

The hinge line appears to mark the northern limit of a series of growth faults that account for much of the subsidence in the southern basin.

Coal production in 1979 was 113,793,868 short tons (85,697,048 short tons in 1978), according to the West Virginia Department of Mines Annual Report. Estimated remaining recoverable reserves total 57,139,067,471 short tons.

The West Virginia Geological and Economic Survey is involved in a 10-year program to remap coal seams and map mines to obtain more accurate estimates of remaining reserves throughout the state. A great number of coal samples are being collected and analyzed; most analyses are available to the public and will be used to map coal-quality parameters.

Mining has proceeded from outcrops of thick, high-quality coals near early railroads and navigable waterways to areas where the coal is thin, deep, impure, or relatively far from surface transportation facilities. Recently, exploration and development have occurred in the hinge-line area, traditionally regarded as relatively barren.

PRESLEY, MARK W., Bur. Econ. Geology, Univ. Texas at Austin, Austin, Tex.

#### Pottsville Alluvial Plain Coals in Northern West Virginia

In upper Pottsville strata (Pennsylvanian) in the central Appalachians, dominant facies are alluvial-plain sandstones. Flood-plain shales and siltstones intercalated with these sandstones contain numerous coal beds. The coals are laterally discontinuous, but locally thick and may be of interest in continuing development of coal resources of the region. Geometry of coal beds is facies-controlled and in many places may be predicted through interpretations of positions, trends, and geometries of associated facies components.

In a study area covering the Philippi and Weston 15-minute quadrangles in north-central West Virginia, Pottsville strata can be subdivided into (1) a lower interval (average thickness in range of 50-60 m) with relatively lower-energy, mixed-load, coal-poor, alluvial-plain deposits, and (2) an upper interval (average thickness in range of 80 to 100 m) with higher-energy, bed-load, alluvial plain deposits with numerous coal beds, commonly at depths less than 300 m. Lower Pottsville strata in the study area contain multistoried sandstone units that occur in belts averaging 6 to 8 km in width. Individual sandstone units are up to 15 m thick and typically include one or more channel-fill sandstone bodies averaging 6 m thick, as interpreted from geophysical logs. In upper Pottsville strata multistoried sandstone units occur in belts averaging 8 to 10 km in width. Individual sandstone units are up to 120 ft (36 m) thick, typically containing one or more channel-fill units averaging 8 m thick. Coal beds up to 2 m thick (as interpreted from geophysical logs) intertongue with or terminate against sandstone units. Coals record deposition in flood-basin environments. Coal thickness may be related partly to variable channel positions, differential compaction, and the interaction of regional subsidence and supply of clastics. Future economic devel-

opment of such coal units should be carefully keyed to an understanding of facies relations.

PRESLEY, MARK W., and KATHY A. MCGILLIS, Bur. Econ. Geology, Univ. Texas at Austin, Austin, Tex.

#### Red-Bed Evaporite, and Carbonate Facies Associations in Interior Basins—A Model for Resource Exploration

Mid-Continent evaporite sequences exhibit a common association with red beds and carbonate rocks. These lithologic elements can be interrelated in a model of coastal evaporite sedimentation, based on modern analogs of evaporites in association with mud-rich tidal flats, coastal sabkhas, and hypersaline brine pans.

As an example of these relations, upper Clear Fork-Glorieta strata (Permian, Leonardian) in the Texas Panhandle contain red beds, evaporites, and carbonate rocks, and are characterized by a gradual basinward (southerly) shift in facies through time. Upper Clear Fork rocks in the study area record dominance of coastal evaporite and carbonate environments early in the development of the study interval. Evaporites and associated carbonates, which were deposited in hypersaline, tide-fed brine pans, landward of open-marine shelf environments, include (1) algal-laminated carbonate rocks, commonly with swallowtail-crystal pseudomorphs after gypsum, (2) laminated anhydrite, and (3) mud-banded salt. Chaotic mudstone-salt is present and was deposited in landward salt-mud flats. Glorieta rocks record late-stage dominance of siliciclastic sedimentation. Laterally-persistent Glorieta siliciclastic units consist of mudstone-siltstone facies, deposited in intertidal mud flats, and grade basinward into sandstone and dolomite deposited in clastic shelf environments. Periods of siliciclastic deposition alternated with periods of evaporite deposition. During sedimentation of each siliciclastic sequence, mud flats prograded seaward into the shelf terrane. Subsequent deposition of evaporites was on the expanded mud flats surface.

This example exhibits many similarities with evaporite sequences in other parts of the Permian basin, parts of the Salina basin, and selected salt occurrences in the Rocky Mountains. Understanding of facies interrelations is important in predicting resource potential of evaporite beds, and the occurrence of hydrocarbons in evaporite-associated strata.

RAHMANIAN, VICTOR D., Univ. Vermont, Burlington, Vt.

#### Upper Devonian Tide-Dominated Deltaic-Intradeltaic Sedimentation in West-Central Pennsylvania: A Sedimentologic Model for Distribution of Petroleum Sandstone Reservoir Types

Upper Devonian Catskill Formation outcrops in west-central Pennsylvania were studied to develop a regional depositional model, and a better understanding of the sedimentologic controls on distribution of the petroleum sandstone reservoir types in the subsurface part of the basin. The Catskill Formation is characterized, from base up, by the Irish Valley, Sherman Creek, and Duncannon Members, whose thicknesses and propor-