AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Hal Gluskoter[1], Ron W. Stanton[1], Romeo M. Flores[2], Peter D. Warwick[3] (1) U. S. Geological Survey, Reston, VA (2) U.S. Geological Survey, MS 939, Denver, CO (3) U.S. Geological Survey, Reston, VA

Adsorption of Carbon Dioxide and Methane in Low-Rank Coals and the Potential for Sequestration of Carbon Dioxide

Early studies that compared the adsorption of both carbon dioxide and methane in coals were done, principally, on bituminous coal samples from the United States and Canada. At normal reservoir temperatures, these coals were found to adsorb approximately twice the volume of carbon dioxide as methane. This two-to-one ratio has been widely reported in the literature, and has approached the status of conventional wisdom. In contrast, new adsorption isotherms determined on 13 samples of low-rank coals (lignite and sub-bituminous) from the Northern Great Plains and Texas demonstrate that these coals can adsorb from 6 to 18 times more carbon dioxide than methane.

There is a statistically significant correlation between the carbon dioxide/methane adsorption ratios to the rank of the coals; and lignites have the highest adsorption ratios. However, the amounts of carbon dioxide adsorbed by the coals in our suite of samples do not correlate with coal rank parameters, such as calorific value and moisture. The methane adsorption volumes do correlate with rank. Although low-rank coals generally have much lower adsorption potential for methane than coals of higher rank, they should not be overlooked as potential sites for the sequestration of carbon dioxide from fossil fuel combustion. The low-rank coals may adsorb as much, or more, carbon dioxide than has been reported for the bituminous coals. In addition to sequestration of the carbon dioxide, injection of carbon dioxide into unmineable, low-rank coal beds may also enhance the extraction of methane.