UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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October 3, 2008

Jeffery C. Camplin
1681 Verde Lane
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OFFICE OF
RESEARCH AND DEVELOPMENT

Re: Response to Request for Correction (RFC) # 08002, regarding EPA Report No. EPA/600/R-08/046

Dear Mr. Camplin:

This letter is in response to your RFC, dated April 28, 2008, under the Environmental Protection Agency (EPA) *Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency* concerning the EPA Report No. EPA/600/R-08/046. "Sampling and Analysis of Asbestos Fibers on Filter Media to Support Exposure Assessments: Bench-Scale Testing."

You requested that EPA correct information contained in that document that you assert could mislead the reader to assume that our analysis included several asbestiform fibers, when in fact we studied only chrysotile asbestos. While EPA does not agree with your assertions that the document at issue does not comply with either Office of Management and Budget's or EPA's information quality guidelines, EPA nonetheless is making the following changes to the document in response to your request:

1. All reported results, including table captions, now specify that the research was conducted on "chrysotile asbestos."

2. Chrysotile asbestos fibers are the most difficult to see and count after capture, so they present a worst case for retaining and counting fibers after they are retained on filters. Amphiboles are easier to see and count after capture. Therefore, this study was not so concerned about the capture of fibers, but in seeing them with electron microscopy after capture. Deeply embedded fibers present a particular challenge. Filtration theory (Baron and Willeke 2005) states that the most penetrating particle size decreases with decreasing size of filter medium. Thinner fibers, therefore, penetrate a filter matrix more deeply than thicker fibers, making microscopy more difficult. Thus, in light of your comments regarding possible misinterpretations and the need to clarify why chrysotile is the most robust asbestiform with which to characterize post-preparation filter retention, we have added the following text to Section 4, Conclusions and Recommendations:

The type of asbestos chosen for this study was chrysotile asbestos. Due to the fact that it is the most common fiber type in most asbestos exposure scenarios to date and owing to its finely fibrous nature it is also the ideal form of asbestos to study post-preparation fiber retention in filters. Lee and Liu's (1980) equation for predicting most penetrating particle diameter ($d_{p.min}$) is:

$$d_{p.\min} = 0.885\left[\left(\frac{K}{1-\alpha}\right)\left(\frac{\sqrt{\lambda}kT}{\eta}\right)\left(\frac{d_f^2}{U}\right)\right]^{2/9}$$

Where, K is the hydrodynamic factor, α = solidity of filter (1 – porosity), λ is the mean free path of the gas molecules, k is the Boltzmann constant, T is the absolute temperature, η is the air viscosity, d_f is the filter fiber diameter, and U is average air velocity inside the filter medium. Therefore, the most penetrating particle diameter decreases with decreasing pore size in the filter medium. This relationship holds for both fibrous and membrane filters (Rubow 1981), and in porous-membrane filters (Baron and Willeke 2005).

Of all asbestos fiber types, chrysotile is the most likely to penetrate the tortuous matrix of Mixed Cellulose Ester (MCE) filter material, thus optimizing the ability of the study to employ electron microscopy to characterize differences in asbestos post-preparation fiber retention, due to MCE pore size (larger pore sizes equate to greater potential penetration of fibers into the matrix) and due to differential plasma etching time. Amphibole asbestos fibers, with their larger average diameter and length (Wylie, et al. 1985), are less likely to penetrate the MCE matrix, and therefore more easily visible than most chrysotile fibers by microscopy. In addition, since chrysotile asbestos is by far the most commonly seen asbestos type on air filters (such as from remediation sites), it best reflects real-world situations. Thus, these results for chrysotile asbestos provide an indication of filter effectiveness for numerous fibers, including amphibole asbestos.

Regarding your reference to the presentation at the recent Johnson Conference, the mention of chrysotile asbestos in the title reflected the specific findings of the study. The EPA Report No. EPA/600/R-08/046 is one of the source documents for this presentation, but is not the sole reference. Thus, the presentation and report are not identical. That is, the presenters addressed chrysotile fibers within the larger context of asbestos measurement.

We anticipate issuing a revised version of the document by November 15, 2008. We will notify you when that is accomplished and the revised document is made available on EPA's Web pages. Once you receive notice that the revised document has been disseminated, if you are dissatisfied with the response, you may submit a Request for Reconsideration (RFR). The EPA recommends that this request be submitted within 90 days of the notification date for the revised document. To do so, send a written request to the EPA Information Quality Guidelines Processing Staff via mail (Information Quality Guidelines Staff, Mail Code 2811R, U.S. EPA, 1200 Pennsylvania Ave., N.W., Washington, D.C. 20460), electronic mail (quality@epa.gov), or fax

(202-565-2441). The RFR should reference the request number assigned to the original request for correction, RFC # 08002. Additional information that should be included in the request is listed on the EPA Information Quality Guidelines web site (www.epa.gov/quality/informationguidelines). Please contact Monica Jones at (202) 564-1641, should you have any questions about our response.

Sincerely yours,

Lawrence Reiter

Lawrence W. Reiter, Ph.D.
Director

References:

Baron, P.A. and K. Willeke, (2005). *Aerosol Measurement: Principles, Techniques, and Applications.* 2nd Edition. Wiley-Interscience, Hoboken, NJ. 213-215.

Lee, K.W. and B.Y.H. Liu.(1980). On the minimum efficiency and the most penetrating particle size for fibrous filters. *Journal of the Air Pollution Control Assocation.* 30: 377-381.

Rubow, K.L. (1981). *Submicrometer Aerosol Filtration Characteristics of Membrane Filters.* Ph.D. thesis, University of Minnesota, Minneapolis, MN.

Wylie AG, R.L. Virta, and E. Russek (1985). Characterizing and discriminating airborne amphibole cleavage fragments and amosite fibers: implications for the NIOSH method: *American Industrial Hygiene Journal*. 46:197-201.