

The Grants Uranium District, New Mexico: Update on Source, Deposition, and Exploration

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More than 340 million lbs of U₃O₈ have been produced from the Grants deposits between 1948-2002 and approximately 560 million lbs of U₃O₈ remain as unmined resources, making it one of the largest uranium provinces in the world. The Grants district extends from east of Laguna to west of Gallup, in the San Juan Basin, New Mexico. Four types of sandstone-uranium deposits are recognized: tabular, roll-front, fault-related, and remnant-primary. The tabular deposits formed during the Jurassic Westwater Canyon time. Subsequently, oxidizing solutions moved down-dip modifying tabular deposits into rollfront and fault-related deposits. Evidence, including age dates and geochemistry of the deposits, suggests that roll-front and fault-related deposits were formed possibly as early as Early Cretaceous and from a second oxidation front during the mid- Tertiary. The source of uranium is important in understanding how the Grants deposits formed. The Zuni Mountains, a granitic highland enriched in uranium (as much as 11 ppm) and with high heat flow, lies south of the district.

Another potential source is Jurassic arc volcanism southwest of the San Juan Basin. Uranium was leached from both the Jurassic volcanics and the Precambrian granites and these waters migrated into the San Juan Basin. These waters then mixed with uranium in pore water being leached from the volcanic ash that covered much of the area during Jurassic times. The uraniferous groundwater migrated into the Westwater Canyon sandstones and precipitated in the vicinity of humate and other organic material to form the tabular uranium deposits. Uranium from different sources actually aids in understanding the complexity and local differences within the tabular deposits, which then had a major impact on the remobilization and redistribution of uranium to form the redistributed deposits. Several companies are active in the district. Future development of these reserves and resources will depend upon the lowering of production costs, perhaps by insitu recovery techniques and the resolution of regulatory issues.