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Depositional Environments and Stratigraphy of Valley-Fill Deposits in the Lower Cretaceous D Sandstone (Cenomanian), Denver Basin, Colorado

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ABSTRACT:

Valley-fill deposits constitute an important producing reservoir for the lower Cretaceous D Sandstone in the Denver Basin of Colorado. These deposits are typically one-half to a mile or more in width and tens of miles long in plan view. Barrier and shoreline-associated "marine bar" deposits are often located sub-perpendicular to these valley-fill deposits. The resulting depositional patterns led to early interpretations of fluvial or distributary channel depositional environments for the valley-fill deposits. Recent studies have demonstrated that the valleys are actually filled with complex estuarine facies. Abundant tidal and biogenic sedimentary structures that are not indicative of fluvial sedimentation can be identified in cores for this interval. Bay-head delta, proximal bay fill, distal bay fill, and estuary mouth facies can be identified in cores. Estuarine deposits in Kouchibouguac Bay, New Brunswick, Canada, serve as a modern analog to the D Sandstone valley-fill deposits. A depositional sequence in which low-relief valley topography was back-filled during an overall marine transgression is proposed for the D Sandstone "channel" system. Within the overall transgression, back-stepping due to lower-order sea level fluctuations resulted in complex stacking patterns in the valley fill, often juxtaposing proximal bay head and distal bay mouth deposits next to each other. For example, proximal classic-rich bay head delta deposits may be stacked over outer bay-mouth bioturbated shale-rich deposits locally. The complex stratigraphy that results from this stacking pattern adds considerable risk to oil and gas exploration for the D Sandstone valley-fill reservoirs.

Speaker Biography:

Dr. Steven M. Goolsby received a B.S. in Geology from Stephen F. Austin State University in 1975 and a Ph.D. in Geology from the Colorado School of Mines in 2008. In the past, Steven has been employed by the Colorado Geological Survey, Canadian Hunter Exploration, and several smaller companies. In 1975, he cofounded Goolsby Brothers and Associates, Inc., which still furnishes a diverse array of geological and petrophysical consulting services to the oil and gas industry. In 2005, he joined Ed Coalson in founding Coyote Oil and Gas, LLC, an oil and gas exploration firm. On April 1st of 2009, he joined Vecta Oil and Gas, LLC, as senior oil and gas exploration geologist. In 2013 Vecta formed Foreland Resources, Ltd., a resource play company pursuing horizontal drilling projects in West Texas and the Rocky Mountain areas. He currently works half time for the exploration companies and half time consulting through Goolsby Brothers and Associates, Inc. Steven is a Certified Petroleum Geologist through the Division of Professional Affairs of the American Association of Petroleum Geologists and is a Registered Professional Geologist with the State of Wyoming. His current interests include play and prospect evaluation and studies that integrate rock properties, geophysical log responses, subsurface fluid attributes, and geology into the evaluation of oil and gas reservoirs.

[RMS-SEPM Main Page](#)

[RMS-SEPM Luncheon Page](#)

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