

Petroleum Exploration in Newfoundland and Labrador: What Have We Found And Where Do We Go From Here?

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ABSTRACT

Recoverable resources of 2.1 billion barrels of oil, 5.1 trillion cubic feet of natural gas and 290 million barrels of natural gas liquids have been discovered on the Grand Banks of Newfoundland, with an additional 4.2 trillion cubic feet of natural gas and 123 million barrels of natural gas liquids discovered offshore Labrador. Production is currently at about 140,000 bopd and, based on the current slate of developments, could reach 350,000 to 450,000 bopd within the next five to six years. These resources have been discovered by the drilling of only 127 exploration wells that are predominantly concentrated within the Mesozoic sediments of the Jeanne d'Arc Basin, (figure 1) although some 20 other basins and sub-basins ranging in age from Early Paleozoic to Cenozoic are located in and around Newfoundland and Labrador (figure 2). The most successful play concept to date has been Cretaceous faulting, which has provided the trapping mechanism for all of the major oil discoveries including Hibernia, White Rose and Hebron (figure 3) and has combined with a stratigraphic pinchout to trap the hydrocarbons at Terra Nova.

Recent landsales and seismic surveys indicate that industry is ready to revisit areas outside the Jeanne d'Arc Basin, such as the Flemish Pass and the Southern Grand Banks in the near future.

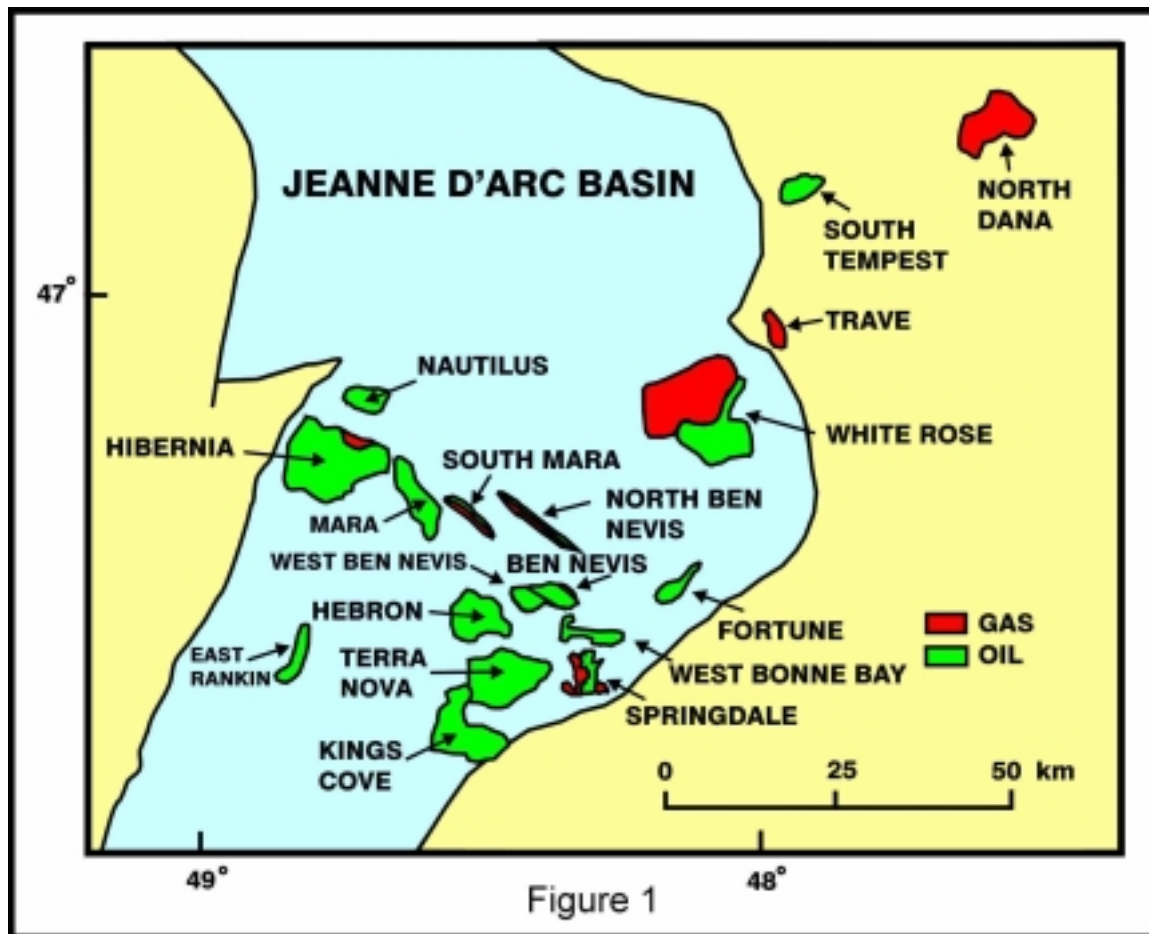
Although only three wells have been drilled in the Flemish Pass Basin (the last one in 1986) they have shown the presence of similar-age reservoirs and source rock to the Jeanne d'Arc, and seismic indicates presence of large structures - including Cretaceous fault blocks. This basin is located in deeper water (1100 metres as compared to 100 metres) than the Jeanne d'Arc, and has been the focus of aggressive rights acquisition by Petro-Canada and Norsk Hydro in recent landsales. Drilling is expected to occur next year with the arrival of a deep water rig.

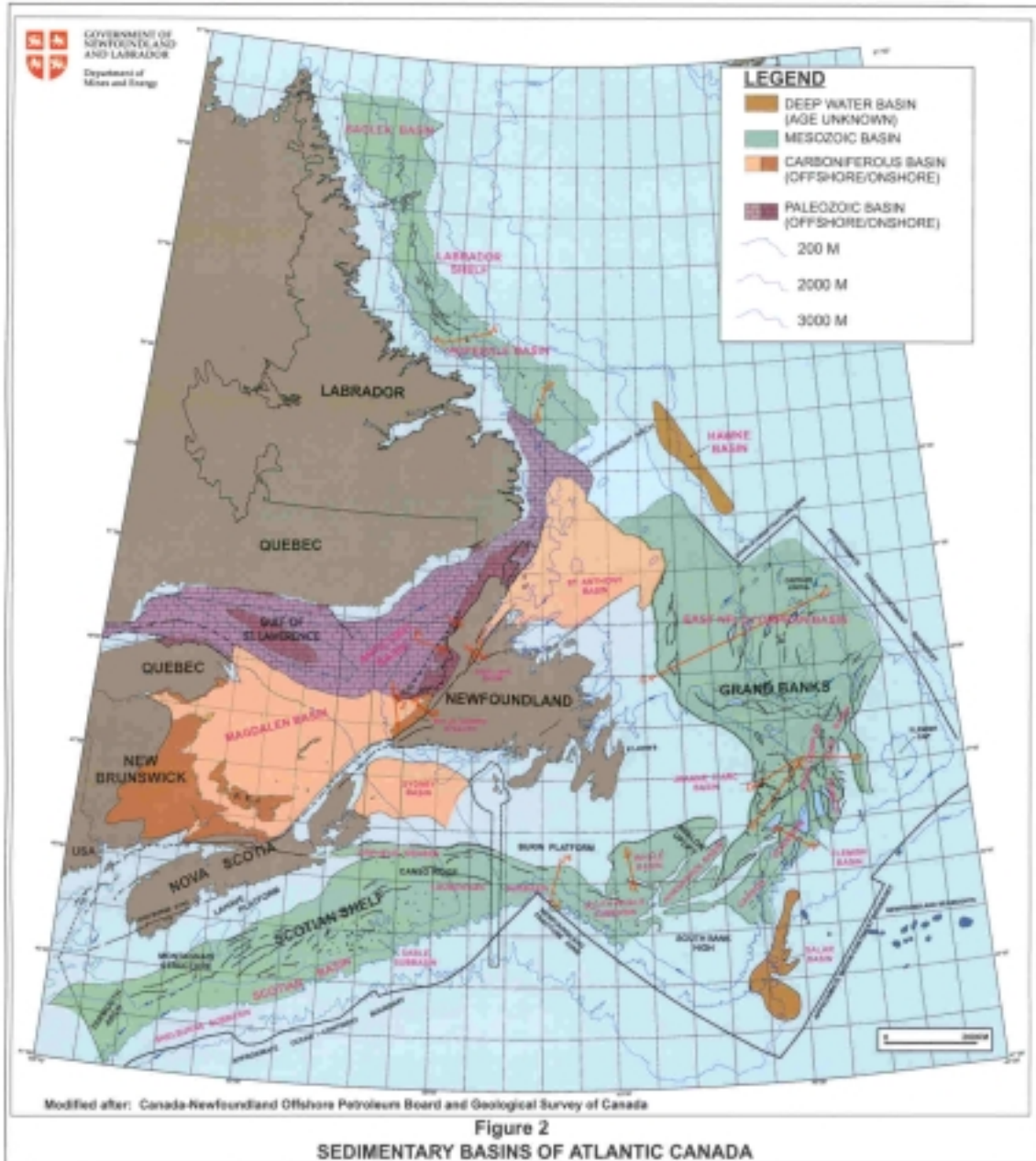
Thirty wells drilled in the Southern Grand Banks (SGB) basins (Whale, South Whale, Horseshoe and Carson/Bonnyton basins) between 1966 and 1974 were largely focused on the area's salt dome play and encountered only minor oil and gas shows. It would appear that, either there is no significant source rock in this area, or that the salt movement post dated the migration of hydrocarbons. No source rock was encountered in any of the SGB wells but seismic indicates that a

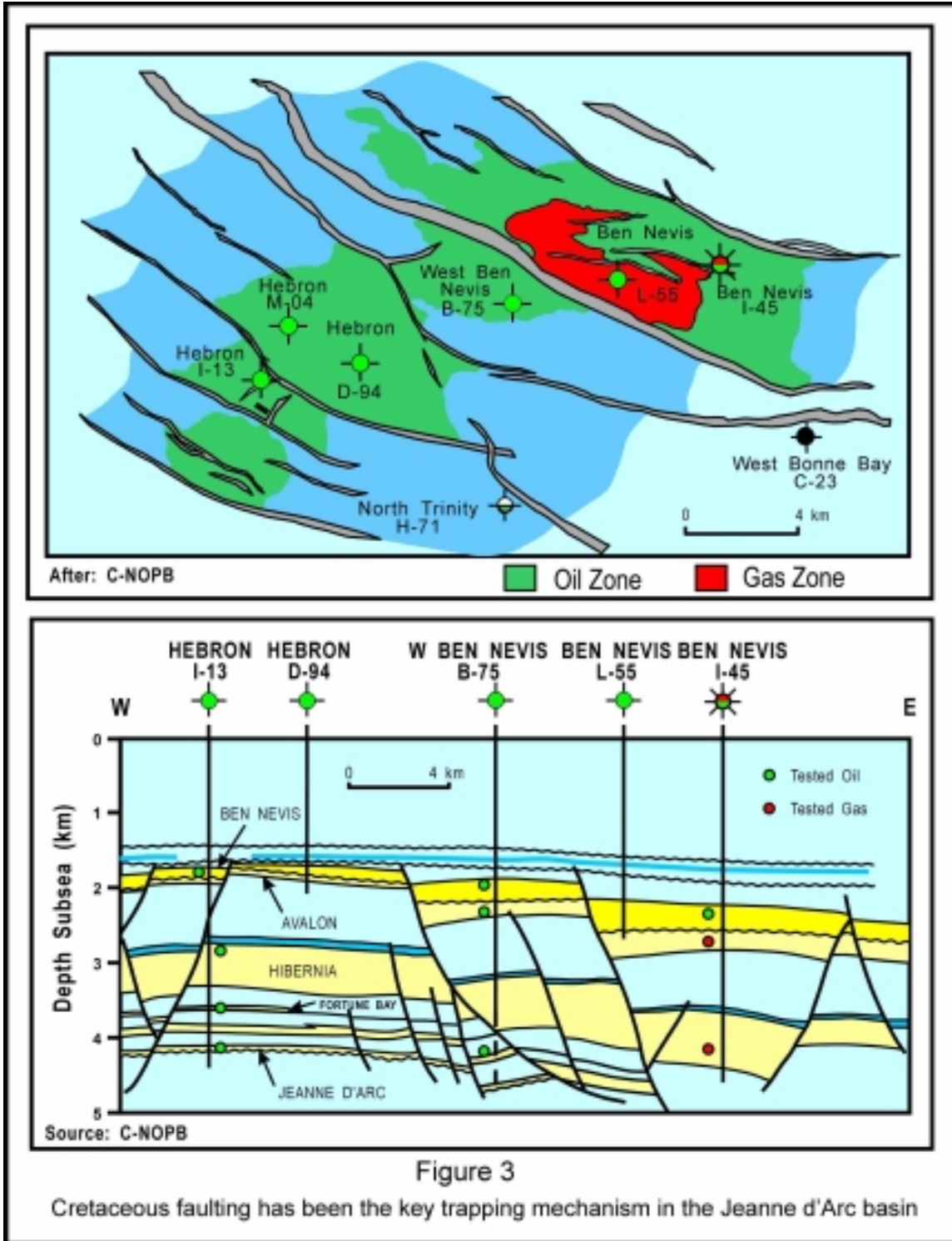
great deal of the sedimentary section has yet to be tested by the drill bit. The presence of rich source rocks within the Scotian Basin to the west and within the Jeanne d'Arc and Flemish Pass Basins to the north indicates that source rock is widely distributed throughout the eastern Canadian Mesozoic basins, and is likely to also be present in the deeper sections of the Southern Grand Banks basins. A review of publicly disclosed seismic data by the authors indicates a number of undrilled plays on the Southern Grand Banks including broad deep-seated anticlines, Cretaceous fault blocks, marginal marine pinchouts, an Upper Jurassic carbonate bank edge, and deep water turbidites. Figure 5 is a seismic line in the Bonniton Basin that shows examples of some of these plays.

Although in the early stages of exploration, one discovery (Port au Port #1) has occurred within the Paleozoic carbonates of western Newfoundland and a number of large undrilled prospects have been identified. A development plan has been submitted for this field and drilling continues on other prospects.

This paper will provide an overview of the geology and successful play concepts, and present new hydrocarbon play concepts that may be explored in several of the more lightly explored basins.







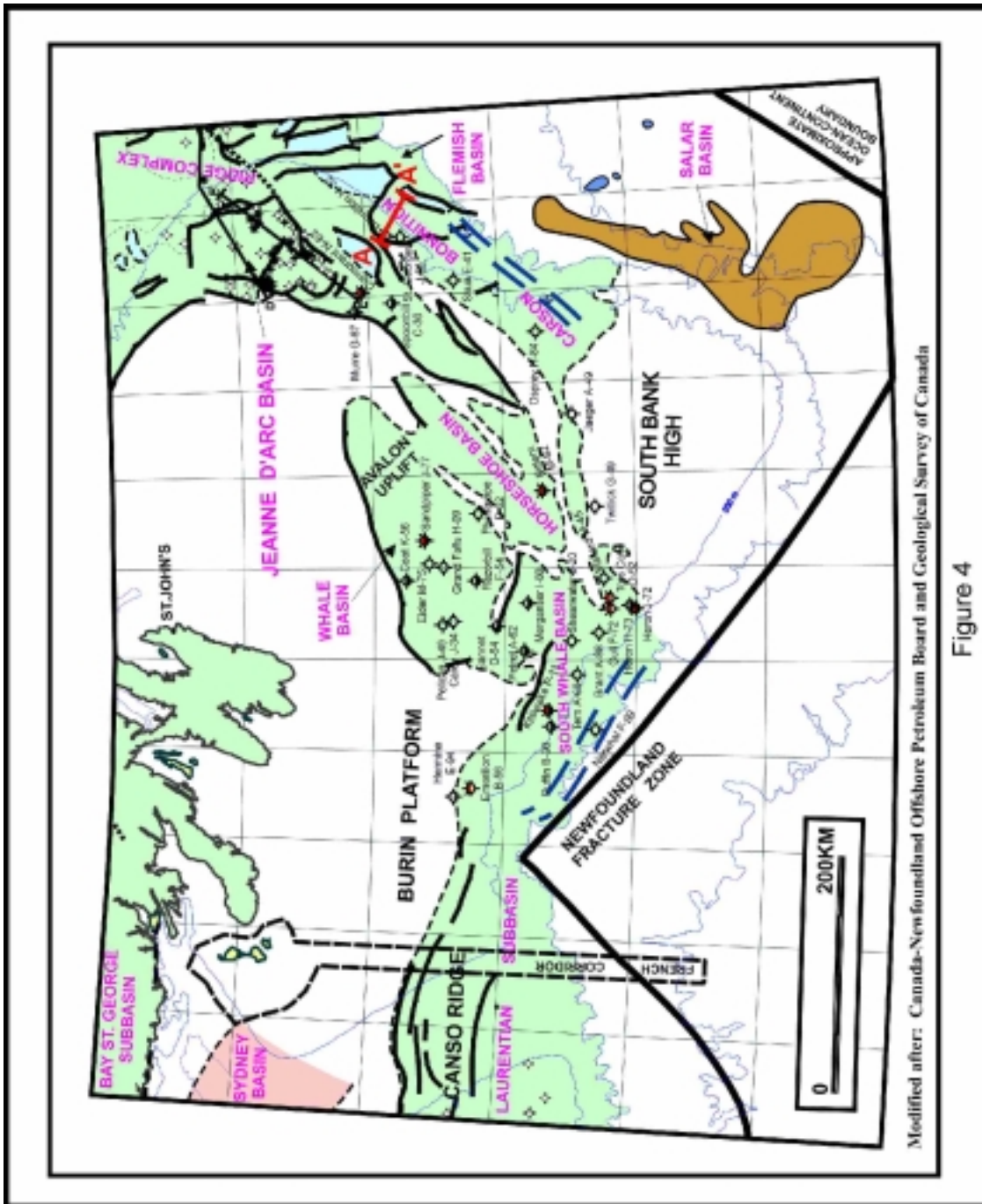


Figure 4

