Coalbed Methane Potential in Nova Scotia, Canada; Implications for Natural Gas Prospects

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The coalbed methane and natural gas potential of selected Carboniferous coal seams from three Carboniferous coal basins of Nova Scotia, eastern Canada were evaluated using organic petrography (coal quality and maturation), surface area, bulk porosity and permeability, adsorption isotherms, and hydrous pyrolysis.

The data suggest that the permeability and porosity is partially dependent on coal composition and maturity but more importantly is related to the stress field and other structural parameters. The amount of early-generated oils is the major parameter for the formation and expulsion of free hydrocarbon gases although coal composition has some influence. Analyses of samples with similar maceral assemblages shows the CH_4 adsorption capacity (generally >10.7 cc/g) is increased due to a change in rank from high to medium volatile bituminous.

The CO_2 surface area and monolayer capacity of selected coal seams from two basins are high enough (>75 m^2 /g and > 15 cc/g STP, daf, respectively) to generate gas contents of 10-20 cm^3/g of coal. High hydrocarbon potential (>100 mg HC/g of rock) of most samples from the three basins and low bitumen content suggest that these coals have a high potential for gas generation. Hydrous pyrolysis analyses supports the view of low liquid hydrocarbon and higher gas generation (>2ml/g of coal).

Selected coal seams from two basins were analyzed for coalbed methane potential. The adsorption capacity in coal is the highest (12 - 20 cc/g, STP, daf) in the youngest basin followed by 13.3 -14 cc/g for deeper seams in the central part of the province. The youngest coals yielded results of 9.8 - 13 cc/g. Organic petrology in relation to adsorption isotherms, cleat patterns and gas outbursts in mines in the youngest basin suggest more prospectivity for natural gas in the offshore deeper horizons.