

SEG 2026 Conference in Salt Lake City, United States

Exploring for Critical Mineral in the Organ Mining District in Doña Ana, N.M.

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Critical minerals (CM) such as tellurium (Te), selenium (Se), and rare earth elements (REEs) are increasingly important to the U.S. economy, national security, and technological advancement. These elements are essential components of modern technologies including smartphones, electric vehicles, photovoltaic systems, and advanced defense systems. As demand for these materials continues to grow, re-evaluating historic mining districts provides an opportunity to identify overlooked critical mineral resources.

The Organ Mining District in southern New Mexico was active from 1847 through the 1930s and hosts mineralization within the Organ Mountains that is associated with the southwestern U.S. porphyry belt and Laramide magmatism. Historical mining activities primarily targeted lead, copper, and zinc, producing approximately \$3.4 million in ore during two major production periods between 1900–1909 and in 1935. In the 1980s, Conoco Inc. drilled 17 exploration boreholes while evaluating the district for porphyry copper mineralization, generating geochemical datasets for elements including Cu, Pb, Zn, Ag, and Au.

This study re-examines the district through targeted sampling of mine tailings, underground workings, and surface outcrops to evaluate the presence of overlooked critical minerals, particularly tellurium and bismuth. Geochemical analyses of collected samples reveal a distinct tellurium enrichment trend, indicating previously unrecognized potential for tellurium mineralization within the district. When integrated with historical exploration data, these results suggest that the Organ Mining District may represent a younger porphyry molybdenum system potentially influenced by magmatic and hydrothermal activity associated with the early stages of Rio Grande Rift extension.

These findings highlight the importance of re-evaluating legacy mining districts using modern geochemical approaches. Targeting overlooked critical minerals such as tellurium could significantly enhance the economic potential of the Organ district and contribute to meeting the increasing demand for strategic mineral resources.