

McLellan, P.J., and Hawkes, C.D., Assessing Borehole Instability Risks for Horizontal Wells in Coals and Fractured Shales, Presented at the 4th Annual Unconventional Gas and Coalbed Methane Conference, Calgary, Alberta, October 23-25, 2002.

Abstract

Horizontal wells are used successfully in some geological settings to enhance production from coalbed methane and fractured shale reservoirs. These wells offer the potential benefits of better inflow performance, less formation damage while underbalanced drilling, and the ability to complete with a low-cost slotted liner, screen or, in some cases, barefoot. Coals and some fractured shales tend to be mechanically very weak, hence they are prone to borehole instability-related problems during drilling, completion and production. The feasibility of horizontal drilling in these types of rocks is strongly dependent on a number of factors, including reservoir depth (and hence stress level), non-linear rock mechanical properties, and planes of weakness such as bedding and fractures. The use of borehole stability analyses for planning horizontal wells in coals and fractured shales will be demonstrated in this presentation. The increased risk of instability for underbalanced drilling will also be addressed, including a description of an analysis method that couples borehole enlargement predictions to wellbore hydraulics and hole cleaning efficiency. Two field examples of borehole instability analyses for horizontal wells will be highlighted. Case 1 is a horizontal well drilled in a source rock shale play in Alberta. Case 2 is a planned horizontal well in Mannville Group coals located in central Alberta.

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