February 18, 1999

Steve Kherkher
Williams Bailey
8441 Gulf Freeway
Suite 600
Houston, TX 77017-5001

RE: General Refractories

Dear Mr. Kherkher:

Per your request, we have reviewed the two reports that Dr. Richard Bradt issued on May 22, 1998 concerning General Refractories Grefco Insulating Cement and the Grefco LiteCast products.

It is apparent to us from the review of Dr. Bradt's reports that he has very little, if any, experience with friable asbestos containing products. Additionally, it is also evident that Dr. Bradt's opinions about electrostatic agglomeration of bentonite, cement, and chrysotile asbestos are only based on assumptions which are somewhat biase\d toward his position on this matter, and are not based on any test data or analyses performed by him. If Dr. Bradt had simply examined either of these materials by standard electron microscopy techniques, he would have determined quite easily that asbestos containing materials such as Eagle-Pitcher Super "66" will release a significant amount of non-coated/non-agglomerated respirable size chrysotile fibers during its use.

Examination Of Eagle Pitcher Super "66" Insulation Cement

A known sample of Eagle-Pitcher Super "66" was examined by both scanning electron microscopy (SEM) and transmission electron microscopy (TEM) for the presence of uncoated asbestos fibers in the product.

Materials and Methods

For the SEM analysis, approximately 0.5 cm piece of the cement was placed on a SEM sample stub and then coated with 100 angstroms of gold-palladium. The sample stub was then placed in an Hitachi S-800 field emission SEM and examined at a magnification of between 700 and 3,500 times. Representative photographs of chrysotile asbestos were recorded. For the TEM analysis, approximately 10 milligrams of the fine powder component of the Eagle-Pitcher Super "66" sample was suspended in alcohol and filtered onto a polycarbonate (PC) filter (0.2 micron pore size). The PC filter was then prepared by the standard Environmental Protection Agency method for direct TEM analysis. Representative photographs of chrysotile asbestos fibers were recorded at a magnification of 20,000X.

Results and Discussion

SEM Analysis

Figures 1 through 7 show uncoated chrysotile fibers that were observed along the edges of the Eagle-Pitcher sample that was examined. These chrysotile fibers were readily observed and found to have little or no particulates attached to the fibers. The SEM analysis shows that as with any multi-phase material, there is considerable intermixing of these phases; however, there was not any observation of preferential adherence of particulate matter to the asbestos fibers. The lack of adherence of particulate matter to the asbestos fibers is obviously contrary to Dr. Bradt's assumptions and opinions.

TEM Analysis

In Figures 8 through 11, photographs are shown of uncoated and unagglomorated respirable chrysotile fibers of the type that were routinely found in this sample. In fact, when the occasional bentonite particles were observed associated with chrysotile fibers, the resulting complex structure was still in the respirable size range.

It is our opinion with in a reasonable degree of scientific certainty, that the use of either the Grefco Insulating Cement or Grefco Litecast 30 & 30G refractory castable during mixing or removal would release airborne respirable chrysotile fibers in concentrations that would be in excess of both current and some past OSHA standards. This opinion is based on our experience, background, and studies involving many different asbestos containing products, including Eagle-Pitcher cement.

Sincerely,

William E. Longo, Ph.D.
President

Richard L. Hatfield
Senior Consultant