SUMMARY

The Hassi Massoud oil field is the largest of its kind in Algeria. The reservoir was discovered in 1956 and produces from a Cambrian-age at approximately 3400 meters depth. It produces 45°API oil from a thick Cambro-Ordovician sandstone formation. This sandstone is extremely hard, abrasive and slow to drill. The reservoir is naturally fractured in some parts. Fractures are either open or plugged with materials such as shale, silica, anhydrite, pyrite and bitumen. Porosity is ranging from 6 to 12%. Generally, the permeability is low with a range of less than 1 to more than 100 md in open-fractures layers.
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Sonatrach introduced Underbalanced Drilling (UBD) primarily in an effort to improve penetration rates. However, all additional benefits obtained from UBD, such as production improvement and reservoir characterization while drilling, will be of an added value.

Well OMPZ553 is the 37th well drilled underbalanced in the Hassi Massoud field. In this well, the focus was on production improvement with minimum formation damage while the increased rate of penetration (ROP) was a secondary benefit. Another objective was the evaluation of production while the well is being drilled. This eliminates the need for expensive post drilling production testing, and also to minimize borehole instability specially when drilling in the R2 section of the drain.

In order to increase the success rate of drilling and completing this well underbalanced, Sonatrach introduced a new systematic and dynamic procedure. The new procedure consists of:

• Proper UBD candidate screening
• Calculating the actual reservoir pressure before UB mode starts
• Completing the well in UB mode

This well proved to be the best UB drilled well in Hassi Massoud field in terms of reservoir benefits and characterization. The pre-job UBD candidate screening, feasibility studies and applying the new procedures proved effective in the success of this well.

This paper describes in detail the above procedure and presents the successful application of such procedure to optimize production and enhance the ultimate recovery in the Hassi Massoud field. Lessons learnt and challenges encountered will also be discussed in this paper.