

## **Geological and geothermal effects on coal rank variations in the Pennsylvanian Basin of New Brunswick**

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Rank determinations by vitrinite reflectance measurements of thin coals from 162 locations, covering most of the Pennsylvanian Basin, form the data base of this investigation. The reflectance values, projected to sea level position with the Maritime coalification curve, show a systematic pattern. This pattern, as interpreted by trend-surface analyses, indicates a progressive increase in rank, from high volatile "C" bituminous coals in the coastal areas in the east, to anthracite in the region southwest of Fredericton.

Local variations within this regional pattern are present, but in a broad sense the trend conforms with the occurrence of progressively older formations in a

southwesterly direction. However, the degree of increasing coalification, to the level of anthracite, cannot be related solely to greater depth of burial and therefore increased geotemperatures in the older formations. Additional sources of heat are required for this, and may have been provided by nearby igneous rocks or concentrations of radioactive minerals.

In support of this is the observation that the highest present heat flow in New Brunswick has been recorded at Mt. Pleasant, which is in close proximity to the anthracite occurrences, while abnormal vertical coalification gradients in wells near Fredericton suggest increased temperatures from a radio-active heat source.