

Characterization of Burrow Associated Dolomite in the Wabamun Formation, West-Central Alberta, Canada

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The Wabamun Formation in western Canada is a Devonian-aged carbonate platform succession. Dominated by thickly bedded, burrow-mottled limestones and dolomites, the Wabamun Formation is host to significant reserves of hydrocarbons. This study examines the influence trace fossils have on reservoir quality and dolomite precipitation within the Wabamun Formation.

Integration of ichnologic and sedimentologic data reveals a carbonate succession comprised of mudstones, intraclast wackestones, and peloidal grainstone facies. These facies are highly bioturbated and are deposited within a shallow marine, epeiric carbonate platform. Preferential dolomitization occurs predominately within and adjacent to the burrow fabrics, thereby suggesting potential ichnological controls on reservoir quality. Spot permeametry has been used to characterize the permeability within the limestone matrix and dolomitic burrows. Initial observations show the burrows having preferentially higher permeabilities than the matrix. This suggests that fluid flow is initially concentrated through the burrow fabric. To augment the study of dolomite and its contribution to permeability enhancement, scanning electron microscopy and ion-microprobe are going to be used to collect carbon and oxygen isotopes from the samples. Utilization of the ion-probe will permit comparison of isotopes for the dolomitic crystals within the burrows to those obtained from the host limestone matrix. Comparison of stable isotopic variation within the samples to values obtained previously for Late Devonian examples in western Canada will also occur. This will allow for a greater understanding of the controls influencing dolomitization within the biogenic structures. It will also help us understand the controls helping enhance permeability within the Wabamun reservoir intervals.