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Assess the Impact of Shallow Water Flows Geohazard on Drilling Operations in the Riserless Sections of Deepwater Well Construction

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ABSTRACT

Riserless drilling of the upper intervals of subsea wells has been standard practice in deepwater well construction, while taking mud returns to the sea floor. It has dramatically increased the safety of drilling shallow sections of subsea wells by reducing the hazard of handling gas at the rig, should shallow gas zones be encountered. It has also been very beneficial in controlling shallow water flows (SWFs) in deepwater areas of the Gulf of Mexico.

The shallow water flow is a typical offshore drilling hazard, defined as the phenomenon involving the flow of water from surrounding region of a casing up to the ocean floor together with formation sands and sometimes free gas. The flowing water is driven by a pressure difference that occurs when the drill bit has encountered unconsolidated but overpressured sand sections.

In the past 40 years of the drilling practices, the SWF hazard has been experienced in several deepwater basins around the world, especially in the deepwater area where the water depth ranges from 1300 to 8200 ft and formation depth ranges from 300 to 4000 ft below mud line (BML). Shallow water flows from overpressure aquifers have been a serious concern in the deepwater Gulf of Mexico for drilling and production operations. They can create significant financial and operational risks for exploration and development projects. The Gulf of Mexico, SWF intervals typically occur between 300 and 2500 ft BML and in water depths greater than 1500 ft. If left unchecked, the disturbance from the water flow can cause loss of soil strength surrounding the wellbore, thereby compromising the structural integrity of the well. In extreme cases, SWFs have led to collapsed casing and/or total loss of wellbores.

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