DEVELOPMENT OF THE AUSTIN CHALK IN GIDDINGS FIELD, BURLESON CO., TEXAS BY HORIZONTAL DRILLING

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ABSTRACT

The Austin Chalk produces in a NE-SW trend, sub-parallel to the Texas Gulf Coast, in a band approximately 523 km. (325 mi.) long and 40-64 km. (25-40 mi.) wide. Giddings Field is located in the central part of this trend and covers a portion of several counties along the productive fairway. The Austin Chalk produces from a hard, dense, intensely fractured limestone with a matrix porosity range of 3-8% and permeabilities of less than 0.01 md. Production comes primarily from the fractures with contribution from the matrix coming later in the life of the well.

The Austin Chalk was deposited near the southern end of the Cretaceous western interior seaway during the Coaniacian and Santonian ages (late Commachean to early Gulfian series) on a stable, gently dipping ramp during a high stand of sea level. The Austin was deposited as a calcareous ooze made up of coccoliths, coccolith fragments, planktonic foraminifera, and fine grained skeletal debris. The Austin is poorly to intensely burrowed and contains organic rich interbedded shale layers with gradational to sharp contacts with the intervening cleaner limestones. The high total organic content indicates the potential for the Austin Chalk to have been partially or completely self-sourced.

As a result of the development and improvement of horizontal drilling techniques, the Austin Chalk has experienced a flurry in drilling activity. This boom began in Pearsall Field in the southern end of the trend and soon spread to the northeast to Giddings Field and beyond. Several different methods such as drilling a highly deviated hole or traverse across the Austin, drilling parallel to faulting, stair-stepping across different zones of interest, or drilling in a specific target for the entire well path have been tried (along with other ideas) with varying degrees of success.

There are many different questions to be answered before drilling a horizontal well. Consideration should be given to off-set production, presence or absence of faulting, and thickness of the target zone to name just a few. The parameters and guidelines used in one area may not work the same way in a different area or in a different part of the same field. Seismic should be used in choosing locations and in evaluating areas of interest where there is limited subsurface control.

For a typical horizontal chalk well, casing is set into the top of the Austin 6-9 meters (20-30 feet) at some predetermined angle which will allow for getting into the target zone as soon as possible. If needed, a tangent section is then drilled before continuing to build angle to reach the center of the target. The well is then drilled to the planned measured depth and completed. Early wells were cased but due to cost and the nature of the reservoir the subsequent wells were completed open hole. The early horizontal wells were drilled with lateral sections less than 609 meters (2000 feet). Improvements in drilling techniques have enabled operator to drill lateral sections greater than one mile.

Both old and new methods are used for formation evaluation of the horizontal wells. Careful evaluation of the cuttings and close monitoring of the penetration rates and gases are critical in determining if the lateral section is being drilled in the right zone in identifying fractured intervals and in qualifying shows. New borehole imaging tools produce a visual record of the borehole and are good direct measurement indicators of fracturing along the well path. The data gathered from these logs can be used in many ways to aid in evaluation of the play.