# OIL SHALES IN NEW BRUNSWICK: HISTORICAL AND CURRENT INDUSTRY-RELATED ACTIVITIES

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The presence of oil shales in the Lower Carboniferous Albert Formation in the southeastern Moncton Subbasin (Figure 1) first came to the attention of Dr. Abraham Gesner when, in the late 1840's, he was guided to a vein of solid bitumen exposed within oil shales along Frederick Brook at Albert Mines (St. Peter 1988) (Figure 2). The bitumen vein, which became known as Albertite, was mined out during the 1850's to 1870's and most of it was shipped to Boston and Philadelphia where it was distilled for the production of lamp oil (kerosene).

The first attempt to commercially mine the Albert oil shales came in 1927 when the Maritime Eduction Company (Figure 3) set up a retort, constructed associated production facilities and opened several small adits in the shale beds in the Rosevale area about 25 km south of Moncton (Figure 2). The company fell into bankruptcy prior to the initiation of production.

In 1942, the Federal Government under the Canada Department of Mines and Resources undertook a study of New Brunswick oil shales in an attempt to secure oil supplies to support our effort in World War II. As part of this study, 79 core holes with an aggregate length of 7480 m were drilled into the shales at Rosevale, Albert Mines and Taylor Village (Figure 2). The results of this work suggested that the most promising area was at Albert Mines where it was estimated there were 91 000 000 t of shale to a depth of 120 m yielding an in-place resource of $4.8 \times 10^9$ L or $30 \times 10^6$ barrels of oil.

Greiner (1962) published the results of a geological study of the Albert Formation and concluded that the highest grade oil shales are restricted to the medial part of the Albert Formation in the southeastern part of the Moncton Subbasin (Figure 1). In 1968–69, Atlantic Richfield Company used Greiner's idea and drilled ten core holes aggregating 4433 m in the southeastern Subbasin. ARCO carried out Fischer Assay analyses on all of the promising oil shale intervals in the ten holes.

In 1974, Canadian Occidental Petroleum Ltd. (Can Oxy) entered New Brunswick and acquired bituminous shale licences on nearly 30 000 ha of land, which is greater than one-half the area of the Moncton Subbasin. From 1974 to 1981, Can Oxy undertook a geological mapping survey of its licence area and drilled eleven core holes (totaling 4539 m) in the Albert Formation near Rosevale and Albert Mines. Following its assessment, Can Oxy converted their licence area to a lease of 1439 ha centered on the Albert Mines structural block.

From 1981 to 1996, Can Oxy continued to assess the Albert Mines lease area. In 1982, Macauley and Ball compiled the available ARCO and Can Oxy Fischer assay results on all cores in the Albert Formation and concluded there was an in-place resource in the Albert Mines block to a depth of 600 m of $67 \times 10^6$ barrels of shale oil in a bed averaging 93.5 L of oil per tonne of rock. Macauley and Ball (1982) were the first to conduct a Rock-eval pyrolysis study on Albert oil shales.

In the 1980's, the New Brunswick Electric Power Commission (NB Power) and the Federal Department of Energy, Mines and Resources signed an agreement to evaluate the potential of utilizing Albert oil shales as a fuel and as a source of lime sorbent for removing sulphur gases when co-combusted with New Brunswick's high-sulphur coal. The test work was to be undertaken in a demonstration-scale circulating fluidized bed boiler at Miramichi, New Brunswick (Figure 1). Canadian Occidental Petroleum were approached and agreed to produce the oil shale from its Albert Mines lease for the demonstration project. Accordingly, in 1986, Can Oxy opened two oil shale test pits in the area; one from the highest grade shale bed, the so-called Albert Mines Zone (Macauley and Ball, 1982), and another larger pit from the stratigraphically lower Dolomite Marlstone Zone. A total of 9000 t of shale was removed from the two pits, crushed and trucked to Miramichi. The test trials at Miramichi demonstrated that there was not sufficient available calcium carbonate in the oil shales to fully capture all the sulphur gases generated from

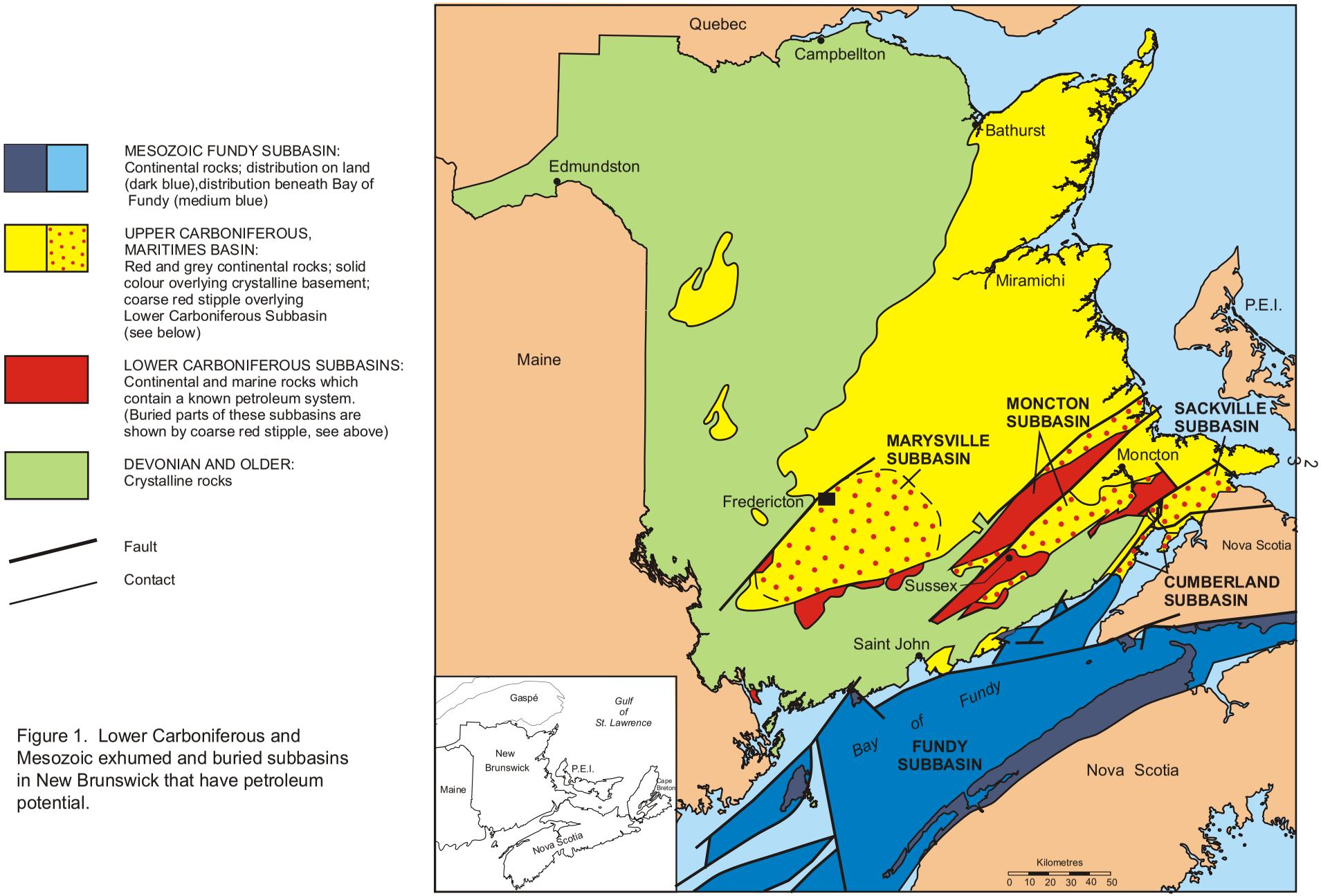


Figure 1. Lower Carboniferous and Mesozoic exhumed and buried subbasins in New Brunswick that have petroleum potential.

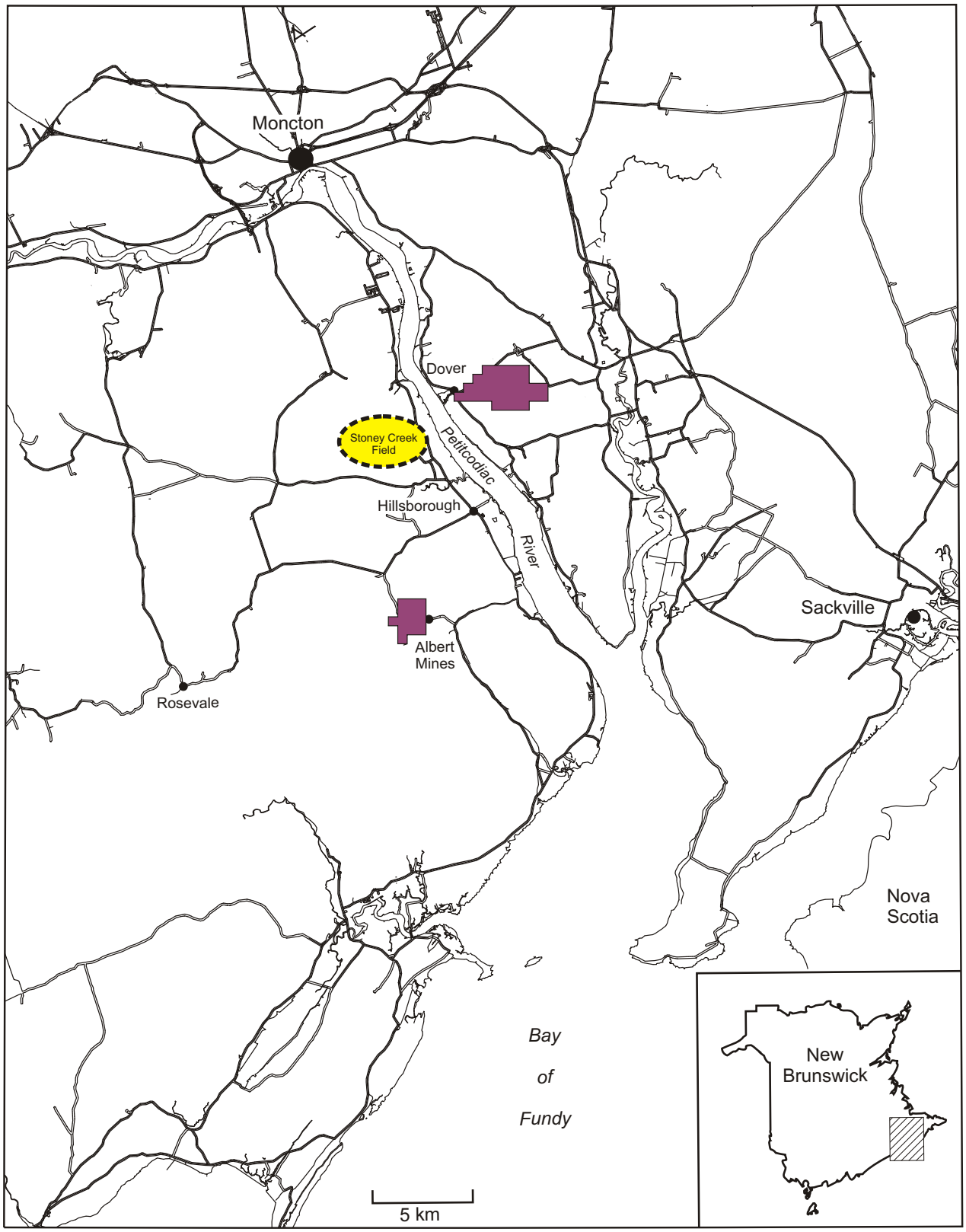


Figure 2: Southern New Brunswick showing the Stoney Creek field (⬭) and A.A. (N.B.) Inc. bituminous shale permit areas (▬).

Figure 3. Maritime Eduction Company oil shale plant and retort at Rosevale, circa 1927.

Figure 4. Drill rig at the Shell Canada Limited Breau No. 1 well in Westmorland County, 1999.

The co-combusted coal. The tests also showed that an enormous quantity of shale ash was generated, which: (1) overloaded the 'baghouse' and (2) created a major disposal problem. It was concluded that the oil shales could not be economically co-combusted with New Brunswick coal. Canadian Occidental Petroleum Ltd. held its property until 1996, but several years of low world oil prices finally contributed to its termination of the lease.

In 1996, a Malaysian company established a New Brunswick subsidiary, A.A. (NB) Inc., which obtained a bituminous shale licence to search on 16 165 ha in the Rosevale, Albert Mines and Dover areas south of Moncton (Figure 2). In 1997, the company opened 10 trenches with an aggregate length of 936 m. High-grade oil shale beds are known from outcrops in the area of the trenches. Geological appraisals and Rock-eval pyrolysis results on trench samples led A.A. to convert its licences to search to three development permits, at Albert Mines, Rosevale and Dover. In 1998, the company relinquished its Rosevale permit, but retained its Albert Mines and Dover properties (Figure 2). The development permits are presently in good standing and comprise an area of 1077 ha. In 1999, the company carried out a shallow core hole drilling program on its permit areas.

In 1998, Shell Canada Limited acquired the bituminous shale rights on nearly 25 000 ha of land south and southeast of Moncton. In late 1998, Shell initiated a core drilling program and put down 9 holes with a total length of 6200 m (Figure 4). The company carried out wireline logging on all the holes and extensively sampled and analyzed organic-rich intervals by Rock-eval pyrolysis. Knowledge of the subsurface distribution of the Albert oil shales has been significantly advanced by Shell's work. The company canceled its New Brunswick licences in 1999 following a major corporate restructuring.

The history of oil shale exploration activity in the past century in New Brunswick, as this brief account implies, has been one of relatively short periods of intense mapping, drilling and analytical work followed by longer periods of 'quiet reflection'. In this regard, oil shale exploration history here is analogous to that in the western US Green River shales of Colorado, Utah and Wyoming. The cycles of activity for this

unconventional energy resource are closely tied to the cyclicity of supply and demand and prices of conventional crude oil. Considering the grade and thickness of the Albert shales, it seems very likely that a commercial operation will eventually develop in New Brunswick.

## References


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Source:

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