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Cementing – New procedure to ensure well integrity in South Rumaila Field utilizing Geomechanics Evaluation

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SUMMARY

Cementing is a major factor affecting the integrity of a well for its entire life. Proper cement bonding to the casing and formation is a key measure of well integrity. Unlike most drilling related activities, the cement placed into wells must remain competent for the entire life of the well and beyond to ensure no fluid leakage even after the well has been abandoned.

Cementing operations in the giant southern field of Rumaila were conducted using single 15.80 ppg cement slurry. The slurry was tested in laboratory for its thickening time, free water and compressive strength. However, reviewing and interpretation of the cement bond logs indicated poor cement quality with no cement in some intervals.

Review of daily drilling reports showed a significant amount of mud losses during drilling through some of the carbonate formations, mainly the Dammam, Tayarat, Shiranish and Hartha. A geomechanical study was performed in order to define the safe operating mud weight window. This study revealed that the formation fracture gradient was significantly lower than the utilized cement weight. This implied that cementing with this high cement weight could reopen the natural fractures and even create new fractures which could consequently open conduits for cement slurry losses.

As a result, it was recommended to use quality light weight cement instead of the current filler cement and perform cementing in more than two stages in order to improve the quality of cementing operation and to avoid fracturing the formation. Furthermore, additives such as fiber and sodium silicate were recommended to be added to combat losses through open fractures and vugs.

Considering some of these recommendations, the quality of the cement job was considerably improved in subsequent wells.