

Optical and morphological characterizations of amphibole and amphibole-asbestos collected from the former vermiculite mine near Libby, Montana, U.S.A. M.E. Gunter, B.R. Bandli, and B.M. Brown, Department of Geological Sciences, University of Idaho, Moscow ID 83844-3022.

In October 1999 we visited and sampled the former vermiculite mine near Libby, Montana. A suite of three amphiboles samples were selected based on differing geological settings within the mine: an in place sample, a vein sample, and a float sample. A polarizing light microscope (PLM) was used for morphological characterizations of grains mounts (i.e., measurement of lengths and widths) and, when equipped with a spindle stage, the refractive index and 2V, along with the thickness of the samples could also be found. When used correctly the PLM provides a rapid method to distinguish amphibole fragments from amphibole fibers in the lab or field.

Observations and measurements were made on approximately 300 particles from each of the three locations. Based on morphological properties (i.e., splayed ends vs. blunt ends, sharp extinctions vs. wavy extinctions, etc.) all three samples were composed almost evenly between 1/3 fibers, 1/3 fragments, and 1/3 that could not be classed with confidence as fiber or fragment. The average length, width (in microns) and aspect ratios were: fibers (234, 3.0, 90), fragments (94, 7.0, 22), unclassified (61, 2.3, 22).

Next size measurements (length, width, and thickness) were made on 50 particles taken from the vein sample with the aid of the spindle stage. Thirty-one of these samples turned out to be fibers with average length, width, and thickness (in microns): 574, 78, 53, and aspect ratios for length/width, length/thickness, and width/thickness: 11, 16, 1.5. For the nineteen fragments the average length, width, and thickness (in microns): 518, 62, 36 and aspect ratios for length/width, length/thickness, and width/thickness: 11, 22, 1.9.

Lastly the refractive indices and 2V were precisely determined for four single crystals from each of the three samples. The refractive indices ranges are: alpha 1.6177-1.6265, beta 1.6305-1.6370, gamma 1.6337-1.6417, and 2Vx 100-122. Ongoing chemical analysis of these samples shows them to vary in composition between winchite and richterite.