



Bell Laboratories

subject: ACGIH Asbestos Symposium

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from: Vicki R. Cohen

On April 9, 1979, I attended an ACGIH Symposium on techniques for evaluating airborne asbestos dust. After some opening remarks by David M. Trayer, Chairman ACGIH, the objectives of the program were discussed by James S. Ferguson of NIOSH, the program chairman. The program aims were to discuss the following:

- (1) Identification of asbestos; finding a practical, cost-effective technique.
- (2) The NIOSH method, an evaluation not identification technique.
- (3) Methods of analysis now in use.
- (4) Asbestos in schools
- (5) Insulators in industry, hair dryers, etc.

Speakers scheduled to speak in the morning included Walter C. McCrone, McCrone Research Inst., Dr. Voelker A. Mohnen and Mr. Roger Cheng S.U.N.Y., Dr. Eric Steel, N.B.S., Willard Dixon, OSHA, Ian Stewart, McCrone, and Steven Bayer and Dick Coupell, NIOSH.

Walter McCrone spoke about optical techniques. He claimed that the NIOSH procedure is good, but must be refined so as to discriminate between asbestos and other fibers. He discussed dispersion staining in detail.

Ian Stewart stressed the importance of crystallographic identification for distinguishing asbestos from nonasbestos material. He claimed that the SEM is not able to detect fibers less than 300Å in width.

Eric Steele of the National Bureau of Standards discussed the use of the analytical electron microscope. With this technique resolution and contrast as well as identification of serpentine from amphibole varieties may be accomplished. Small fiber morphology may be seen using selected area x-ray diffraction (SAED) as well as chemical composition using the electron diffraction pattern (EDS). Although SEM can see and identify most fibers, the polymorphs of the same serpentine mineral (ie., antiguerite, chrysotile), can not be distinguished. SEM is also quite costly, and a standardized technique and practical time problems must be resolved.

Dick Coupell from NIOSH has developed a spot test for identifying asbestos bulk. The test is actually a screen for the presence of magnesium. To date, there have been no false negatives from 150 samples tested. A copy of this relatively simple screening test is attached.

Willard Dixon, OSHA Analytical Lab, spoke about quick tests which could be done in the field to readily identify whether asbestos is present. Some examples he gave were that fiberglass melts and makes a crinkling noise. Fiberglass is also easier to grind with mortar and pestle than asbestos.

Voelker Mohnen's main topic of discussion was the importance of describing the relationship between the mass of asbestos dust to the fibers present. He stressed that an adequate fiber size distribution relating particle size to mass is of great importance when determining health effects from exposure to airborne fibers. An EPA round robin experiment was conducted in which seven well known laboratories were given the task of analyzing the same air filter sample. Each of the laboratories came up with different results. Mohnen stressed that some means of standardizing asbestos fiber determinations was necessary. If these highly reputable labs showed such disagreement, what kinds of results can we expect from other labs lacking in their expertise.

A panel discussion with the various speakers was held in the afternoon, chaired by Benjamin Levadie, State of Vermont. He began the discussion by asking for an honest definition of asbestos. He also asked the audience to consider which forms of asbestos were most hazardous, serpentine or amphibole. Although amphibole is known to be very hazardous, this variety comprises only 5% of the asbestos which is used. The serpentine variety whose health effects are not entirely understood comprises 95% of the asbestos which is used. Questions then came from the floor concerning the rationale for the current aspect ratio used for fiber counting. A suggestion was that all physiologically active fibers ought to be regulated.

Each panel member was then asked to comment on which analytical technique is best and how it should be standardized.

McCrone commented that the problems are not with the methods, but with the analysts. He claimed that an optical crystallographic method was the only way to determine the crystallographic mineralogic species.

Mohnen didn't recommend any technique and wished to leave the standardization of methods to Willard Dixon.

Dixon made the recommendation that standard asbestos fibers for calibration purposes be made available through NBS. He suggested field by field instruction and analysis during counting procedures to standardize the NIOSH method and to employ dispersion staining techniques to verify the crystallographic structure.

Ian Stwert spoke about standardising techniques for crystallographic identification using the electron microscope.

Steven Bayer, who runs the NIOSH course in phase contrast microscopy claimed that he has been training individuals to count asbestos in a uniform manner since 1971. Whether or not this method is best, he has standardized it to the best of his ability.

Jim Ferguson's comment was that one technique can not be used for all purposes. The technique to be used should be dependent upon the type of sample to be analyzed.

No standardized or best method for the identification and evaluation of airborne asbestos was decided upon at this symposium. All the methods discussed had various drawbacks including time, cost, accuracy, and reproducibility.

Several of the attendees I spoke with, however, mentioned that they would be taking the McCrone course in dispersion staining.

In summary, the symposium was informative both in terms of the discussions of the various techniques available for asbestos identification as well as the problems associated with those techniques. However, those problems were not resolved.

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