These include the Dilco coal which rests on the Dalton Sandstone, and the Cleary coal which overlies the widely distributed Point Look Sandstone. Menefee and Kirtland-Fruitland coals are commonly associated with discontinuous sandstones of limited ground-water potential.

Much of the natural ground water associated with the coal deposits of the San Juan basin does not meet the water-quality standards of the Public Health Service or the Office of Surface Mining. However, to prevent further degradation, stripping and reclamation practices should be based on the regional hydrologic system and on the hydrologic characteristics of the coal-associated aquifers.

LAGASSE, PETER F., Simons, Li & Associates, Inc., Fort Collins, CO

Response of Rio Grande River to Dam Construction

Data in sufficient detail to support a qualitative assessment of the geomorphic response of the Rio Grande to the construction of main-stem dams are available for two reaches in New Mexico: below Elephant Butte Dam and below Cochiti Dam. Documentation of channel adjustments below Elephant Butte Dam during 1917-32 provides a set of interpretive keys to support a detailed analysis of the response of the Rio Grande to the construction of Cochiti Dam in 1973. A comparison of cross-section, planform, and profile data develops a time-sequenced picture of geomorphic change during 1970-80 in the 50-mi (80 km) reach of the Rio Grande below Cochiti. When correlated with the hydrologic records, hydraulic data, and the history of engineering activity in the reach this analysis provides a qualitative assessment, in terms of trends, of the response of a semiarid zone alluvial river to dam construction.

Regulation of discharge and alternation of sediment load following closure of Cochiti Dam required major adjustments in the alluvial system below the dam. In the upper reaches, gravel armor and base-level control by the volume and size of sediment in arroyo and tributary deltas restricted change in the vertical dimension. Correlative adjustment in river planform was strongly influenced by channelization activities. In the lower reaches, adjustment has been through significant shifts in longitudinal profile with relatively little change in planform. Degradation was limited by gravel armor and arroyo control in the upper reaches, but became the dominant process in the middle reaches. In the lower reaches, an initial period of degradation was followed by aggradation as the heavy sediment load derived from upstream scour encountered a slightly reduced gradient and depletion of main channel flow by successive irrigation diversions. Available hydrologic data also permit evaluation of the impact of an extended period of regulated low flow and a sustained period of high flow on system stability.

A qualitative analysis, alone, yields meaningful results, and also supports a more precise assessment of river response as well as the predictive capability that can be derived from physical-process computer modeling.

LESSARD, ROBERT H., New Mexico Highlands Univ., Las Vegas, NM

Environment of Deposition and Uranium Host Rock Potential of Jurassic Morrison Formation, Northeastern New Mexico

A stratigraphic examination of the Morrison Formation in northeastern New Mexico indicates that its sediments were deposited in either a semiarid or arid environment when the area was located below 30°N lat. and was under the influence of the Northeast Trades. The dry environment and the prevailing northeasterly flow adversely affected the chance of commercial quantities of uranium from being incorporated into Morrison sediments.

Dinosaurs that lived in the area were adapted to living in a dry and hot habitat.

LOGSDON, MARK J., Univ. New Mexico, Albuquerque, NM

Preliminary Basin Analysis of El Rito Formation (Eocene), North-Central New Mexico

The Eocene El Rito Formation of north-central New Mexico is the basal Tertiary unit of the Chama basin and the northwestern Espanola basin. Deposition of the El Rito occurred in the final stages of the Laramide orogeny. The formation is an alluvial-fan deposit, showing two principal facies, quartzite conglomerate and quartzose sandstone. Paleocurrent directions determined from imbricated clasts, cross-bedding, and parting lineations indicate that the primary sources for the sediment were in the north and northeast.

The clasts of the early, conglomeratic facies were derived from the reworking of sediments eroded from the Precambrian crystalline highlands of northern New Mexico early in the Laramide orogeny. The conglomerates represent debris-flow, sieve and high-energy, braided-stream gravel deposits. The immature, sand-sized particles were derived from proximal sources in the Brazos uplift during the final stages of the Laramide orogeny. The sandstone units represent sheet-flow sediments deposited from lower energy, braided streams with more easterly sources than the sources for the conglomerates.

Point counts of thin sections of four sandstone samples show high QFL% quartz and QpLvmLsm% metamorphic lithics. These results are consistent with a provenance in the Precambrian metamorphic core of the Brazos uplift. Extensive diagenetic effects typical of Cenozoic desert alluvium include calcite, zeolite, and hematite pore-filling and replacement of grains, alteration of feldspars, and removal of heavy minerals.

LOVE, DAVID, and DONALD L. WOLBERG, New Mexico Bur. Mines and Mineral Resources, Socorro, NM

Historical Geology as Framework for Synthesis and Management of Data from Environmental Impact Studies in New Mexico

Development of New Mexico's energy resources and concomitant utilization of other resources produce unavoidable impacts on the environment. Although areas involved in specific projects are comparatively small, the cumulative extent of impacted areas is substantial. Currently, required studies of impacts produce inventories and descriptions of discrete subjects (e.g., climate, water quality, soils, biota, archeology, paleontology, etc) without relating the subjects to a larger system, or more completely analyzing their scientific potential in the context of natural systems. Historical geology provides a framework for a unified study of the dynamics of the predevelopment environment. This synthetic approach indicates which data are redundant and what further data are needed, provides a long-term baseline for evaluating impacts of development, and provides insights for mitigation of adverse impacts. Because historical geology considers the chronology of changing landscapes and their ecology, the environmental context of data is essential for reconstructing the