

EXPLOITATION OF A MISSISSIPPIAN CARBONATE RESERVOIR THROUGH HORIZONTAL DRILLING — THE GAINSBOROUGH NORTH POOL

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ABSTRACT

The Gainsborough North Pool provides an example of maximizing the production from a reservoir by utilizing horizontal drilling. The discovery well, drilled in December, 1987, encountered an oil saturated carbonate reservoir rock within the Mississippian Frobisher, Kisbey and Alida sequences with an estimated oil column of 23 m (75 ft). The reservoir consists of pisolitic to oolitic limestones ranging from a grainstone to a packstone. The Frobisher and Kisbey carbonates are interbedded with mudstones and silty sandstones, whereas the Alida reservoir section is more homogeneous.

Subsequent development drilling resulted in 25 vertical wells, establishing pool boundaries and additional reservoir data. This drilling revealed a pool area of approximately 1024 Ha (2560 acres), and showed the pool to have an active aquifer system, as

well as fractures in portions of the reservoir. The combination of the active aquifer system, fracturing and near wellbore coning provided early water production in nearly all wells. Production at this time averaged 191 m³ OPD (1200 BOPD) from the 19 productive vertical wells.

A horizontal drilling program was undertaken as means to enhance productivity through additional volumes, and beneficially to influence ultimate pool recovery. The first horizontal well was drilled in late 1989 and was completed for a production rate of 159 m³ OPD (1000 BOPD). The initial success has resulted in an additional seven horizontal wells being drilled in the pool. The Gainsborough North pool is currently producing 731 m³ OPD (4600 BOPD) from seven horizontal wells and 18 vertical wells, with a current cumulative oil production of 460,000 m³ oil (2.9 mmstb).