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Coalbed methane potential of the paleocene fort union coals in south-central Wyoming, USA

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Abstract

The Paleocene Wasatch and Fort Union Formations in Wyoming contain coal seams interbedded with clastics. Individual seam thickness ranges from 2-15 ft (aggregate thickness is 64-163 ft). Coals are subbituminous to high-volatile C bituminous (VRo= 0.47 to 0.59%) and present from <2,000 to 6,000 ft. Gas content ranges from 115-263 scf/t (as-received). The coals are almost fully saturated based on a comparison of adsorption isotherms with desorption. They pinch-out updip forming a stratigraphic trap, which may explain the high gas content and the mixed biogenic-thermogenic origin. Gas composition is 97% methane with 3% inerts. Heating value is 990 BTU/ft^3. Average ash is 15 wt%. The coals have fast diffusivity (63% of total gas desorbs in <16 hrs). A pressure transient test at 3,140 ft showed permeability of 14 mD (un-stimulated). The coal was normally pressured (0.44 psi/ft) but heavily damaged (+23 skin). Another seam at 4,100 ft had a permeability of 2.6 to 4.6 mD, estimated from long-term water production. Potential recoverable resource is 700 Bcf on 80-acre spacing. Numerical simulation shows peak gas rate to be 320 Mcf/d after 36 months. Production should remain at that level for 12 months before declining at 10%/year. Conventional gas potential exists within the sandstones at <2,000 ft. Wells drilled decades ago showed IP rates from 500 Mcf/d-12 Mmcf/d. A 24-inch pipeline with an operating pressure of 800-1000 psig and a capacity of 275 Mmcf/d crosses the area.

Biography

Thomas Gentzis obtained his Ph.D. in 1991from the Newcastle University, England, specializing in organic petrology and geochemistry. He spent 14 years with the Alberta Research Council and at the National Center for Upgrading Technology in Canada. In 2001, Thomas joined CDX Gas, where he played a key role in the successful drilling and production from horizontal wells in low-permeability coals. He moved to Dallas in 2007 as an unconventional resource specialist and joined Core Laboratories two years later. In his capacity as Geological Advisor, Thomas provides organic petrological and geochemical services to clients worldwide and maintains functional excellence in the geosciences. He has published over 120 technical papers in peer-reviewed journals, two book chapters, has given numerous presentations at conferences and symposia by invitation, and is a member of the editorial board of three journals.