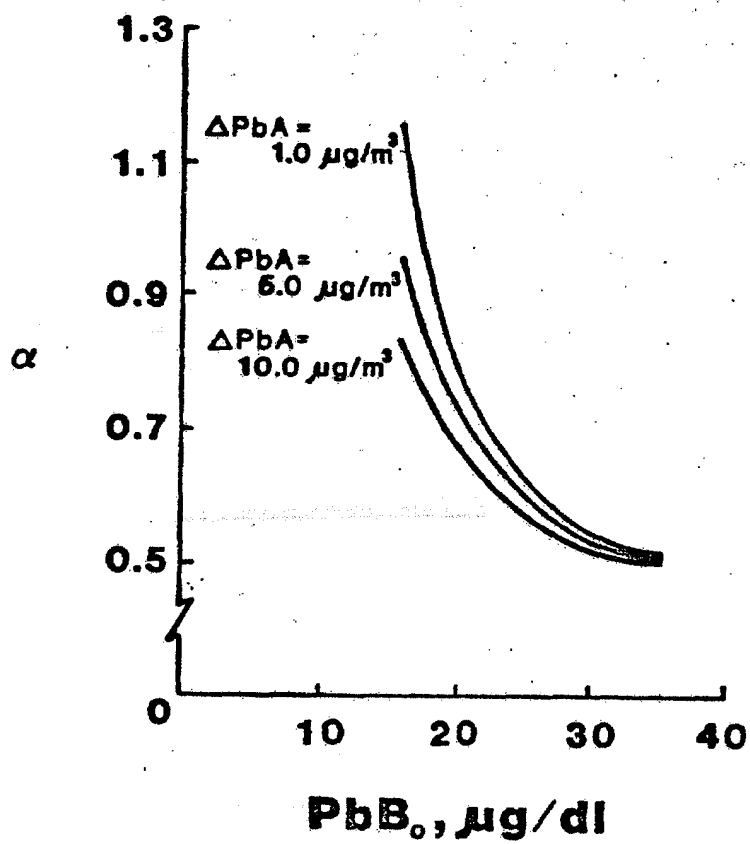
$PbA = f(PbB)$

$\alpha = f'(PbB)$



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