

Background and perspectives on the Pajarito Mountain yttrium–zirconium deposit, Mescalero Apache Indian Reservation, Otero County, New Mexico

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An important yttrium–zirconium deposit has been discovered at 8,014-ft-high Pajarito Mountain in the northeastern part of the Mescalero Indian Reservation, south of Ruidoso in south-central New Mexico. The accompanying article by Sherer (1990) briefly describes the geology and economic potential of this deposit, which will be developed by Molycorp, Inc. The purpose of this paper is to present some background information on previous work on the area and to provide insight into the significance of this deposit.

The presence of Proterozoic crystalline rocks at Pajarito Mountain was first confirmed by K/Ar dating reported by Kelley (1968) although previous workers (Thompson, 1942, p. 12; Lloyd, 1949, pl. 1) suggested that these rocks were Precambrian age. Motts and Gaul (1960), after detailed mapping and petrographic studies, presented compelling arguments for a Tertiary age of the complex, but subsequent dating reported by Kelley (1968) and the U.S. Geological Survey (Moore, Foord, and Meyer, 1988) confirm a Proterozoic age of about 1,100–1,200 Ma. These Proterozoic rocks consist of gabbro, syenite, quartz syenite, and alkali granite (Kelley, 1968; Condie and Budding, 1979; Moore, Foord, and Meyer, 1988; Sherer, 1990). The economic potential of the area was unevaluated until recently although a few reports suggested the area had potential for uranium and/or thorium (McLemore, 1982, 1983) and rare-earth elements (McLemore et al., 1988a, b) based entirely on the reported lithologies. The U.S. Geological Survey spent 1980–1982 mapping the northeastern part of the Mescalero Reservation (Moore, Foord, and Meyer, 1988; Moore, Foord, Meyer, and Smith, 1988); however, their work was not published until 1986 or later (Moore and Foord, 1986; Moore, Foord, and Meyer, 1988). Foord et al. (1983) had released some information earlier in the unpublished abstract of a talk at a Mineralogical Society of America symposium, and a confidential report had been written for the Mescalero tribe (Moore et al., 1985). Roeder et al. (1987) presented some chemical data on apatites from the Pajarito Mountain alkalic rocks. A geologist from Molycorp, Inc. sampled the Pajarito Mountain area on July 4, 1983, as part of a survey of alkalic-rock complexes in the western United States. Apparently, the U.S. Geological Survey and Molycorp, Inc. worked independently of each other in the early 1980's.

The Pajarito Mountain deposit is unusual because the ore mineral is eudialyte, a zirconium silicate that, here, contains yttrium. The eudialyte is disseminated throughout syenite, quartz syenite, and alkali granite. This will be the first deposit in the world

mined solely for yttrium and zirconium, which are typically produced as coproducts or by-products of mining other commodities (U.S. Bureau of Mines, 1989).

Yttrium is used in phosphors in color televisions and computer monitors, laser crystals, zirconia electrolytes, superalloys, catalyst substrates, heating elements, synthetic garnets for microwave and other electronic applications, and ceramics and glass. Orpac, Inc. has introduced a yttrium concrete, and yttrium also may have potential use in superconducting materials. Zirconium is used in foundry sands, refractories, ceramics, and abrasives (U.S. Bureau of Mines, 1989).

Access to the Pajarito Mountain deposit is heavily restricted and currently permission must be obtained from both the Mescalero Indian Tribe and Molycorp, Inc. before entering the area.

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