Building a Dam out of "Naturally Occurring Asbestos"; Challenges and Solutions at the Calaveras Dam Replacement Project

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The San Francisco Public Utilities Commission is well into construction of the Calaveras Dam Replacement Project (CDRP), a new earthen dam in northern California designed to withstand a major earthquake on the nearby active Calaveras fault. The first phase of construction involved excavation and on-site disposal of 3 million tons of material including a highly complex assemblage of Franciscan subduction zone mélange containing fibrous minerals across the amphibole chemical spectrum. To date, 30 amphibole species and subspecies have been detected in air monitoring samples using the CARB AHERA counting rules. The second phase, in progress, is construction of the zoned dam using on-site materials. The upstream shell is constructed of blueschist rock composed primarily of fibrous glaucophane, a sodic amphibole similar to riebeckite, and winchite, one amphibole comprising the "Libby amphibole mix". This material is blasted from an on-site quarry, then loaded, hauled, and placed as engineered fill. The limited chemical range of amphibole in solid solution affords the opportunity to fingerprint site amphiboles, distinguish them from offsite amphiboles, and document their containment on site.

This project represents the largest construction project involving NOA in the country, and involves disturbance of one of the most complex geological and mineralogical units in the world. As such, applying regulations that were designed for building materials and routine construction sites, and controlling and monitoring airborne emissions on such a massive scale, is a major challenge.

After a review of the dam history, design, and some fault-related geotechnical challenges, this presentation will document how the NOA team, composed of geologists and industrial hygienists, is managing the NOA program, and in particular, how an innovative techniques are being applied to identify differentiate asbestiform amphiboles derived on site from those that are present off site.

Biography

Dr. Bradley Erskine is a Principal Geologist with Kleinfelder with 27 years of experience in managing and supporting a broad spectrum of environmental engineering projects. He holds a bachelor degree in geology from University of California Los Angeles, a Masters degree from San Diego State University (Paleomagnetics), and doctorate degree from the University of California at Berkeley in geology with a specialty in metamorphic petrology and mineralogy, and has applied this expertise to the evolving field of Naturally Occurring Asbestos. He currently is managing a $20M asbestos monitoring and compliance program for the San Francisco Public Utilities Commission, where excavation of 7 million yards of NOA material and construction using NOA containing rock is required to build an earthen replacement dam in northern California.