

Uranium Mineralization in the Todilto Formation, New Mexico: Resource Potential and Uranium Sources

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The Jurassic Todilto Formation of northern New Mexico hosts important uranium deposits, mostly north and west of Grants, New Mexico. The deposits occur in the lower Luciano Mesa Member, in limestone. Most primary ore bodies are localized by intraformational folds within the limestone. The folds have a wide variety of geometries in cross section. Many are less than ten meters in cross-sectional width. Some resemble tepees, but most have mappable fold axes that can be traced for tens of meters or more. Some ore bodies occur in trends; intraformational fold axes are subparallel to the trend or are randomly oriented. Primary ore minerals include uraninite, coffinite, and blue-black vanadium minerals, with accessory calcite, fluorite and barite. Some near-surface deposits have been oxidized, yielding tyuyamunite and metatyuyamunite, the calcium analogs of carnotite, which form preferentially in the calcium-rich limestone environment. Other oxidized ore minerals include uranophane and schroëckerite.

The age of primary Todilto mineralization is estimated at 150-155 Ma based on concordant and nearly concordant U-Pb ages for uraninite. Discordance in some dated samples is attributed to loss of Pb with preferential loss of ²⁰⁶Pb resulting from migration of relatively long-lived daughters in the ²³⁸U decay chain. The age of the Todilto is believed to be Callovian (about 165-161 Ma) and thus mineralization occurred relatively soon after deposition. Resource potential for Todilto uranium is uncertain. The formation was prospected intensely following initial discoveries around 1950; most near-surface deposits have probably been discovered and are now mined out, with a few exceptions. Deeper deposits down dip were mined to depths of 400 ft or more. Mineralization at greater depths is likely; uranium minerals in the Todilto were intersected in deep drill holes up to 1000 ft below Ambrosia Lake. Narrow and elongated Todilto ore bodies could be missed in deep drilling. The most likely sources of Todilto uranium were voluminous ash deposits from the Jurassic volcanic island arc to the west, and a granitic highland enriched in uranium to the south and southwest. Uranium Energy Corporation is currently evaluating Todilto deposits in the Ambrosia Lake area for possible development.