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RADIOACTIVE PHONOLITE AND ASSOCIATED THORIUM - RARE EARTH - NIOBIUM VEINS IN THE LAUGHLIN PEAK AREA, CHICO HILLS, COLFAX COUNTY, NEW MEXICO*

By

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ABSTRACT

Unusual veins that contain potentially commercial amounts of thorium, niobium, and rare earths occur in an area of alkalic igneous rocks near Laughlin Peak, eastern Colfax County, New Mexico.

The filling of the principal vein is highly altered and its mineralogy and composition vary greatly. The vein contains an oxidized yellow-brown powder with abundant apatite and svanbergite; and a porous, fine-grained, brownish, crystalline aggregate of quartz, svanbergite, barite, apatite, kaolinite, anhydrite, and allanite(?). Amorphous or metamict thorium, iron, and niobium minerals and highly altered igneous rock may also be present.

Calcium, silicon, strontium, barium, phosphorus, aluminum, and iron are the major constituents of the vein material which contains as much as 2 percent thorium, 3 percent rare earths, and 0.6 percent niobium. A radioactive breccia zone north of the principal vein probably contains smaller amounts of thorium and rare earths. A radioactivity anomaly indicates a third possible mineralized structure south of the principal vein.

The veins are in an inlier of Dakota sandstone of Early Cretaceous age that was exposed by erosion of a thick radioactive phonolite sill complex of Tertiary age. The sill complex occupies the crest of the major El Rancho Grande anticline of Tertiary age near its intersection with the Sierra Grande arch of Pennsylvanian age. The veins are nearly parallel to subsidiary anticlines that extend from the major structure. More than 40 square miles of favorable ground remains to be prospected.

Thorium, niobium, rare earths, calcium, strontium, barium, and phosphorus are concentrated in the vein, in certain carbonatites, and in alkalic rocks associated with each. The vein material, like the carbonatites, is thought to be derived from alkalic magmas which produced the associated alkalic rocks. The ore fluid possibly was a carbon dioxide-rich fluid, perhaps evolved from the adjacent radioactive phonolite.