

ern San Juan basin, northwestern New Mexico. Isopleth maps illustrate geometry of the major depositional units, distribution of sandstone depocenters, and large-scale lithofacies variations within the units. A reconstruction of topography at the base of the Westwater Canyon Member shows a series of subparallel paleotopographic lows and highs that trend east-southeast. The Westwater Canyon is thick and sandy along paleotopographic lows, but is thin and less sandy over the paleotopographic highs. These relationships suggest active structural control of sedimentary facies along east-southeast-oriented folds or faults by differential subsidence during deposition of the unit. Locally, east-southeast-oriented basement faults that were episodically reactivated since the Precambrian may be detected by detailed seismic reflection studies.

Depositional patterns and lithofacies distribution, in turn, appear to have controlled the location of uranium deposits. Primary and remnant uranium ore in the Westwater Canyon is restricted to east-southeast-trending depocenters defined by anomalously thick and sandy facies with relatively high sandstone:mudstone ratios. Redistributed ore is also localized in anomalously thick zones of the Westwater Canyon with relatively low sandstone:mudstone ratios.

KLUTH, CHARLES F., Chevron U.S.A., Inc., Denver, CO

Plate Tectonics of Ancestral Rocky Mountains

The Ancestral Rocky Mountains were intracratonic block uplifts that formed in Colorado and the surrounding region during Pennsylvanian time. Their development related to the collision-suturing of North America with South America-Africa, which also resulted in the Ouachita-Marathon orogeny. During Early Pennsylvanian time, suturing was taking place only in the Ouachita region, and foreland deformation took place largely in the Mid-Continent. By Middle Pennsylvanian time, the length of the suture zone had increased, and it was active from the Ouachita to the Marathon region. At this same time, deformation of the craton also increased in intensity and in areal extent, culminating in the Ancestral Rocky Mountains. By Late Pennsylvanian time, suturing was taking place only in the Marathon region, and cratonic deformation decreased areally, spreading southward into New Mexico and west Texas and west into the Cordillera miogeocline. The Ancestral Rocky Mountains, and related features over a broad area of the western United States were formed while an irregularly bounded peninsula of the craton (including the transcontinental arch) was pushed northward and north-westward by the progressive collision-suturing of North America and South America-Africa. This intraplate deformation is, in some respects, similar to the deformation of Asia in response to the Cenozoic collision with India.

KOELMEL, MARK, Chevron U.S.A., Inc., Denver, CO

Paleotectonic, Stratigraphic, and Diagenetic History of Weber Sandstone, Rangely Area, Colorado

Rangely field is in Rio Blanco County, Colorado, on a doubly plunging anticline of Laramide age. The Rangely structure is asymmetrical with the steepest flank to the southwest. The Permo-Pennsylvanian Weber Sandstone is the primary producing formation with cumulative production exceeding 670 million bbl of oil. The Weber is a subarkosic arenite deposited in an eolian regime. It interfingers with the alluvial Maroon Formation in the southern and southeastern portions of Rangely field. Isopach maps of the Pennsylvanian formations suggest a paleotectonic platform in the Rangely area and a Permo-Pennsylvanian north-south-trending arch west of the Laramide-age Douglas Creek arch. Hydrocarbons migrated into the Rangely area prior to the Laramide orogeny and were stratigraphically trapped at the Weber-Maroon transition zone. Subsequent Laramide structure localized and hydrocarbon accumulation.

Diagenetic history of the Weber Sandstone differs between the Uinta and Piceance basins. Weber diagenesis in the Uinta basin is dominated by silica precipitation and porosity appears to be residual primary. Weber diagenesis in the Piceance basin includes dissolution of detrital material and precipitation of a complex sequence of carbonate cements. Weber porosity in the Piceance basin appears to be both residual primary and secondary. The boundary between these two diagenetic regimes appears to coincide with the Pennsylvanian paleoarch.

KWARTENG, A., L. SALAZAR, P. GOODELL, and G. R. KELLER, Univ. Texas at El Paso, El Paso, TX

Potential Exploration Targets for Roxby Downs-Olympic Dam Type Mineral Deposits

The Olympic Dam deposit near Roxby Downs, central South Australia, appears to be another type of sediment-hosted stratabound ore deposit. It contains copper, gold, silver, uranium, and rare earths, and in terms of present market prices, is valued at over \$100 billion, making it one of the world's most valuable deposits. When brought on line in 1988, the projected production of 4,000 tons/year of U_3O_8 as a by-product will have a significant impact on the world uranium market.

The deposit is hosted in middle Proterozoic rocks in a deep, small basin within the Gawler craton, and is overlain by 350 m (1,148 ft) of unmineralized late Proterozoic miogeoclinal Adelaidean sediments on the Stuart shelf. The nearest host rocks are no closer than 150 km (93 mi). According to Western Mining Corporation, the discovery resulted from regional considerations, with target selection being decided by nearly superimposed gravity and magnetic highs identified from detailed geophysical studies.

The present study is a synthesis and integration of large amounts of geological, geophysical, and geochemical data available from the South Australian Department of Mines and Energy, mining companies, and universities. The presence of a probable analog deposit at Mt. Painter, approximately 270 km (168 mi) east-northeast of Olympic Dam, available for field study and sampling, makes possible the testing of ideas and hypotheses. The exposed Gawler craton and surface and drill core samples from Mt. Painter have supplied materials for further study.

Plate tectonic reconstructions of the Gawler craton make it possible to apply Olympic Dam genetic models to other continents. The present study undertakes this application to the United States resulting in several areas being interesting targets.

LAMERSON, PAUL R., Chevron Corporation, Denver, CO

Fossil Basin and its Relationship to Absaroka Thrust System, Wyoming and Utah

The Fossil basin of southwestern Wyoming and adjacent north-central Utah is a Late Cretaceous-early Tertiary depositional basin formed largely on the hanging wall of the Absaroka thrust system. The basin is divided into the northern Fossil basin and the southern Fossil basin by the cross-basinal, northwest-southeast-trending Little Muddy Creek transverse ramp, which appears to be related to a lateral change in the stratigraphic position of the Absaroka thrust fault in both hanging wall and footwall rocks. The Absaroka thrust sheet is characterized by distinctly different structural styles north and south of this transverse ramp.

North of the ramp the Late Cretaceous-early Tertiary northern Fossil basin lies between the toe of the Absaroka thrust on the east and the Rock Creek anticline on the west. The basin was created by movement on, and erosion, of the Absaroka thrust sheet in pre-late Campanian-Maestrichtian time. Exploratory drilling has not as yet found significant oil and gas reserves in the northern Fossil basin even though Ordovician Bighorn Dolomite on the hanging wall of the Absaroka thrust has been juxtaposed with Cretaceous source beds in the footwall.

South of the transverse ramp the Late Cretaceous-early Tertiary southern Fossil basin lies between the toe of the Absaroka thrust system on the east and structure created on the hanging wall of the Medicine Butte thrust on the west. Within the southern Fossil basin, Cambrian through lower Upper Cretaceous rocks within the Absaroka thrust sheet are in fault contact with organic-rich Lower Cretaceous (on the west) and lower Upper Cretaceous (on the east) source rocks in the footwall. Essentially all oil and gas production established to date has been found in the southern Fossil basin in three lines of folding in the Absaroka thrust hanging wall. The westerly two lines of folding produce from Paleozoic and, locally, Mesozoic objectives, and the easterly folding produces from Mesozoic objectives. Exploratory and development drilling permits better interpretation of timing of thrust motion and subsurface structural geometry in the Fossil basin area.

LANGMAN, JAMES W., Independent, Littleton, CO

Parautochthonous Core-Thrusting Kink Folds and Chronologic Sequence of Thrusting, La Barge Platform, Sublette County, Wyoming