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Case Study: Restoring Sand-Prone Subsea Wells to Production

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Abstract

This paper provides a case study of an intervention effort which returned to production three wells that had been on extended shut in, two subsea and one dry tree, in a mature BP operated Gulf of Mexico deepwater field. The three wells involved in this operation had been shut in due to incidences of sand production. The production facility was not designed with any sand management capability such as hydrocyclones, sand jets, etc. Thus, historically, any incidence of sand production led to a well shut in. The objective of this intervention was to evaluate integrity of the completions and the remaining production potential of each of the wells.

As deepwater and subsea fields mature, intervention and surveillance options on subsea wells have to be explored and developed. Several operational challenges were faced during the planning and execution of this operation due to the sand prone nature of the wells combined with the subsea environment. They were carefully assessed and the risks were effectively managed in order to return all three wells to production.

Field Background

Pompano is currently the oldest BP operated facility in the Gulf of Mexico with first production in 1994. The facility was developed with 33 dry tree wells and a 10 well subsea template tieback to the fixed jacket platform. The template is tied to the platform via two subsea flow loops, one 8" insulated loop for normal production and one 3" uninsulated loop for well testing and well servicing purposes (Figure 1). Pompano's production peaked at about 65,000 BOPD in 1999. By July 2007, total field production was approximately 11,500 BOPD.

Maintaining the existing production and minimizing field decline has become more critical than ever. Low cost, high return well intervention work is key to maximizing the value of this field. The challenge for the Pompano team is to identify and successfully implement unique and creative production enhancement activities. At the forefront of this search is a rigorous effort to revisit and recover production from shut in wells.

Well Histories

This intervention focused on three shut in wells, two subsea (TB-03, TB-07) and one dry tree well (A-03).

The TB-03 well was initially shut in due to Hurricane Katrina in September 2005. The well remained shut in for almost 5 months as a result of this event. Prior to this shut in, the well was producing 930 BOPD, 480 BWP, and 1.09 MMSCFD. A start up was attempted in January 2006. Upon start up, the well produced about half a cup of solids in 8 hours. Shake outs during this period showed between a trace and 10 percent of solids in the flow stream. At this time, the well was shut in until further analysis could be done on the produced solids.

The results from lab analysis of the produced solids showed that these solids were fine grained and could have been produced through the type of frac pack completion in the TB-03 well. This was positive indication that integrity of the completion might still remain and the well could be restored to production.