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### **Lower Silurian Incised-Valley Deposits in the Appalachian Foreland Basin: Regional Variation and Structural Control**

From study of cores and geophysical logs combined with outcrop investigation, the regional distribution of Lower Silurian incised-valley deposits in the Appalachian foreland basin can be explained in terms of temporal and spatial structural variability. The origin of incised-valley deposits was controlled by sediment accommodation and sediment dispersal in response to the dynamic interplay among flexural subsidence, crustal uplift, and along-strike structural variation. In the Appalachian basin, incised-valley deposits and other facies are arranged in a predictable stratigraphic pattern related to convergent-margin structural evolution.

The Lower Silurian incised-valley deposits of the Appalachian basin are present most commonly in areas having a low rate of relative subsidence, where exposure and erosion occurred as the rate of eustatic sea-level change exceeded the rate of change in accommodation due to tectonism. Incised-valley deposits are present in some distal parts of the Appalachian foreland and in areas of structural recesses, where subsidence rate was less than in adjacent salients. Accommodation generated by lowstand incision in the recesses was filled by sharp-based fining-upward successions deposited during subsequent sea-level rise. These incised-valley deposits consist of cross-bedded, fine-to coarse-grained sandstone that fines upward to shale above a basal unconformity. Fluvial and estuarine deposits fill the incised valleys in proximal areas of structural recesses, while shoreface sandstones occupy valleys in the distal areas. In proximal and distal areas of the foreland basin, the Lower Silurian incised-valley deposits are important as natural gas reservoirs and for gas storage because of high porosity, high permeability, and effective seal.