

## **Uranium Exploration in the Rocky Mountain Region**

**Samuel B. Romberger**

*Geological Engineering, Colorado School of Mines, Golden, CO.*

Exploration for uranium in the Rocky Mountain Region has been driven by a number of factors, including type of deposit, historical mining, improved extraction technology, environmental issues, economic factors, and capital availability. Despite the improvement of the uranium market in the last 10 years, few new deposits have been discovered in the region. Production continues to be dominated by the In Situ recovery facility at the sedimentary rock-hosted deposit at Smith Ranch in the Powder River Basin of Wyoming. However, several properties have promise of developing into mines. Mitigating factors affecting the interest in uranium exploration are the abundance of cheap fossil fuels, public skepticism about the role of alternative fuels in U.S. power generation, and access restrictions imposed by local political entities.

Exploration activity is concentrated around known districts within sedimentary basins of central to eastern Wyoming and southwestern South Dakota, the Colorado Plateau of Utah and Colorado, the Grants-Laguna belt in New Mexico, and the breccias-pipe field in northwestern Arizona. Each area has unique exploration challenges and politico-social issues. With the exception of the Arizona breccia pipes, most deposits are of the sandstone-hosted type, where favorite targets are channel facies within paleo-fluvial systems which served as important aquifers for the transport and localization of uranium ores. However, each area has its own characteristic geologic features that must be considered in developing exploration models. In Wyoming, most ore is hosted in early Tertiary arkosic channel sandstones eroded from uplifts cored by Precambrian granites. The source of uranium is arkosic material eroded from uranium-enriched granites or tuffaceous material deposited with the sediments. Uranium deposition resulted from reduction along channel flanks, and deposits typically have a distinctive "roll" morphology.

On the Colorado Plateau, uranium occurs as tabular deposits within fluvial members of the Jurassic Morrison Formation localized in coarse channel facies containing abundant terrestrial fossil material. Individual deposits are small, where the ore grade is related to the abundance of organic material which served as the primary reductant. Similar units host the mineralization in New Mexico, however, structure is complex and primary tabular ores were remobilized into roll fronts and along faults as a result of changes in the hydrologic regime during uplift. The Arizona breccia pipes are collapse features that bottom in the Mississippian Red Wall Limestone and the tops are often concealed beneath younger sediments. Even though concealed, the pipes exhibit a subtle circular topographic low. High grade ore occurs at a particular stratigraphic horizon below a sulfidiferous cap.