

Successful Wellbore Placement within a Mannville Coal Seam

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In order to drill an optimum horizontal well for CBM in Mannville coals, it is necessary to take a fully integrated team approach starting from the building of a shared earth model right through to planning and executing the actual drilling operations.

Although there are many steps and many people ultimately involved in drilling such a well, it all begins with a fundamental understanding of the rock framework. This includes several factors including the stratigraphy, sedimentology, hydrogeology, coal characterization, rock mechanics and stress field analysis. All of this information is then integrated with the basic structural framework and the predicted fracture system, defined by 3D seismic, to create a shared earth model. The model is then used to create the ideal well bore trajectory yielding a complete drilling program with realistic pre-drill directional surveys. This planning is an integrative process between geologist, geophysicists and drilling engineers.

The primary objective when drilling a horizontal CBM well is to stay within the coal as much as possible along the length of the given trajectory. However, in thicker seam scenarios where vertical variances in coal quality exist, production vs. coal property analysis suggests that the optimum placement maybe at a specific position within the seam. To date that has been very difficult to achieve using current geosteering technologies. Currently, a typical CBM well is drilled horizontally using conventional measurements like gamma ray and/or resistivity to position the well in the coal seam. Although this might work in certain applications, this approach has some disadvantages when drilling thin zones (1-10ft) or trying to targeting specific intervals within a seam, as these conventional measurements used for well placement are shallow reading, non-directional or both. Operators making use of these measurements frequently discover that by the time shallow measurements indicate proximity to undesired formations or water zones, the well has already been drilled into them, resulting in issues with wellbore stability, side tracks, increased AFE, loss of production, etc..

This poster describes the successful proactive well placement of the first horizontal well in a CBM environment with the Directional Deep Resistivity Logging While Drilling (DDR-LWD)/Rotary Steerable System (RRS) system. These principals will be illustrated using a example from the Upper Mannville Mikwan coal deposit in Central Alberta.