core, while anhydrite content decreases. Anhydrite precipitation appears to increasingly postdate the onset of dolomitization with depth. Reflux processes are felt to be largely responsible for the ubiquitous dolomitization and sulfate precipitation.

Porosity developed as a result of a sulfate solution event, producing vuggy, moldic, and intercrystalline dolomitic porosity due to leaching of sulfates from the dolomite fabric. Lateral solution pathways developed, particularly through the leaching of sulfates from packstone allochem replacements and void fills. Insoluble residue content was a major inhibiting factor in solution, especially because of stylolite development in shaly dolomites, which created low-porosity horizons. Hydrocarbon shows are primarily intercrystalline.

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## Cycle Correlation in Late Pennsylvanian Strata of Midland Basin

Cyclic sedimentary units composed of successions of shales, limestones, and sandstones have long been reported from the Eastern shelf of the Midland basin, but recognition that cycles are of regional extent has been hindered by the lateral variability encountered in lithologic characteristics of shoal-water portions of the cycles. Most cycles are vertically asymmetric, with a thin transgressive sequence and a much thicker regressive sequence, and have lithologic asymmetry, in which carbonates are more common in the transgressive parts of the cycle, whereas sandstones are much more prevalent in the regressive parts of the cycle. Many cycles of the Canyon Group and lower portion of the Cisco Group can be shown to be of regional extent on the eastern shelf by tracing the deeper water deposits of the cycle. These consist of phosphate nodule-bearing black shales containing many ammonoids, and can be distinguished from deposits of all other environments by either the phosphatic lithologic character or the ammonoid content.

Phosphatic black shales in most cycles are thin, 1 to 2 m (3 to 6 ft), but laterally as extensive as the subjacent sheet-like limestones that are used for subsurface correlations. This couplet of limestone and overlying black shales is the most reliable means of identifying cycles. In the upper Canyon and lower Cisco Groups, couplets include the Ranger Limestone and basal Colony Creek Shale, Home Creek Limestone and basal Finis Shale, Bunger Limestone and basal Necessity Shale, and upper Gunsight Limestone and basal Wayland Shale. The entire interval consists of regular cycles. The remainder of the interval not included in the couplets consists of shoal-water and terrestrial deposits.

Basinwide correlation potential for these cycles is shown by the similarity of Midland basin cycles to Mid-Continent cyclothems, and by great similarity to the mapped extensions of these cyclothems into the eastern Oklahoma basins and Ouachita front areas. Variations occur in the basic cycle pattern owing to variable rates of sedimentation and local tectonic control, but the cycles can be identified and mapped across facies boundaries. Cycle correlation is a reality in the Mid-Continent and is also possible in the Midland basin with the mapping of transgressive limestone and phosphatic black shale couplets, or other indicators of deepest water deposition even in lithologically dissimilar strata. A cycle correlation system could be determined in the Midland basin, and a standard cycle chronology established for this region.