NIOSH Elongate Mineral Particle Research

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During the mining and processing of some mineral commodities and other rock types there is the potential to produce respirable dust containing naturally occurring elongate mineral particles (EMPs), including both asbestos and/or non-asbestos fibers. The United States National Institute for Occupational Safety and Health (NIOSH) estimated that 44,000 mine workers may be exposed to EMPs. EMPs have been documented to cause lung cancer and mesothelioma in humans in addition to fibrotic lung disease (asbestosis), with some estimating up to 76,700 EMP-caused lung cancer deaths between the years of 1980 and 2009. Unfortunately, there is little information available relating the geologies of the materials being mined to the potential for EMP exposure to mine workers. There is a strong need for research on fundamental mineralogical properties of EMPs—relevant to toxicology, epidemiology, and exposure assessment—and their geographic distribution, which industry can use as a basis for exposure monitoring and miner protection. This presentation will outline the NIOSH research addressing these concerns including: 1) assessment of miners’ potential exposure to asbestos and other EMPs by analyzing bulk material samples previously collected from copper, granite, gold, iron, limestone, sand and gravel, coal, and other types of mines across the country, 2) further elucidation of the toxicology of EMPs by creating new separation methods to allow both in vitro and in vivo toxicity tests on EMPs of specific lengths, widths and other characteristics of concern, 3) establishment of an application of qualitative and quantitative analysis of regulated asbestos and other EMPs for end-of-shift measurement using newly developed and novel techniques for EMP analysis, and 4) making new reference materials (anthophyllite asbestos and actinolite-tremolite asbestos) available to laboratories analyzing the elongate mineral particle fraction of bulk rocks and airborne dusts, and for toxicity testing.