Comparing types of fluvial bodies, with implications for reservoir description: Nonmarine Iles Formation near Rangely, Colorado

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Architectural variations among discontinuous fluvial sandstone bodies lead to differentiating point-bar from crevasse-splay bodies within an outcrop of the nonmarine Iles Formation north of Rangely, Colorado. Comparing variations shows how body type influences the lateral distribution and internal connectedness of facies, the map-view shape of bodies, and ultimately the proportion of accelerated versus new production that might be expected during well down-spacing. The question arises whether these differences are substantial enough to be considered for reservoir description purposes.

A 200 ft-thick vertical succession of strata within a 160-acre study area shows an upward change from distal to proximal crevasse splay and associated crevasse channel bodies, each separated by floodplain mudstone and carbonaceous shale, to a series of paired, yet isolated point-bar bodies of a meanderbelt. Three-dimensional exposure within the outcrop belt allows physical tracing of lateral facies and accretionary architectural changes that lead to classification of body types. The two body types in the upper part of the succession are similar in terms of low facies diversity, high net-to-gross sandstone, gross rock volume, and average thickness. By contrast, the map-view geometry and the internal facies and accretionary architecture are completely different. The three-dimensionality of the outcrop also reveals interesting relationships relative to one-dimensional (single well or core) or two-dimensional (single cliff-face) exposures. For example, crevasse channels at single observation points or along limited cliff faces could easily be called “multistory channel bodies,” yet mapping shows that they are constructional parts of proximal crevasse-splay systems. Crevasse splay bodies are commonly dismissed as containing ineffective reservoir sandstone, perhaps as a result of overemphasizing the thin (< 6 ft-thick) fringe of rippled very-fine sandstone facies at the edges of splays. However, because they are products of avulsions during floods, crevasse splays are linked to crevasse channels that are in turn linked to river channelbelts. Crevasse splays may be an under-appreciated component of the discontinuous fluvial reservoirs typical of “tight-gas” fields in the Rocky Mountain region.

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