Immersive visualization as a collaborative well planning tool on the Ekofisk Field, Southern Noth Sea

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The abstract is a summary on what will be presented in a live demo using the Inside Reality software.

The Ekofisk field, a chalk reservoir of Maastrchtian - Danian age located in the Southern North Sea, is one of the largest fields on the Norwegian shelf with a STOOIP of 6.7 MMMSTB. Even though the field was discovered as early as 1969, it is still producing 300 000 bopd, some 10% of the Norwegian oil production. The Ekofisk field is produced from a four wellhead platforms, Ekofisk A, B, C and X. Water injection was started in 1987 from the K platform, and is the main reason for maintaining a high production level.

A jack-up drilling campaign on the old Ekofisk Bravo wellhead platform including 5 wells, started with the 2/4-B17B well, targeting an area in the eastern part of the field. While drilling in the overburden section, extensive water influx was observed, and while increasing the mudweight to balance the increased pressure, a loss-gain situation occurred which eventually caused the abandonment of the well at about 8000 ft tvd ss.

The next well after this, 2/4-B10B located further to the west, experienced the same high pressure water influx as B17B, but the drillers were able to increase the mudweight with out getting into a loss situation, and the well was eventually completed. The following two wells, B11A and B9B was drilled to the western part of the field, and did not experience abnormal pressures in the overburden section. In the meantime, an alternative well plan had been made for the B17B well in order to reach the same planned BHL as in the first attempt, now called B17B T4. At 6900 ft ss, a 17.5 ppg EMW water kick was taken, and the well had to be abandoned once again. The most likely reason for the water influx in the overburden, which had not previously been observed on the field in over 220 wells, was a leak water injector, that over a few years had injected vaste amounts of water into the overburden.

At this point, the well cost of B17 was significant, and there was a major reluctance in the drilling team and within management to continue drilling from the B17 slot. Giving up the B17 slot would represent a lost production opportunity, since this was a one time drilling campaign on the Ekofisk Bravo platform, which does not have a fixed drilling unit.
In the meantime, immersive visualization software had been installed in the Onshore Drilling Center visualization facility at ConocoPhillips Norway. During a multidisciplinary team evaluation of the B17 situation, an idea came out from the brainstorming session, to use the B17 slot to drill to another location on the field, originally planned to be drilled from the permanent drilling rig on Ekofisk, the X platform. The Inside Reality software was used to replan the well trajectory, now called B17C, to the alternative location on the northern flank. In this work, all experiences from the first phase of the drilling campaign in addition to the geologic and seismic data, was used to plan a well trajectory in the overburden with minimum risk of hitting high pressure water. Eventually management approved the new well plan during a visualization session. The management team expressed that the use of immersive visualization made the decision very easy.

The overburden section of B17C was drilled without encountering pressure problems. The well was successfully completed, and is currently (April 2003), producing 4000 bopd. The value of the project is 6 months earlier production than anticipated from this area, and the well planning team believe that without the use of immersive visualization, an approval of a B17 redrill would have been unlikely.