Changes in Facies Architecture In The Deep-Water Axial Channel Belt, Miocene To Oligocene Puchkirchen Formation, Upper Austrian Molasse Basin

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During the deposition of the Puchkirchen Formation, sedimentation in the Molasse Basin was dominated by a large deep-water, axial channel belt that served as a conduit for debris flows and turbidity currents. This low-sinouosity channel belt was 3-5 km wide and more than 100km long. The Puchkirchen gas field, which lies within this channel complex, consists of two distinct reservoir horizons, A1 and A2, which show significant differences in their sedimentological structure and architecture.

Sandstones of A2, the lower interval, show abundant current structures, including flat lamination and cross-lamination, suggesting that most were deposited from the bed load of low-density turbidity currents. Vertical variation within the flat laminated Tb divisions suggests high variability within the flows. They were probably deposited by largely bypassing, non-collapsing currents and may represent coarse lags left by currents that had not yet reached the depositional stage. Sedimentation within this interval was possibly concentrated in smaller scale channels within the larger scale channel belt.

In contrast, turbidity currents of the A1 horizon deposited thick, massive, fine-grained sands through flow collapse. Architecture of the A1 reservoir interval within the channel was controlled mainly by the deposition of mass transport complexes. To date, no smaller-scale channels and associated levee deposits have been recognized within the larger channel within this interval. In fact, mass transport domination of the channel
system may have prevented the development of a complex internal channel belt architecture with differentiated architectural elements such as channels and levees. Controls on sandstone deposition could have included local topography on the tops of the debris flow deposits or topographic barriers within the channel associated with mass transport deposits. We believe that a debris-flow dominated channel system, as present within the study area, allows for unconventional stratigraphic traps.

Understanding the changes in sedimentation style throughout the deep-water channel belt of the Puchkirchen Formation is key to finding new reservoirs within the Austrian Molasse Basin.