Geology of the Cambrian-Ordovician Lemitar Carbonatites, Socorro County, New Mexico: Revisited

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Carbonatites are igneous rocks of magmatic origin that are composed of more than 50% carbonate minerals, less than 20% SiO2, and they can form economic deposits containing significant amounts of rare earth elements (REE), barite (Ba), fluorite (F), and niobium (Nb). REE are critical minerals and are critical to the functioning of information-age technologies because of their unique properties, i.e., high electric conductivity, strong magnetism, fluorescence, and luminescence. Carbonatites are currently the principal source of REE in the world. Carbonatites in the Lemitar Mountains are light REE enriched and contain as much as ~1% total rare earth elements (TREE). While previously described, new analytical techniques have allowed for additional and more precise description, age, and model of their origin. The Lemitar carbonatites from both 40Ar/39Ar and U/Pb methods are ~515 Ma. Petrographic observations combined with whole-rock geochemical and isotope data indicate the Lemitar carbonatites are mantle-derived and related to the regional Cambrian-Ordovician belt of alkaline igneous rocks and carbonatites in southern Colorado and New Mexico. The Lemitar carbonatites are not economic at the present time because of small tonnage and low grades. However, drilling is required to determine if they increase in REE and Nb concentrations at depth (1.1% total REE in one sample is significant). Detailed geophysics are required to determine if the Lemitar Mountains could have a larger carbonatite emplaced in the subsurface.

Keywords:
Lemitar, carbonatite, carbonatites, silicocarbonatite, rare earth elements, REE, geology, Socorro county, New Mexico, Cambrian, Ordovician

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