

REE-Be-U-enriched fluorite mineralization of the Round Top and Little Round Top laccolith-Cretaceous limestone contact zone and rhyolite breccias, Sierra Blanca peaks, Trans-Pecos Texas

O'Neill, L.C.¹, Kyle, R.¹, Elliott, B.²

LCO'Neill@utexas.edu

1. Department of Geological Sciences, Jackson School of Geosciences, The University of Texas at Austin, 1 University Station, C1100, Austin, TX 787122

2. The Bureau of Economic Geology, The University of Texas at Austin, University Station, Box X Austin, Texas 78713-8924

The Trans-Pecos region of Texas is the site of extensive Paleogene magmatic activity linked to subduction-related processes off southwest North America, including caldera-sourced felsic pyroclastics. This magmatic province also includes numerous plutons, most of which are shallowly emplaced rhyolitic-microgranitic laccoliths. More than 100 of these laccoliths are present in Trans-Pecos Texas and contiguous regions, but only a few have recognized mineral occurrences. Typically these metallic and industrial mineral concentrations form as replacement deposits in Permian to Cretaceous reactive carbonate rocks near laccolith contacts.

The Sierra Blanca peaks are comprised of five peraluminous laccoliths dated at 36 Ma northwest of the town of Sierra Blanca in Hudspeth County. The Round Top laccolith has been the focus of major exploration programs for beryllium in the 1980's and for REE from 2010-12 that has provided a large sample and information base. Prior studies of the Sierra Blanca laccoliths have indicated that they are enriched in Li, Be, Zn, Rb, Y, Zr, Nb, Sn, REE, and Th, and typically consists of 48-52% potassium feldspar, 28-30% quartz, 8-14% plagioclase feldspar, 4-5% biotite, and 2-3% opaques, dominantly magnetite-hematite. Prior microbeam studies indicate the common presence of subhedral zircons, with anomalous concentrations of U, Th, and Hf. Nb-Pb-rich grains probably are columbite-tantalite.

The rhyolite-limestone contact and northwest-trending faults are complexly brecciated with cementation by clay, fluorite, silica, and/or calcite. Unusual element enrichment, including beryllium and uranium, is notably highest at the Round Top intrusion-limestone wall rock contact and within brecciated rhyolite along faults.

Current studies of the Round Top laccolith indicate the presence of at least four unique rhyolites varying significantly by color, mineralogical composition, and texture, but believed to be of cogenetic origin. Further studies are underway to determine the geochemical variations and possible REE enrichment differences among the rhyolite types. Within the laccolith the rhyolites have mottled, cross-hatched, or striped textures of unknown origin but possibly linked to initial magma heterogeneity, and/or subsequent selective alteration. Characterization through petrographic and geochemical studies of the Round Top and Little Round Top rhyolites, and the fluorite cementation alteration-mineralization relationships are in progress to evaluate the role of magma chemistry, crystallization history, and hydrothermal processes in the enrichment of unusual elements.

Keywords: Trans-Pecos Texas, Sierra Blanca, Laccolith, Mineralization, Round Top, REE