Syndepositional Subsidence and the Origin of Multiple Coal Splits, Hartshorne Formation, Arkoma Basin, Oklahoma.

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The examination of more than 6500 wireline well logs in the Oklahoma portion of the Arkoma Basin reveals that the Pennsylvanian (Desmoinesian) Hartshorne Formation contains multiple coal splits. As a result, the upper and lower coals are present across the study area, not just immediately south of the previously recognized single coal split line. In addition, single thicker, "undifferentiated" coals are also present to the south of the original coal split line. In the southern part of the study area, thick coals split to the south and north. Consequently, the upper and lower Hartshorne coals converge toward thicker, single undifferentiated coals. "Bony coal" or shale near the center of the undifferentiated coals appears to correlate to the mudrock-rich interval that separates the two coals. In addition, the upper coal thins toward and is often absent over the thickest valley fill sandstones.

The spatial distribution of Hartshorne lithofacies provides evidence that localized subsidence initiated coal splits. Subsidence generated topographic lows that were flooded with sediment that interrupted peat accumulation. Bog areas on the margin of the topographic lows were relatively unaffected and continued to generate peat, which resulted in thick accumulations. Subsequently, these topographic lows became the pathways for fluvial drainage. Valley incision followed, establishing an association between split coals and incised valleys. After valley filling, peat bogs encroached over the fill. The thinning or absence of the upper coal over some thicker valley fills may be the result of nondeposition on, or the erosion of peat from, localized topographic highs. These positive areas were generated by the differential compaction between sand-rich valley fills and adjacent mud-rich deltaic sediments.