



OTC 17830

Solid Expandable Tubular Systems Extend the Life of Mature Fields

D.E. Eynon, Marathon Oil Co.; J. Mueller, V.S. Felix, and N. Ruzic, Enventure Global Technology; and P. Courty, Cudd Pressure Control Inc.

Copyright 2006, Offshore Technology Conference

This paper was prepared for presentation at the 2006 Offshore Technology Conference held in Houston, Texas, U.S.A., 1–4 May 2006.

This paper was selected for presentation by an OTC Program Committee following review of information contained in an abstract submitted by the author(s). Contents of the paper, as presented, have not been reviewed by the Offshore Technology Conference and are subject to correction by the author(s). The material, as presented, does not necessarily reflect any position of the Offshore Technology Conference, its officers, or members. Papers presented at OTC are subject to publication review by Sponsor Society Committees of the Offshore Technology Conference. Electronic reproduction, distribution, or storage of any part of this paper for commercial purposes without the written consent of the Offshore Technology Conference is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of where and by whom the paper was presented. Write Librarian, OTC, P.O. Box 833836, Richardson, TX 75083-3836, U.S.A., fax 01-972-952-9435.

Abstract

Being able to capitalize on advantageous mechanical isolation technologies has been the catalyst for some operators to utilize existing wellbores to optimize field recoveries from different reservoirs. An innovative application that installed over 1,400 ft of solid expandable tubulars enabled Marathon Oil Gabon Limited (MOGL) to simultaneously isolate a sour zone produced through casing perforations and segregate a previously repaired multi-stage cementing collar in their Tchatamba South B2 sidetrack (TCTS B2st) well in Gabon. The solid expandable cased-hole liner allowed MOGL to develop a lower zone and continue producing from the existing well.

This value-added approach was even more economically prudent because MOGL used a hydraulic workover unit (HWO) in this well intervention as an alternative to a conventional rig. The increasing cost and unavailability of drilling and workover rigs, mainly offshore, have become contributing obstacles for well intervention and well repairs in mature fields. In this case solid expandable tubulars mitigated production problems and extended the life of the well with lowered costs and increased reliability.

This paper describes the safe and successful installation of a solid expandable tubular system that isolated six individual sets of perforations into four intervals. This system also reinforced the integrity of a previously repaired, multi-stage cementing collar, accomplishing both objectives with a minimum reduction to the existing inside diameter (ID) of the wellbore. The paper also details how this enabling technology allowed MOGL to perforate and produce a deeper zone thus optimizing reserve recovery in a mature field.

Field Conditions and Relational Wells

The Tchatamba Field, located in 162 ft of water offshore Gabon, consists of two stand-alone platforms, the Tchatamba West and the Tchatamba South, and a mobile offshore

production unit called the Tchatamba Marin (**Figure 1**). A total of nine wells on artificial lift via electric submersible pumps (ESP) produce from three reservoirs—Madiela, Cap Lopez, and Azile. Wells in the Tchatamba field are pumped without an ESP packer or a surface-controlled subsurface safety valve (SCSSV) once reservoir pressures deplete to the point they are incapable of flow to surface. This simplifies ESP installation and production operations.

Operational limitations dictated the recompletion of the Tchatamba South 2ST (TCTS 2ST) well. The recompletion operation called for isolating the shallow, sour Azile reservoir and perforating two previously undeveloped zones of the Madiela to optimize field production and increase overall recovery.

Solution Options

MOGL investigated potential equipment and services that would provide the most reliable and cost-effective solution. The Azile sands in TCTS B2st covered approximately 430 ft measured depth gross inside of 9-5/8 in., 47 ppf casing. Isolating each of the four zones open in the Azile and the previously repaired multi-stage cement tool was needed to successfully recomplete the well and produce the Madiela. The two main solutions identified and considered included:

- A cement squeeze of the perforations
- Isolation with casing patches or a liner

Both solutions are a relatively standard procedure for a small jackup drilling rig, but because of the higher daily cost, limited availability and extremely tight scheduling, MOGL considered another approach. MOGL typically repairs failed ESPs using a Cudd 225K hydraulic workover unit (HWO) positioned in Gabon on a long-term contract. A cost comparison indicated potential savings of \$1.5MM by using the HWO for this operation.

Cement Squeeze

Cement squeezing the Azile perforations may have required multiple squeeze jobs due to the differentially pressured (7.65–8.5 ppg) Azile zones and the relatively long interval. Cementing equipment availability and capability along with space for placement on the platform was also a concern. Another risk identified was the exposure of the cement-squeezed perforations and the multi-stage cementing collar to an extreme underbalance (negative test). This underbalance would result from the Madiela reservoir pressure being as low as 3.2 ppg and the true vertical depth of the Madiela being ~1,500 ft deeper than the Azile formation. Consideration was