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Riserless Drilling With Casing: A New Paradigm for Deepwater Well Design

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Abstract

As the deepwater Gulf of Mexico (GOM) drilling operations move into deeper water and well depths there has been a lack of consistent and sustained drilling performance improvement. This is an evaluation of the GOM deepwater wells in an attempt to understand the reason for this poor drilling performance and propose a solution to adapt the well designs for the specific challenges of deepwater drilling. Execution of these very expensive wells, which often fail to achieve objectives, or worse are lost, requires a step change in drilling performance.

The complex deepwater drilling environment has pushed the typical offshore well construction design model to its limits. Many of the well design philosophies and the well equipment itself are not well suited for the unique deepwater drilling environment. This requires step changes in well design philosophy, and the understanding and acceptance of the associated risks of implementing new practices. The acceptance of change has been a monumental driver in our industry. The goal is to ensure that exploration and development of oil and gas continues to be feasible in this industry subject to volatile commodity prices and ever increasing costs. A paradigm shift in well design philosophy that involves managing the drilling risks in the shallow hole sections, where the well costs are minimum, rather than the current practice of incurring risks after significant investment has been made, is critical to future success and economic viability of deepwater drilling.

The well design model presented uses the shallow and rapid growth of the pore pressure/fracture gradient (PP/FG) environment to optimize casing seats. Drilling with Casing (DwC) is an enabling technology that can be a mitigant for managing shallow hazards. The fundamental premise is to use this technology to set the first, and possibly the second, casing strings significantly deeper than current practice.

The proven ability of DwC to mitigate many similar drilling hazards as those encountered in deepwater drilling would allow the casing seats to be based upon the prevailing PP/FG environments, rather than being influenced by the shallow hazards.

This could allow for the following well design improvements:

- Larger annuli below salt for improved drilling margin management.
- Less total casing strings in the well.
- More use of conventional casing string sizes for drilling and geological contingencies.
- Enhanced planning and use of solid expandable systems.
- Decreasing the risk of not obtaining at least an 8-½ in. ID completion, essential for economic success in deepwater environments.
- Batch drilling into salt, which optimizes horsepower as well as cost, utilizing smaller capacity rigs for the lighter hook load casing lifts.