

Petroleum Systems in the Grand Banks of Newfoundland, Offshore Eastern Canada

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Significant hydrocarbon discoveries have been made in only one of the several Mesozoic basins situated on the Grand Banks of Newfoundland ! the Jeanne d'Arc Basin. Two main oil families have been identified in the Jeanne d'Arc Basin. The first group, comprising the majority of oils, is sourced mostly from the Kimmeridgian Egret Member of the Rankin Formation. Many of these oils have probably also received a contribution from a Tithonian interval within the uppermost Jeanne d'Arc Formation, a source that may dominate the oils from the Beothuk well. Several oils from this group have been biodegraded to varying extents and some contain a mixture of biodegraded and unbiodegraded hydrocarbons. The second group of Jeanne d'Arc Basin oils ("Ben Nevis"-type) has a significant contribution of hydrocarbons from a more terrestrially-influenced source rock than the Egret Member. This could be a Callovian-Oxfordian interval within either the Voyager Formation or the lower part of the Rankin Formation. This second group of oils occurs in only one part of the basin and may be associated with the Trinity Fault. In the Jeanne d'Arc Basin, lateral migration appears to be relatively short with a significant vertical component due to faults acting as conduits. A heavy (but not biodegraded) oil recovered by drillstem tests from Late Cretaceous carbonates in the Heron well in the South Whale Subbasin has properties very different from the Jeanne d'Arc Basin oils and is probably sourced from the same carbonates that host it.