

CBM Adsorption Isotherms of Philippines Versus U.S. Coals: From Tectonic Control to Resource Evaluation

Romeo M. Flores and Gary D. Stricker
MS 939, US Geological Survey, Denver, CO.

Twenty coal samples were collected from Batan, Cagayan-Isabella, Catanduanes, Cebu, Cotabato, Negros, Samar-Leyte, Semirara, Surigao, and Zamboanga-Sibuguey coalfields in the Philippines for methane adsorption isotherm analysis and the results were compared to those from 94 U.S. coal samples. The Philippine coals are Pliocene-Miocene in age, range in rank from semi-anthracite to subbituminous, and were deposited in back-arc basins and sub-basins. Tectonic rift and collision stages in the Early Miocene resulted in block faulting that developed horsts and grabens and half grabens on micro-continental blocks. Middle-Late Miocene through Pliocene tectonism resulted in rapidly subsiding basins/subbasins during tensional (drift) and compressional (collision) stages. The intensive micro-plate deformation overprinted by volcanism is a sharp contrast to U.S. foreland coal basins (Appalachian, Illinois, Gulf Coast, Powder River, Williston) developed on continental plates from Carboniferous to Paleogene times.

Comparison of the mean coalbed methane (CBM) adsorption isotherms (dry-ash free) plotted on curvilinear regression lines from 114 lignite to anthracite coal samples indicates that Philippine lignite B and medium-volatile bituminous coals are 0.8 to 12.8 cc/g more than similar rank U.S. coals. Mean adsorption isotherms of Philippine semi-anthracite coal average 13 cc/g; bituminous coal range 16-31 cc/g; subbituminous coal range 3-7 cc/g; and lignite average 6 cc/g. Mean adsorption isotherms of U.S. anthracite coal range 17-35 cc/g; bituminous coal range 13-19 cc/g; subbituminous coal range 3-7 cc/g; and lignite average 3 cc/g.

CBM adsorption isotherms and total desorbed gas of subbituminous coal from Semirara coalfield are better than those from the Powder River Basin (PRB), Wyoming. In Semirara Panian mine coal cores, collected at 233- to 235-m depths and near the highwall, yielded up to 1.1 SCM/MT total gas contents. In the PRB, coal cores collected at 50- to 100-m depths juxtaposed to mine highwalls yielded 0-0.09 SCM/MT total gas contents. This suggests that gas diffusion rate in Semirara coals is slower than in PRB coals. Coal cores collected at 155- to 170-m depths near the abandoned Himalian mine in Semirara coalfield yielded up to 1.04 SCM/MT total gas content, indicating that gas is still held in the coal by original hydrostatic pressure. Total gas-in-place resources for Semirara Island and offshore (250 km²-area) are estimated to be about 283 BCM.