

BOOK REVIEW

Short Course Notes on Mineralogical Techniques of Asbestos Determination, edited by R. L. Ledoux. Mineralogical Association of Canada Short Course Handbook 3, 1979, 279 pp.

For mineralogists working on “asbestos” analytical problems, *Short Course Notes on Mineralogical Techniques of Asbestos Determination* is a worthwhile acquisition. The volume contains the published versions of papers presented at the Mineralogical Association of Canada Short Course held at Laval University, Quebec, May 1979. Although fibrous clays are not mentioned at all, and fibrous zeolites are discussed only briefly, many clay mineralogists may wish to become familiar with certain of the political and scientific problems encountered in dealing with “asbestos.” One major problem involves defining just what is meant by “asbestos,” because size, chemistry, and morphology are all critical factors. Unfortunately, many previous workers were less than exact in applying definitions, and much unnecessary debate and confusion focused on such fundamental things as the difference between chrysotile and serpentine. Because clay mineralogists are no strangers to problems of particle shape and composition, an awareness of past problems might prevent similar difficulties as such fibrous materials come under review for possible negative health effects. The volume covers the subject of “asbestos” (actually asbestiform) minerals in a rather unique way. Mineral chemistry and crystallography are followed by brief sections on beneficiation and mining. Extensive coverage is then given to analytical methodology for fibers in air and liquids, but unfortunately only brief mention is made of methods for fibers in solid materials. In many of the chapters, environmental concern is the overarching theme. Finally, and very importantly, research perspectives are discussed and rationally outlined from what appears to be a nonzealot’s perspective.

In the first paper, Whittaker deals with the mineralogy and geochemistry of amphiboles, paying special attention to asbestiform varieties. The new International Mineralogical Commission nomenclature is presented in abbreviated form, and it is made clear that “amosite” (primarily asbestiform cummingtonite-grunerite) is not a mineral name and that crocidolite is the varietal name of asbestiform riebeckite. Yet, the author proceeds to use these terms throughout his chapter, even to the point of describing “amosite asbestos.” In addition, other authors in the text commonly use these discredited terms. One might have hoped that at least here in a mineralogical publication the nomenclature could have been consistent. A beginning section defining terms would have helped the reader and perhaps led to more editorial consistency. In the next paper Wicks gives a fine review of the crystal chemistry of the serpentine group. He suggests that the “polymorphs” chrysotile, lizardite, and antigorite can have slightly different compositions as a result of differing tectonogenic conditions. His observations on deciphering the thin-section petrography of these fine-grained assemblages indicates that more paragenetic information can be gleaned from retrograde metamorphic reactions than hitherto thought possible. While both papers on crystal chemistry review their topic well, it is surprising that the chrysotile paper was not given priority because chrysotile constitutes more than 90% of mined asbestos. On the other hand, it is a detriment to the volume that succeeding papers pay too little attention to the asbestiform amphiboles. There is evidence that certain of these materials can have a greater effect on health than chrysotile. The section on economic geology is limited to a paper by Cossette and Delvaux describing the technical evaluation of asbestos ore bod-

ies (actually just chrysotile ore bodies). This paper is much too detailed in its descriptions of testing apparatus; however it does present information on the difficulties of evaluating fiber value and length and the problems of determining inherent fiber characteristics and relating them to monetary values.

Chatfield presents what is probably the most thoughtful and useful paper in the volume. He begins by questioning just what constitutes asbestos—is it composition, crystallinity, or the number of scrolls in a roll? For anyone familiar with the regulatory agency and biological literature on asbestos, these are more than just philosophical questions. Too much time has already been spent in the field in cleaning up incorrect definitions and nomenclature of asbestos. Chatfield’s discussion of analytical methods gets to the heart of what the short course seems to have been organized for. He points out clearly that any analytical method selected for use must be capable of achieving the desired goal of precision and accuracy. His comments on counting statistics are especially useful, since statistical evaluation is something that is often overlooked when a claim is made that “asbestos is polluting something.” This paper reflects a serious analytical and scientific attempt to come to grips with what asbestos is, how do we measure it, and what do these measurements mean. Heidermann’s paper dealing with asbestos fine dust according to mass concentration is very difficult to follow. The rough English of the text and the many “typos” are annoying and interfere with the readability of the paper. Also, the extensive discussion of dispersion staining techniques is often confused with phase contrast methods. Barbeau discusses a relatively new approach to asbestos identification—wet chemical analysis—and points out the possibilities and difficulties of the method, rather than trying to prove its accuracy and precision in this volume. The paper by Trudeau described methods of evaluating asbestos concentration in the work place and is especially recommended for scientists interested in the environmental implications of laboratory methodology. A flow diagram of steps for asbestos abatement is given and amounts to the preparation of a “mini” Environmental Impact Statement. Of special note is the author’s statement “Let us remember that the main objective is not to comply with a standard or to measure dust levels, but rather to reduce the dust level as much as possible in order to insure health at the work place.”

The concluding paper by Gibbs summarizes the general problem of asbestos pollution and technology. He questions what *levels* of exposure should be considered for regulation and also what fiber *dimensions* and *compositions* can potentially cause harm. In some quarters “asbestos” is considered homogenous and totally dangerous. Although there is sound evidence that at least some forms of asbestos are truly dangerous, even in low concentrations, asbestos is a useful industrial material for which no substitutes have yet been found. As Gibbs notes, future research goals should also seek, for example, environmentally safe substitutes or ways of encapsulating asbestos so as not to present a danger. Gibbs foresees a future for asbestos, and I contrast that view with those who seek to remove it from our environment regardless of the social and fiscal cost. I recall the rhetorical question posed by Malcolm Ross of the U.S. Geological Survey concerning this proposed removal, “If we dig up all of the asbestos-containing cement pipe which carries water to our cities, what do we replace it with—hollowed-out logs?” Further, who pays for the

immense cost? If "asbestos" is truly dangerous, however, can society afford *not* to repair a mistake? Before we charge forward like Don Quixote, we certainly ought to make sure that our analytical methodologies and the biological and sociological implications of the data are clearly understood. In this matter, haste will clearly lead to waste.

This book will definitely be useful to those scientists interested in the "asbestos" problem and what may become a "fibrous clay" problem. Its moderate price and paperback for-

mat make it a good buy. Aside from the concentrated typographical errors in certain parts of the volume, the text is generally well written, legible, and up to the usual M.S.A. standards. The figures are very clear, and the quality of printing is excellent.

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