tions predict a decrease in the concentrations of K^+, Na^+, and CA^{++} such that $K^+ < Na^+ < Ca^{++}$ in buffering capacity. This phenomenon is actually observed. Reactions such as from (2) also provide a mechanism to produce H^+, lowering pH, and perhaps also forming secondary porosity during later diagenesis of clastic rocks.

Both examples demonstate that authigenic mineral assemblages, not the appearance or disappearance of single minerals, must be documented to relate diagenetic changes to burial depth. Also, diagenetic mineral assemblages are strongly controlled by water compositions in open systems and these are not a simple function of burial depth. This also implies that any disturbance of fluid compositions during drilling or well completion may profoundly affect mineralogy.

INGERSOLL, RAYMOND V., Univ. New Mexico, Albuquerque, NM

Temporal Changes in Depositional Facies in Great Valley Forearc Basin of California—Influence of Basin Evolution and Tectonics

The Great Valley forearc basin began in the Late Jurassic as a residual forearc basin on top of oceanic crust, and evolved into a composite forearc basin on top of both oceanic and continental crust in the Late Cretaceous and Paleogene. The depositional basin widened through time owing to the westward and upward growth of the subduction complex and the eastward migration of the coeval magmatic arc. Depositional facies reflect changes in shape, size, tectonic activity, and inherited characteristics of the basin.

Late Jurassic depositional environments primarily consisted of slope with locally incised channels. The basin was relatively narrow and a steep slope allowed sediment movement from the shoreline on the east directly into the trench to the west. By the Early Cretaceous, a bathymetric barrier was formed by the upward- and outward-building subduction complex, thus trapping arc-derived sediment within the forearc basin. Basin-plain environments dominated in this terraced forearc. The subduction complex continued to grow, and the magmatic arc migrated eastward during the Late Cretaceous, resulting in a wider, composite basin. Complex interbedded submarine fan, slope, and basin-plain facies formed in this setting. Submarine fan systems became larger owing to the concentration of sediment gravity flows within submarine canyons incised into the widening shelf on the east side of the basin. The basin evolved into a broad ridged forearc and, eventually, into a broad shelved forearc during the Paleogene as the subduction complex emerged above sea level and the forearc basin filled. As a result, Upper Cretaceous submarine fan complexes are overlain by slope facies, which are overlain by shelf facies. Nonmarine environments have persisted following filling of the basin and sequential termination of subduction by the northward migration of the Mendocino triple junction during the Neogene.

INKOLLU, S. N. MURTY, GeoSource Inc., Houston, TX, MARTHA O. WITHJACK, Cities Service Co., Tulsa, OK, and J. J. GALLAGHER, Cities Service International, Houston, TX

Basins of East India: Tectono-Stratigraphic Facies

Rocks and structures of east India result from both global and local processes. Global sea level and the breakup of Gondwanaland control the broad aspects of sedimentation and deformation, and local sedimentologic and tectonic variables determine specific lithologic and structural variations. The concept of tectono-stratigraphic facies is convenient in the interpretation of different suites of rocks and structures which are related ultimately to the same global processes. Three tectono-stratigraphic facies are recognized for east India. *Facies 1* is on the craton. It consists of very long, narrow grabens or half grabens containing small normal faults. Most faults are Early Triassic to Early Cretaceous in age but some may be older. Sediments are restricted to the grabens and are late Carboniferous through Early Cretaceous fluviatile or lacustrine clastics. *Facies 2* is in broad basins along the continental margin. Major Late Jurassic to Early Cretaceous normal faults divide the basins into a series of elongate blocks. Sediments are predominantly Late Jurassic through Early Cretaceous marine, paralic and continental clastics. *Facies 3* is found along the continental margin. Faults are Late Cretaceous to early Tertiary in age, while sediments are marine, paralic, and continental deposits of Late Cretaceous to recent age. Marine sediments are more dominant offshore.

The ten most prominent basins of east India can be classified in terms of tectono-stratigraphic facies. The Godavari, Mahanadi, Damodar, and Satpura basins are dominated by facies 1, and the Cauvery, Palar, Godavari-Krishna, and Mahanadi-Brahmani basins are characterized by facies 2 and 3. The Bengal basin is dominated by facies 3. Observed dominant facies may grade into one of the other facies in unexplored parts of these basins or at depths yet to be probed.

IVEY, JOHN B., Consultant, Denver, CO

Geologic Framework for Development, Production, and Reclamation of Coal Properties

Today, geology plays an increasingly important role in the development, production, and reclamation of coal properties. The geologic framework of a property is defined by geologic mapping, drilling, logging samples, downhole geophysics, correlation of lithologic units, and review of laboratory analyses. These activities form a data base which is needed by the mine design engineer, the development and production engineers, and the reclamation specialist.

A detailed surface geologic map will be of use throughout the life of a coal mine. This map can best be prepared (after preliminary photogeology) by field mapping, which includes measuring sections and defining structure and stratigraphy. The identification of lithologic units and determination of their engineering characteristics are important because they bear a relation to excavation and slope stability in surface mines, and to roof, pillar, and floor stability in underground mines.

A typical drilling program includes rotary, spot-core, and full-core drilling, geophysical logging, and sample logging. Bulk sampling of coal for physical testing can