Cutler Formation increases 1,050 ft (320 m) in thickness across the Orvis fault, which had down-to-the-south movement. During the Laramide orogeny, a significant reversal in movement occurred along the fault to cause the north-dipping monocline now present at the surface.

WELLS, STEPHEN G., and ROSE DEVON, Univ. New Mexico, Albuquerque, NM

Geomorphic Applications to Landscape Stability and Surface Coal Mining Reclamation, Northwestern New Mexico

The long-term success of surface coal mining reclamation in the strippable coal belts of northwestern New Mexico is dependent on the relative stability of undisturbed and restored landscapes. Landscape stability is measured by the rate of modification of a landscape component of a given age. Field instrumentation in selected watersheds measures modern rates of modification. Areas of rapid modification, or relative instability, include headwaters of high-relief watersheds and areas of active base-level lowering. Studies of the Quaternary geomorphic history in the coal belts indicate a variety of landscape ages. Relict landscapes of the Pleistocene indicate long-term stability, and many of these landscapes have been preserved by upper Quaternary eolian deposits. These stable landscapes are characterized by high infiltration rates, low sediment yields, low relief, and relatively dense root systems. Landscape classification schemes incorporating modern geomorphic processes and relative landscape ages serve as analogs for reclaimed landscapes.

Evaluating the success of postmining reclamation procedures requires that both internal (within reclaimed areas) and external (outside reclaimed areas) geomorphic variables be considered. Internal geomorphic variables include hillslope gradients and areal configurations, infiltration rates, degree of drainage integration, and surface roughness. External geomorphic variables include base-level changes, arroyo-headcutting rates, valley-fill geometry, and the ratio of bedrock to valley fill. Engineering designs are significant to internal variables, whereas the geomorphic history of a watershed influences the external variables. Research at the McKinley coal mine in northwestern New Mexico suggests that external variables pose the greatest threat to reclaimed landscapes.

WENNER, D. B., Univ. Georgia, Athens, GA, J. S. STUCKLESS, U.S. Geol. Survey, Denver, CO, and K. K. CHANG, Univ. Georgia, Athens, GA

Constraints on Origin of Granitic Uranium-Source Rock, Granite Mountains, Wyoming

The origin of the granite of Lankin Dome from the Granite Mountains is of special interest to uranium geologists because of its spatial association with the large uranium deposits in central Wyoming and because the granite lost more than 5.5×10^{10} kg of uranium at approximately the same time as the surrounding deposits formed. Furthermore, the granite has been shown to be the source of the sediments that host the uranium ores. Thus, recognition of similar granites may lead to the discovery of hidden uranium deposits.

Chemical and radioisotope studies have suggested that the granite of Lankin Dome was derived from a sedimentary protolith. Stable isotope studies support this hypothesis and show that this granite is anomalously enriched in O^{18} relative to other Archean granites in Wyoming. δO^{18} values for the granite of Lankin Dome, the Louis Lake batholith, and the granite of the Owl Creek Mountains are 8.44 ± 0.34 ($n = 36$), 7.45 ± 0.40 ($n = 15$), and 7.43 ± 0.17 ($n = 4$), respectively. Investigations in progress indicate that the northern Laramide Range may be composed of more than one granite, and that at least part of the Archean granite has lower δO^{18} values than the mean observed in the Granite Mountains. Altered rocks within the granite of Lankin Dome are anomalously depleted in O^{18}, which suggests interaction with meteoric waters. The effects of this event on the uranium history are being investigated.

The combined oxygen and chemical data suggest at least a partly pelitic protolith, which was probably enriched in uranium, for the granite of Lankin Dome. By analogy, other crustally derived granites, within an area of general uranium enrichment, may prove to be favorable uranium source rocks.

WILSON, LEE, Santa Fe, NM

Potential for Ground-Water Pollution in New Mexico

Significant contamination of ground water requires, in combination, a source of pollutants, an aquifer which is susceptible to pollution, and geologic pathways capable of conveying contaminants to the aquifer. In New Mexico, major sources include pumping-induced saline intrusion, mill wastewater, septic-tank effluent, and (historically) brine disposal. Leaks, spills, municipal wastewater, animal confinement facilities, mine drainage, and industrial wastewater are locally important. Valley fill alluvium and fractured limestones represent the most vulnerable aquifers. Significant pathways reflect a highly permeable and/or thin vadose zone, or the presence of improperly constructed and abandoned wells which bypass vadose-zone protection. Northwestern and southeastern New Mexico contain most of the areas where sources, vulnerable aquifers, and pathways coexist. Because ground-water flow rates in vulnerable aquifers are generally 70 to 700 ft (21 to 213 m) per year, potential zones of pollution will be small and difficult to monitor. A surprising amount of ground-water monitoring occurs in the state, pursuant to regulatory programs, project evaluations, and scientific research. Monitoring can be improved through: (1) coordination of monitoring activity (especially among government agencies); (2) more focus on characterizing the pollutant sources; (3) measurements which define the hydrogeologic flow system in the immediate vicinity of the source; (4) reliance on indicator parameters rather than on comprehensive testing of water quality; and (5) much better quality control of the field sampling and laboratory analysis of ground water.

WOLBERG, DONALD L., New Mexico Bur. Mines and Mineral Resources, Socorro, NM, and J. KEITH RIGBY, JR., U.S. Bur. Land Management, Albuquerque, NM

Paleontology of "Fossil Forest," Interesting Late Cretaceous Fossil Assemblage, San Juan Basin, New Mexico

The Fruitland Formation in the region of the Bisti badlands contains a diverse and abundant fossil flora and fauna of Late Cretaceous age. Potential development of the substantial Fruitland Formation coal reserves has led to a cooperative investigation of a Fruitland "fossil forest" by the New Mexico Bureau of Mines and Mineral Resources and the U.S. Bureau of Land Management.

Within the fossil forest study area, at least 21 m of upper-