

Muddy Burrow Networks of the Upper Ben Nevis Formation: Sedimentological and Paleoecological Significance, and Implication on Reservoir Quality

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ABSTRACT

Shallow tier, U to Y-shaped, irregularly branched, muddy burrow networks are described from mid-Cretaceous, intensely bioturbated sandstones and silty sandstones of the upper Ben Nevis Formation in the Hibernia field offshore Newfoundland. The burrows range in diameter from 3 to 6 mm and generally exhibit club-shaped, downward terminations. Although they appear to be filled with structureless mud and/or silt, concentric lining around a 1 to 3 mm, sand-filled core is discernable. At present, these burrows are not assigned to a specific ichnogenera, although they share morphologic features with both *Cylindrichnus* and *Polykladichnus*. In modern coastal settings, a very similar burrow structure is produced by the polychaete *Nereis*.

Burrow morphology, nature of occurrence, and the aspects of preservation provide clues to tracemaker behavior in response to sedimentological and paleoecological conditions at the time of emplacement. Textural variations between the burrow fill and matrix, cross-cutting relationships, and colonization patterns reflect the development of the infaunal community and history of sedimentation. The associations revealed aid in elucidating the depositional environment, interpreted as a restricted marine setting such as a shallow embayment or sound.

The muddy burrow networks significantly influence the quality of the reservoir sandstones. A notable contrast in the relative permeability between the sandy matrix and muddy burrow fill has been documented using a pressure-decay profile permeameter. This data, in conjunction with matrix-burrow relationships visible in core, suggests that flow patterns are tortuous, and that the muddy burrows may actually inhibit production.