XII Reunión Argentina de Sedimentología

XII Argentine Meeting of Sedimentology

RESÚMENES

EDITADO POR

Alfonsina Tripaldi y Gonzalo Veiga

Ciudad Autónoma de Buenos Aires, Argentina — 3-6 Junio 2008

Detailed facies and architectural analysis of an ancient submarine (slope) channelised unit: Insights into reservoir distribution and connectivity

Ernesto Schwarz[1] and R. William C. Arnott[2]

1- Centro de Investigaciones Geológicas (CONICET), Calle 1 #644, B1900TAC La Plata, Buenos Aires, Argentina
2- Department of Earth Sciences and Ottawa-Carleton Geosciences Centre, University of Ottawa, 140 Louis Pasteur Pvt., Ottawa, Ontario, Canada, K1N 6N5

A detailed facies and architectural characterization of a deep-water channelised unit is presented (Isaac Channel 5, Neoproterozoic Isaac Formation, Castle Creek area, Southern Canadian Cordillera). Isaac Channel 5, composed mostly of turbidites deposited on a gravitationally unstable slope, crops out discontinuously across a five-km-wide section.

In Castle Creek South, Isaac Channel 5 is made up of three main facies assemblages: 1) sandstone-dominated channel-fill facies, 2) mudstone-dominated, thin-bedded overbank facies, and 3) muddy debrites and slump deposits. Channel-fill facies make up 68% of total exposed strata and occur in three vertically-stacked, multi-story channel complexes (8-30 m thick). Strata are dominated by amalgamated sandstone (56%) with the best reservoir characteristics, with lesser interbedded sandstone and postdepositionally brecciated mudstone-rich layers (26%), interbedded sandstone- and mudstone-rich strata (15%), and structureless sandstone (3%). Thin-bedded overbank facies cover 23% of the exposed area. Most of these strata (71%), which consist mostly of a few cm (0.4-9 in)-thick, laterally-persistent turbidite beds with moderate to poor reservoir characteristics, drape the channel complexes and exhibit an upward-fining and -thinning trend, inferred to reflect local channel-complex abandonment. Less commonly (18%), thin-bedded overbank facies are observed to interfinger with channel-fill facies. These strata, which are interpreted to be inner-bend levee deposits, are muddier and thinner than turbidites in the abandonment facies and have poor reservoir characteristics. This mudstone-rich facies occurs adjacent to channel fills and should be taken into account when evaluating levee deposits as potential reservoir targets. Muddy debrites and slump deposits are good stratigraphic markers within Isaac Channel 5 and make up the remaining 9% of the exposed section. These unstratified, mudstone-rich units have poor to no reservoir potential and very likely represent important impediments to subsurface fluid flow (barriers).

Sandstone-rich channel-fill facies within each channel complex are locally interstatified with thin-bedded turbidites and slump deposits. Where present these fine-grained deposits do not extend across the full width of the outcrop. Composite channel fill sandstone within a discrete channel complex, therefore, forms a laterally and vertically contiguous reservoir unit interrupted locally by discontinuous (<500 m long) permeability baffles. Individual channel complexes, on the other hand, are vertically separated (compartmentalized) by laterally persistent muddy debrites and thin-bedded deposits that would constitute kilometer-scale barrier-type facies within a multi-layer reservoir (~100 m thick).

Detailed facies characterization of this two-dimensional outcrop provides valuable insight into the geometry, continuity, and distribution of lithofacies at the scale of channel fills and channel-complexes in slope systems, in addition to an understanding of the lateral continuity and dimensions of potential barriers and baffles to fluid flow. This, in turn, may help improve the understanding of reservoir distribution, connectivity and performance in slope-channel reservoirs.