

Coal rank changes in the Sydney and Pictou coalfields of Nova Scotia: Cause and economic significance

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In eastern Canada the coalification is essentially post-deformational, resulting in a general increase of rank with depth in individual seams. However, within the confines of the Sydney Coalfield and between the Sydney and Pictou fields the rate of increase is not constant, signifying differences in geothermal gradients and/or thermal conductivity of the sediments.

In the Sydney Coalfield the Harbour seam shows variations in the coalification gradient of 0.032 to 0.046% Ro/100 m, which compares with a gradient of 0.052% Ro/100 m for the Acadia seam of the Pictou coalfield. Variable gradients were also obtained from sequences of separate coal seams cut in twelve boreholes, which in the Sydney field ranged from 0.050 to 0.086% Ro/100m. The highest gradient was obtained in the offshore Murphy *et al.* P-05 well, which is located over a pre-depositional high, where a higher palaeotemperature likely existed.

In addition to the vertical changes there are also regional variations in rank within one seam at the same depth. In the Sydney field an easterly increase of two V-types in rank over a distance of 48 km can be related to a difference in the original depth of burial.

This eastward shift in rank is economically important, because it means that high quality coking coal of medium volatile rank is reached at a depth of 700 m in the eastern part of the field, in contrast to a depth of 900 m in the central portion. The coal presently mined is high volatile "A" bituminous, and requires additions of low volatile American coal to produce coke of metallurgical quality. This low volatile coal, however, could also be obtained from the Acadia seam in the Pictou field, where it occurs between depths of 580 and 990 m. The Acadia reserve (comprising 14 million tons) is the only known low volatile coal deposit in eastern Canada.