Engineered Solution for Deepwater Cementing Challenges

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There are unique challenges associated with drilling for oil and gas in deep water. Large borehole and sub-sea wellhead designs required to reach directional targets require competent cement slurry placement to maximize casing support and isolation. Challenges associated with the riserless section are low fracture gradients resulting from young, unconsolidated sands and shallow drilling hazards such as shallow water flow (SWF) and hydrate formations. These challenges are referred to as "shallow hazards" and require drilling designs that will help prevent initiation of flow before running the casing and during and after cement slurry placement. Specialized, low-density cementing systems to maintain satisfactory equivalent circulating density (ECD) for cement slurry return back to the seabed are discussed. Two cement systems are presented: engineered foam, and engineered blend with solids to lower the slurry density.

Another challenge in deepwater cementing is the low temperatures encountered at shallow depths. The engineered cement systems are further optimized to help provide adequate strength under these conditions and prevent SWF and help save rig time. As more offset wells are completed with flow lines connected back to production platforms, the overall effectiveness of drilling the riserless section with minimal disturbance to the surrounding seafloor becomes critical. Lack of cement slurry return may compromise the casing support, and excess cement slurry returns cause problems with flow lines and control lines. Calipers used to accurately estimate hole volumes are seldom run. Use of tracers and other techniques to determine the return of cement slurry to the seafloor are discussed. Case histories are presented to illustrate the field implementation procedures and cement slurry design. Results and solutions presented in this paper can be applied to meet the challenges of deepwater drilling.