Sandstone uranium deposits: examples from the grants district, New Mexico - the largest uranium producers in the U.S.A.

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New Mexico ranks second in uranium reserves in the U. S., which amounts to 15 million tons ore at 0.277% U_3O_8 (84 million lbs U_3O_8) at $30/lb (13.6 million tonnes ore at 0.237% U at $78/kg U) (Energy Information Administration, 2000). The most important uranium deposits in the state are sandstone uranium deposits within the Morrison Formation (Jurassic) in the Grants uranium district, San Juan Basin. More than 340 million lbs of U_3O_8 (130 000 tonnes U) have been produced from the Grants uranium deposits from 1948 through 2000, accounting for 97% of the total uranium production in New Mexico and approximately 30% of the total uranium production in the United States. During a period of nearly three decades (1951–1980), the Grants district in northwestern New Mexico produced more uranium than any other district in the United States. The Grants district is one large district in the San Juan Basin, extending from east of Laguna to west of Gallup and consists of eight subdistricts. The Grants district is probably 4th in total world production behind East Germany, Athabasca Basin in Canada, and South Africa. However, as of spring 2006, all of the conventional underground and open-pit mines in New Mexico remain closed. However, several companies are currently exploring for uranium in sandstone in the Grants district for possible in situ leaching.

Sandstone uranium deposits are defined as epigenetic concentrations of uranium in fluvial, lacustrine, and deltaic sandstone formations. Three types of sandstone uranium deposits are recognized: tabular (primary, trend, blanket, black-band), roll-front (redistributed, post-fault, secondary), and fault-related (redistributed, stack, post-fault). In addition, a fourth type is found in the Grants district, remnant-primary sandstone uranium deposits. All three types are found in the Grants district.

Only one company in New Mexico, Quivira Mining Co. now owned by BHP Billiton (successor to Rio Algom Ltd and Kerr McGee Corporation), produced uranium in 1984–2000 from mine waters recovered from inactive underground operations at Ambrosia Lake (mine-water recovery). Quivera is reclaiming their uranium properties in the Ambrosia Lake and has sold their remaining assets to Strathmore Minerals Corp. Hydro Resources Inc. (HRI) has delineated 7 350 tonnes of U_3O_8 at

Churchrock and 15 000 tonnes of U_3O_8 at Crownpoint. HRI plans to mine uranium by in-situ leaching at Churchrock starting in 2007. Reserves at Churchrock are estimated as 15 million pounds of U_3O_8. Strathmore has demonstrated uranium resources at Roca Honda of 11 321 200 contained lbs U_3O_8 and at Churchrock of 5 502 000 contained lbs of U_3O_8 and plans for in situ leaching are underway. Strathmore also has uranium resources at the Noserock property. Quincy Energy Corp and NZU LLC also are planning to mine 5 000 tonnes of U_3O_8 at Hosta Butte by in-situ leaching. Rio Grande Resources Co. is maintaining the closed facilities at the flooded Mt. Taylor underground mine, in Cibola County. Laramide Resources Ltd. acquired the La Jara Mesa uranium deposit in Cibola County, which was discovered in the late 1980s in the Morrison Formation and contains approximately 8 million pounds of 0.25% U_3O_8. Laramide also acquired the Melrich deposit. Future development of these reserves and resources will depend upon the lowering of production costs, perhaps by in-situ leaching techniques and timely approval of required permits.