Detailed Analysis of Small and Large Scale Architectural Elements in Deep-Marine Basin-Floor Deposits of the Upper and Middle Kaza Groups, British Columbia, Canada

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Deep-marine turbidite systems are known to contain large volumes of oil and gas, however little is known about the detailed architecture of “sheet sands” deposited on the basin-floor. Marine seismic and core lack the vertical and lateral resolution, respectively, to effectively identify and characterize small-scale architectural elements, and most outcrop analogue examples are too hampered by lateral and/or vertical size limitations. Exposures of deep-marine basin-floor deposits of the proximal Upper Kaza Group and the more distal Middle Kaza Group allow for a detailed study of small-scale architectural elements, which include deep and shallow channels, sandy terminal-splays, and inter- and intra-splay turbidite sheets, while also having a large enough vertical and lateral extent to study large seismic scale elements typically referred to as “sheet-like deposits”.

Deep channels that scour up to 15 m are uncommon in the Upper Kaza and absent in the Middle Kaza. Their fill consists of muddy and heterolithic bypass facies. Shallow channels, which at their base scour a few meters, are common in the Upper Kaza, but rare in the Middle Kaza. In their axes channels are commonly filled with bypass facies (dunes) at their base and Ta sandstone that grade laterally over 10’s to 100’s of meters into progressively higher division turbidites. Sandy terminal-splay deposits are laterally extensive amalgamated coarse sand sheets with little lateral facies variation over several hundreds of meters, and are common elements in both the Upper and Middle Kaza. Inter- and intra-splay turbidite sheets are also common in both the Upper and Middle Kaza and consist of laterally extensive sheets of thin- to medium-bedded fine-grained turbidites. Lenticular sandstone interbeds occur locally.

Smaller scale architectural elements populate the depositional sedimentary body and build up the (seismic) scale elements. These elements have an apparent “sheet-like” morphology consisting of alternating 5-55 m thick “sheet” sands separated by up to 35 m thick fine-grained units. This simplistic stratal organization belittles the assemblage of the smaller scale composite building blocks that add significant stratigraphic complexity to these seemingly “simple” sheets, which accordingly will profoundly impact reservoir characteristics.