Abstract

Coal Seam Gas (CSG) development activity is typically identified by low cost, vertical wells using low technology, simple solutions. This approach is frequently driven by small companies with minimal financial capabilities to embark upon more sophisticated well designs and completions. The net result has been a relative lack of interest from oilfield service providers used to operating within the economics of mainstream hydrocarbon activity and a lack of technical innovation employed in the CBM market.

The underbalanced, horizontal CSG pilot program performed in Australia discussed in this paper marks a significant departure from the norm. This development was driven in part by the desire to maximize production from individual wells, but also by the need to perfect technology which may subsequently be used to penetrate coal seams extending beneath surface restricted areas within the license blocks.

The three-well pilot CSG program was drilled and introduced a combination of horizontal, underbalanced drilling using recyclable foam and electromagnetic MWD (EM-MWD). A single-trip window milling system was used to kick-off the lateral from the main bore, which remained as a sump for installation of the dewatering system. This paper is a case history of the three-well campaign that describes the details of and lessons to be drawn from the application of this technology.

The program had an experimental aspect to it because this technique had not been applied to CSG previously and it delivered many valuable, but often painful, lessons in the process.

Background

The license blocks discussed in this paper are located in southern central Queensland, Australia with a number of different drilling environments. Project economics did not allow the drilling of several wells in similar areas to perfect the drilling technique and three distinctly different environments were tackled during this pilot program. These were as follows:

Well No. 1 – Low permeability coal of 6m - 8m thickness at 1,200m TVD, where fracturing and cavitation had previously delivered no commercially viable quantities of gas. Formation pressure estimated in the region of 1,050 – 1,200psi, but pressure could take a week to develop at surface.

Well No. 2 – High permeability coal of 4m thickness at 714m TVD where offset wells were productive in the range of up to 0.5MMcf/day and produced very little or no water, but the lateral had the potential to drill into a wet area.

Well No. 3 – High permeability coal of 4m – 6m thickness at 650m TVD, where previous wells were also productive in the range of 0.5MMcf/day, but produced high volumes of water of up to 4,000bbls/day. The same basic well design was employed for all three wells, with a 14” conductor set at 17m, 9-5/8” casing set at 200-250m and an 8-1/2” hole drilled vertically to kick-off point. Moderate build rates were used to reach a high