

Late Triassic Facies in the Western Barents Sea, the Fruholmen Formation

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ABSTRACT

The Fruholmen Formation of Late Triassic (Late Norian to Rhaetian) age is a prospective interval for oil and gas in the Western Barents Sea. Although the majority of fields and discoveries in the Norwegian Barents Sea are confined to deposits of a Jurassic age, the Late Triassic play has been proven in the Goliat field and two other oil discoveries. Previous studies have shown that regional transgression took place in the Early Norian, marking the boundary between the underlying Snadd and Fruholmen formations. The lower part of the formation is represented by relatively deep-water shales, while the upper part is characterized by prograding deltaic deposits. The current study focused on the regional facies reconstructions of the Western Barents Sea area. It included an integrated analysis of core data (core descriptions and photos), well logs and 2D/3D seismic data. Type section identification by logs and core was followed by thickness and attribute map analyses. The Fruholmen Formation is characterized by a great variety of lithologies and facies. As a whole, five main type sections and corresponding facies zones were identified: I – zone of onshore sedimentation, including the alluvial plain; II – coastal plain, including deltas of small and big rivers; III – shallow water shelf, including subaqueous deltas; IV – shallow water shelf with thick deltaic complexes formed under the conditions of syndepositional subsidence, V - deep shelf with fan deltas. To map the facies distribution, the Fruholmen Formation was subdivided into two intervals, which are separated by a sequence boundary. The lower interval corresponds to a highstand system tract of the underlying sequence and is dominated by nearshore and shallow water shelf facies (zones II-IV). The upper interval represents a distinct Fruholmen sequence. The corresponding map displays a basinward shoreline shift and in comparison to the lower interval, the zone of continental deposition has extended. It could be concluded that the deposition of the Fruholmen Formation occurred under the conditions of a gradual shallowing of the sedimentary basin. As a result, zones of continental deposition (minimum thickness) to deep shelf deposition (maximum thickness) were identified. Two depocenters are associated with the Nordkapp Basin and the Bjørnøyrenna Fault Complex. Based on drilling results, the most favorable zones for hydrocarbon accumulations are expected to be confined to deltaic and coastal plain facies.