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Sandstone and Conglomerate Shoreline Deposits in Triassic-Jurassic Newark and Hartford Basins of Newark Supergroup

Three types of sandstones and conglomerates in the Newark and Hartford basins of the lower Mesozoic Newark Supergroup are similar to Holocene and to presently forming deltaic and wave-sorted shoreline deposits in modern, block-faulted, closed basins in the western United States. (1) Sandstones and siltstones with internal, "deceleration-of-flow" sequences dominated by climbing ripple cross-lamination that comprise 2 to 4-m thick, low-angle, inclined foresets. The foreset beds intertongue with silty shale at their toes. Stacks of these foresets define coarsening-upward sequences that are interpreted as small, Gilbert-like delta fronts stacked on the topset plain due to fluctuations in lake level. (2) Sheetlike, decimeter-scale, muddy sandstone beds. These are composed of graded, deceleration-of-flow sequences similar to those described above but contain mudstone partings with large polygonal cracks and soft-sediment deformation structures. Fining-upward sequences of these beds are interpreted as broad, flat delta fronts formed by flash-flooding streams intersecting an expanding shallow lake. (3) Cobble and pebble conglomerates with well-sorted sand or granule matrix. These rocks are typically associated with well-sorted, medium to coarse-grained sandstones with planar, horizontal lamination or oscillatory ripple cross-lamination. These beds are interpreted as wave-sorted alluvial fan-toe deposits.

The Gilbert-like deltaic sandstones and the sheetlike muddy sandstones in the Newark and Hartford basins generally have low porosity and, therefore, would be poor reservoir rocks. The wave-sorted conglomerates, which are limited to the faulted basin margins, are potentially excellent reservoir rocks, in many places occurring directly in contact with black shales. Thick shoreline sandstones and conglomerates deposited in deeper lakes may occur in the Newark and Hartford basins, but they were probably restricted to the basin margins and may have been removed by subsequent faulting or erosion, or possibly they have not yet been recognized due to the scarcity of large outcrop exposures.

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Petrology of Basal Conglomerate of Triassic Pekin Formation, Sanford Subbasin, North Carolina

This conglomerate, locally known as the "millstone grit," is exposed in a narrow strip along the western border of the Sanford subbasin of the Deep River basin. The grit is composed of interbedded fine to coarse rudite and medium to coarse arenite. The most common grains are schistose metamorphic quartz, metaquartzite, and quartz-mica schist.

Ten microfacies are identified. These include four arenites in decreasing abundance—hematitic sublitharenite, litharenite, sublitharenite, and feldspar-bearing litharenite—and six rudites in decreasing abundance—sublithic rudite, lithic rudite, hematitic lithic rudite, hematitic sublithic rudite, feldspar-bearing lithic rudite, and feldspar-bearing sublithic rudite.

Diagenetic events include compaction and alteration of less stable mineral grains in the eogenetic stage. Pressure solution, the precipitation of silica as syntaxial overgrowths and microquartz, and the precipitation of pore-filling kaolinite occurred in the mesogenetic stage. The telogenetic stage consists of hematite cement and alteration of other less stable grains.

The grit was deposited in the midfan area of a wet or stream-dominated alluvial fan. Sedimentation may have been initiated by movement on a western fault, evidence of which has been eroded. Source of the sediment was the metasediments and volcaniclastics of the Carolina slate belt of the Piedmont directly west of the Sanford subbasin. When the microfacies are plotted on the QFL diagram of Dickinson et al, they do not fall in the zone of the transitional continental (arkose), but are located in the recycled orogenic tectonic regime.

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Washability Characteristics of Facies of Upper Freeport Coal Bed: Homer City, Pennsylvania Area

Washability testing data were obtained for samples of Upper Freeport coal-bed facies (mappable subunits). The facies, which were identified and correlated using core and mine-face descriptions, are relatively uniform in thickness as units and vary less in quality than the entire bed because the number of facies are not the same throughout the deposit. Washability characteristics of a coal bed were inferred from collective megascopic descriptions, x-ray radiographic analyses, and coal-quality characteristics of the facies. In addition, certain petrographic, physical, and chemical data such as inertodetrinite content, pyrite forms, density, and contents of Zr and La of coal-bed facies samples were related to washability characteristics such as weight percent of recovery and pounds of sulfur/million Btu of recovery for a particular specific gravity of separation.

Petrographic characterization of pyrite forms and associations, weight percent of pyritic sulfur, and density were used to estimate sulfur cleanability in the samples. Good estimates of product recoverability at specific gravity float levels were made from the density of the unprocessed samples. Sulfur variability (1) is commonly greatest in the uppermost facies of the Upper Freeport coal bed, (2) results from variability in the amount of different pyrite forms (irregular pyrite that replaced organic matter), and (3) has a positive correlation with the lithology of the overlying rock. Specifically, sulfur is commonly highest in those facies overlain by sandstone.

Facies analysis of a coal bed provides data that are more reliable for the assessment of coal-bed quality than are data from whole-bed analyses. In addition, stratigraphic data, such as the quality and extent of coal-bed facies, can aid in evaluating coal beds for mining and preparation as well as in interpreting the conditions of paleopeat formation.

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Central Appalachian Cross-Strike Structural Discontinuities and Lineaments Compiled on Side-Looking Airborne Radar Image Mosaics

Seven cross-strike structural discontinuities (CSDs), 17 lineaments, and 4 crustal blocks, previously recognized in the central Appalachians, were compiled on side-looking airborne radar (SLAR) image mosaics to develop a structural model. The high-resolution, synoptic view and detailed expression of surficial morphology on x-band SLAR images provide a preliminary means of mapping CSDs and lineaments on the basis of alignment or disruption of structural and geomorphic patterns. Wheeler defined CSDs as structural lineaments or alignments at high angles to regional strike that are recognizable because they disrupt strike-parallel structural, geophysical, geomorphic, sedimentologic, or other patterns in allochthonous fold and thrust belts. CSDs are broad zones that may contain many lineaments of varying size and orientation. Geologic and geophysical data suggest that some Appalachian CSDs and lineaments are the surficial expression of crustal block boundaries.

The previously defined CSDs, lineaments, and crustal blocks were compiled on a 1:1,000,000-scale SLAR image mosaic of eight 1:250,000-scale quadrangles from central Pennsylvania to southern Virginia. Data compiled on the likely origin of these 7 CSDs suggest that three involve basement, three involve only lateral decollement ramps (zones where a decollement transfers to a higher stratigraphic level along regional strike), and one may involve both basement and a lateral decollement ramp. CSD lateral ramps can dip either north or south. Geologic literature suggests that lateral decollement ramps alternate in dip direction along strike of the CSD. Reported evidence for basement involvement in the origin of CSDs includes spatially related centers of earthquake intensity, intrusive igneous rocks, stratigraphic evidence of syndepositional uplift, and basement faults beneath splay faults as seen in seismic reflection data. High-resolution strike-line seismic reflection, gravity, and magnetic profiles are necessary to further understand the origin and formation mechanisms of CSDs.

CSDs are an exploration target for natural gas because they are areas where fracture permeability is enhanced. The spatial relationship of CSDs to gas fields in the Valley and Ridge province suggests structural closure of anticlinal traps due to differential movement along the CSD zone.