Comments on BOEMRE Interim Final Rules on Increased Safety Measures for Energy Development on Outer Continental Shelf

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As an licensed engineer with over 30 years experience in oil & gas with both onshore, pipeline and offshore design, engineering and operations it is incumbent on me to speak out when I see an unsafe practice being promoted in the form of federal regulation in Sec 250.243 (c) and Safety Measure Report: II.B.2.6 that "The operator must perform a negative pressure test to ensure proper casing installation. This test must be performed for the intermediate and production casing strings."

A careful review of the incidents leading up to the Deepwater Horizon when coupled with my knowledge of deepwater operations and operating personnel may provide some insight into the cause of the blowout. In my sole opinion, based on my understanding of the testimony presented to the joint USCG/BOEMR to date, the sole cause of the blowout was the lack of understanding by the drilling team as to the effects and results of their testing program. The testing program was performed to validate that a true barrier was in place to prevent just such an occurrence. Everything else that occurred after that was contributory to the primary cause.

The attribution of changes in volume to a "bladder effect" may have been partially justified by the drilling personnel on the Deepwater Horizon. Such an occurrence is noted in the Applied Drilling Engineering supplied as Volume 2 of the SPE Textbook Series, in Chapter 7. The knowledge required to apply Hook's Law and Poisson ratio are beyond that of many non-engineering personnel and some non-Petroleum Engineering or non- Civil/Structural engineering personnel. In its essence, changing the pressure to higher and lower internal pressure has the effect of causing changes in the length and the internal diameter of the casing. Critical to the effect of is analyses are the properties of the cement that is either constraining the pipe at the bottom of the well or if not constrained, is allowing it to hang free of support. If at a point in its transition from a fluid state to a set and hardened state, the cement can be damaged by the movement of the casing resulting in cracking and formation of a micro-annulus outside the wall of the casing. This is also discussion referenced in API RP 65-2 under Section 4.7.11 Mechanical Parameters and 4.10.2 WOC.

The knowledge of the state of the cement and the timing of the positive and negative pressure tests being mandated by the BOMRE in the adopted rule is critical to the formation of an effective barrier by the cement. Determination of the volume change that takes place when the casing extends in length requires more than a back of the envelope calculation which should be performed utilizing appropriate engineering tools and by qualified technical personnel. Only because of specific coursework taken with respect to transient fluid hydraulics am I familiar with some of the key issues related to this area.

My experience with offshore personnel, many with limited technical education but extensive industry training is that they are good at observation. However, they have a tendency to improperly subscribe the true cause of changes that occur that they are unable to calculate due to the complexity of the calculation or the true physical interaction of the parameters being observed. The tendency can be to

dismiss a volume change during the test as being caused by the “ballooning” effect as being appropriate, while in effect the belief is misplaced. Note that “ballooning” is an issue related to mud flow back from a fractured formation as noted on Page 500 of the Advanced Drilling and Well Technology, another reference book by SPE published in 2009. Thus it is a recognized effect by offshore drilling personnel that may have been improperly used to rationalize an unexpected result. Only by ensuring that appropriate technical personnel have calculated the effect along with an intimate knowledge of the curing properties of the cement can an adequate estimate of a volume change be predicted.

Therefore, In my opinion based on my knowledge and experience, the prescription alone that either positive or negative pressure test be performed without adequate requirements on who is to interpret the tests and their qualifications is an unsound practice and can lead to further issues with future well completions. I specifically recommend that regulations be modified to prescribe qualification of personnel in the regulations and less on specific prescriptive methods to be employed. Use of considerations in the API Recommended Practices by properly qualified personnel should be sufficient to reduce the risk.

The opinions expressed are my opinions alone and may not represent those of my past or current clients, past or present employers or the industry as represented by key industry groups.