

The impact of volcanism on reservoir quality, Scotian Basin

Georgia Pe-Piper¹ and David J.W. Piper²

¹*Department of Geology, Saint Mary's University, Halifax, Nova Scotia, B3H 3C3, Canada*

²*Geological Survey of Canada, Natural Resources Canada, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada*

Abstract

In magma-rich rift margins, the role of magmatism in petroleum systems is widespread and significant. In magma-poor margins, the impacts are more subtle, but nevertheless present. In the Scotian Basin, minor Aptian–Albian magmatism is associated with regional and prolonged elevated geothermal gradient, sufficient to be recognised in vitrinite reflectance. At the same time, in the western Sable Sub-basin, hydrothermal basinal fluids resulted in cementation of sandstone reservoirs by silica and carbonates. The diagenetic alteration of feldspars to albite and eventually clays and carbonate minerals took place at shallower depths in thick permeable sandstones where fluid temperatures were higher, compared with areas with lower fluid temperatures, or thinner (presumably less connected) sandstone beds. Abundant carbonate cement also appears to be favoured by the passage of hot hydrothermal basinal fluids. The presence of such late carbonate cements is the principal risk factor for reservoir quality in late Jurassic-early Cretaceous sandstone reservoirs of the Scotian Basin. Similar concepts on the influence of magmatism on reservoir quality may be applicable to other eastern Canadian basins where a regional volcanic phase post-dates the main extensional phase, e.g. late Albian in the Salar basin.