GALLOWAY, W. E., Bur. Econ. Geol., Univ. Texas, Austin, Tex.

Deposition and Early Hydrologic Evolution of Westwater Canyon Wet Alluvial-Fan System

The Westwater Canyon Member is one of several large, low-gradient alluvial fans that comprise the Morrison Formation in the Four Corners area. Morrison fans were deposited by major laterally migrating streams entering a broad basin bounded by highlands on the west and south. The Westwater sandstone framework consists of a down-fan succession of (1) proximal braided channel, (2) straight bedload-channel, (3) sinuous mixed load-channel, and (4) distributary mixed load-channel sandstone bodies. Regional sandstone distribution and facies patterns are highly digitate and radiate from a point source northwest of Gallup, New Mexico.

Early groundwater flow evolution within the Westwater fan aquifer system can be inferred by analogy with Quaternary wet-fan deposits and by the interpreted paragenetic sequence of diagenetic features present. Syndepositional flow was controlled by the down-fan hydrodynamic gradient and high horizontal and vertical transmissivity of the sand-rich fan aquifer. Groundwater was abundant, fresh, and slightly alkaline; dissolution and transport of soluble humate would be likely. With increasing confinement of the aquifer below less permeable tuffaceous Brushy Basin deposits and release of soluble constituents from volcanic ash, flow patterns stabilized and relatively more saline, pregnant groundwater permeated the aquifer. Uranium mineralization occurred during this early postdepositional, semiconfined flow phase. Exposure, erosion, and possible further flushing of proximal fan deposits had little apparent effect on the aquifer. Development of overlying Dakota swamps suggests a shallow water table indicative of regional discharge or stagnation. In either event, only limited downward flux of acidic water is recorded by local bleached, kaolinized zones where Westwater directly underlies the Dakota. Subsequent groundwater flow phases have further obscured primary alteration patterns and caused some local oxidation and redistribution of uranium.

GREEN, MORRIS W., U. S. Geol. Survey, Golden, Colo.

Disconformities in Grants Mineral Belt and Their Relation to Uranium Occurrence

At least two major, regionally extensive, intraformational disconformities and numerous local ones are present in sedimentary rocks of Triassic, Jurassic, and Cretaceous ages in the Grants mineral belt. These disconformities, some of which have been known for many years, have proven useful in stratigraphic correlation and in differentiating genetically related rock sequences in the mineral belt. In addition, two of these disconformities, one local and the other regional, are significantly associated with the distribution of sandstone-type uranium deposits in the Jurassic Morrison Formation and the overlying Cretaceous Dakota Sandstone.

The Westwater Canyon Member and laterally equivalent beds of the Recapture and Brushy Basin Members of the Morrison Formation are separated from underlying Jurassic rocks by an intraformational disconformity which marks a major change in depositional environment from predominantly sabkha–eolian dune to fluvial-lacustrine within the Jurassic sequence. This disconformity is economically significant in that all of the large uranium deposits in rocks of Jurassic age in the mineral belt occur within fluvial sandstone facies of the Morrison above the disconformity. Recognition of this disconformity in outcrop and in the subsurface is important in delineation of exploration target areas and resource assessment in the San Juan basin.

Uranium deposits in the basal part of the Dakota Sandstone are associated with the well-known regional, southward-beveling disconformity present at the lower boundary of the Dakota throughout the San Juan basin and adjacent region. In the western part of the mineral belt, impermeable Brushy Basin shales have been truncated at this disconformity and uranium-bearing groundwaters from the Morrison Formation have migrated into basal organic-rich sandstone of the Dakota to produce several small to medium-sized uranium deposits.

HAYSLIP, D. L., G. E. FULLER, P. W. LEVY, Brookhaven Natl. Lab., Upton, N. Y., and J. R. RENAULT, New Mexico Bur. Mines and Mineral Resources, Socorro, N. M.

Thermoluminescence of Uranium Host Rocks in Ambrosia Lake Area

Exposure to radiation during the formation or redistribution of uranium ore deposits is expected to affect the thermoluminescence (TL) properties of the host rock. For example, TL measurements on samples from a traverse of a Wyoming roll-type deposit display the following intensity-versus-distance pattern. Starting from barren oxidized ground the intensity increases gradually with decreasing distance to ore, is extremely high in ore, and drops abruptly with distance in reduced ground to a level substantially below that in oxidized ground. This pattern is in accord with current hypotheses concerning the genesis of this type of deposit.

Measurements of both natural and artificial TL made on quartz separates from drill cores and samples collected underground in the Ambrosia Lake area, because of the intensity and structure of their respective glow curves, permit discrimination among oxidized ground, reduced ground, and mineralized areas. In addition, samples from oxidized ground show TL intensities and glow-curve characteristics that have been correlated with structural features that controlled the redistribution of ore. Although the data show some statistical variation, the general intensity-versus-distance pattern has been observed in many cases. All currently available results suggest that TL can be developed into a viable tool for uranium exploration.

HUFFMAN, A. CURTIS, JR., ALLAN R. KIRK, U.S. Geol. Survey, Denver, Colo., and R. JAMES CORKEN, Northern Arizona Univ., Flagstaff, Ariz.

Depositional Environments as Ore Controls in Salt