Seismic stratigraphy and structural setting of the McCully gas field

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The McCully gas discovery is located 11 km northeast of Sussex, in the southwestern part of the Moncton Basin. The gas-bearing interval occurs within sandstone and shale of the Horton Group between depths of 2036 to 2372 m. Lithofacies analysis of these rocks suggests that they are akin to rocks of the Hiram Brook Member of the Albert Formation. However, seismic-stratigraphic correlation to the Will DeMille well suggests the rocks are stratigraphically equivalent to the Frederick Brook Member of the Albert Formation. Spore analyses were inconclusive.

Acoustic logs from the prospective zone show very small differences in the acoustic properties between the sandstone and shale. The seismic velocity in the interval is about 4700 ms^{-1}. Low-amplitude, discontinuous reflections are imaged on existing 2D and 3D seismic data. Seismic markers were mapped at the top (basal Hillsborough unconformity) and the approximate bottom of the gas-bearing interval ("yellow reflector"). The Hillsborough unconformity dips gently to the northwest on a large, basin scale monocline. The "yellow reflector" is gently folded, forming an east-northeast-striking anticline. Consequently, the unconformity intersects the folded Horton Group rocks at different stratigraphic levels within the McCully field. The existing seismic data suggest that the "upper gas sands" are "trapped" by the unconformity, whereas "lower sands" are possibly "trapped" by anticlinal closure.

Regional seismic mapping, in conjunction with outcrop data, suggests that the northern and southern margins of the Moncton Basin in the McCully area are formed by reverse faults. The northern margin is bounded by the Berry Mills Fault. Outcrops of Windsor Group rocks and clear Windsor Group reflections demonstrate that at least 3 km of horizontal movement has occurred on a north-dipping thrust fault. Seismic evidence on the southern basin margin is less clear, but reverse faulting offers one explanation for the relationships observed.