as a result of strip mining or by erosion and deposition.

The Dilco, Gibson, and Cleary coal deposits are part of an intertonguing sequence of Upper Cretaceous marine and nonmarine deposits consisting principally of fine-grained clastics. Aquifer tests have established a range for the hydrologic parameters of strata in the coal sequence. Chemical quality of the ground water also has been determined.

Natural erosion of the coal deposits generally occurs in the form of mass wasting, sheet wash, and eolian deposition. This material is periodically reworked by ephemeral streams to produce thin valley-fill deposits. Infiltration of runoff into the underlying sediment creates a perched ground-water aquifer that is likely to go dry during periods of limited runoff. These ephemeral aquifers have hydrologic characteristics and water quality similar to the undisturbed coal sequences.

Through conventional reclamation processes, spoil material replaces the original coal sequence. The spoil material has been found to have hydrologic characteristics and water quality similar to the natural coal-bearing deposits and the valley-fill material.

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Geologic Controls of Uranium Mineralization in Tallahassee Creek Uranium District, Fremont County, Colorado

Two important orebodies have been defined by drilling in the Tallahassee Creek uranium district, Fremont County, Colorado. They are the Hansen orebody, which contains about 12 million kg of U_3O_8, and the Picnic Tree orebody, which contains about 1 million kg of U_3O_8. Host rock for the Hansen is the upper Eocene Echo Park Alluvium, and host rock for the Picnic Tree is the lower Oligocene Tallahassee Creek Conglomerate. Average ore grade for both deposits is about 0.08% U_3O_8.

The principal source rock for the uranium in the deposits is the lower Oligocene Wall Mountain Tuff, although a younger volcanic rock, the Oligocene Thirtynine Mile Andesite, and Precambrian granitic rocks probably also contributed some uranium. Leaching and transportation of the uranium occurred in alkaline oxidizing ground water that developed during alteration of the ash in a semiarid Oligocene or early Miocene environment. The uranium was transported to sites where it was deposited in a reducing environment controlled by carbonaceous material and biogenic products such as hydrogen sulfide.

Localization of the ore was controlled by ground-water-flow conditions and by the distribution of organic matter in the host rock. Ground-water flow, which was apparently to the southeast in Echo Park Alluvium that is confined in the Echo Park graben, was impeded by a fault that offsets the southern end of the graben. This fault and attendant displacement prevented efficient discharge into the ancestral Arkansas River drainage, and protected chemically reducing areas from destruction by the influx of excessive amounts of oxidizing ground water. Localization of orebodies in the Echo Park Alluvium may have occurred in areas where overlying rocks of low permeability were breached by erosion during deposition of the fluvial Tallahassee Creek Conglomerate (which overlies the Wall Mountain Tuff), allowing localized entry of uranium-bearing water. Paleohydrologic control in Tallahassee Creek Conglomerate may have been affected by the alteration of pervious ash beds to impervious clay beds.

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Palynological Evidence for Miocene Age of Abiquiu Tuff, North-Central New Mexico

The Abiquiu Tuff crops out at the north end of the Nacimiento uplift and in the western part of the Espanola basin in north-central New Mexico. No paleontologic or radiometric age dates have been published for this unit, but regional correlations based on lithology and stratigraphic position suggest a Miocene age. At the south end of the Nacimiento uplift are extensive outcrops of the Zia sand of early to middle Miocene age based on vertebrate fossils. Between the outcrops of these two units are scattered exposures tentatively identified as Abiquiu(?) formation.

To determine if the Abiquiu Tuff, Zia sand, and Abiquiu(?) formation are stratigraphically equivalent, sections of each were analyzed for pollen content. The Abiquiu Tuff near the village of Abiquiu, the Zia sand at its type locality near Zia Pueblo, and an outcrop in the Nacimiento uplift near Gilman were sampled at 30-ft (9.3 m) intervals. Most samples were barren, but sufficient pollen was recovered to indicate a Miocene age for all of the outcrops. Pollen from the Abiquiu Tuff and Zia sand are similar to pollen from the Miocene Split Rock Formation of Wyoming and Brown's Canyon Formation of Chaffee County, Colorado.

The Zia sand and Abiquiu Tuff are exposed along the west margin of the Rio Grande rift. Extensional faulting that cuts these formations cannot have occurred earlier than late Miocene. The Abiquiu(?) formation at Gilman rests against Precambrian rocks along the Sierrita fault, the major bounding fault between the south part of the Nacimiento uplift and the Rio Grande rift. The juxtaposition of Miocene and Precambrian rocks along this fault indicates that 530 to 685 m of movement associated with rifting and uplift occurred in post-middle Miocene time.

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Preliminary Pore Structure Analysis of Tight Sandstones Using Computer-Processed Photomicrographs

The complexity of pore networks in fine-grained low-permeability sandstones makes accurate modeling of fluid-flow properties difficult owing to the lack of quantitative information concerning the pore structure. Many such sandstones in the Uinta basin, Utah, are reservoirs for large amounts of natural gas. These sandstones, most of which are Tertiary and Cretaceous in age, commonly contain pores that vary greatly in size. Variation in pore size is partly due to the dissolution of mineral grains and pore-filling cement; however, many of the secondary pore spaces contain authigenic clay, principally illite and kaolinite, which has served to create micropore space.

We have developed a method to digitize and quantify pore networks of fine-grained rocks using the apparent pore space observed in photomicrographs of thin sections. By digitizing numerous photographs, statistical data were generated, thereby making it possible to address the problem of pore structure. Pore structure data include such parameters as the pore size and shape, anisotropy of the pore arrangement within the rock matrix, and pore connectivity.

Specimens obtained from CIG Exploration, Inc., Natural Buttes 21 cores (Sec. 15, T10S, R22E) were used to determine