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Tahiti Subsurface – Drilling and Completion Technology Challenges and Accomplishments

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Abstract

Few wells in the world have been completed at the depths and pressures required for the Tahiti Field. This combination of depth and pressure has stretched existing drilling and completion technologies to the limit. Efficiently drilling and completing the Tahiti wells required extensive engineering to design, select materials, and fabricate and test the highly specialized equipment needed to accomplish this daunting task. Along the way numerous experts have been employed to identify the technology and equipment upgrades required for successful implementation in the field. This paper will discuss the technology development from identification through implementation.

Introduction

The Tahiti Field is located in Green Canyon Blocks 596, 597, 640 and 641 (Figure 1) in water depths from 4,100 to 4,300 ft and approximately 190 miles southwest of New Orleans, Louisiana. The field underlies a salt canopy that is 8,000 to 15,000 ft thick. The primary pay sands are Middle to Lower Miocene in age and range in depth from 23,000 to 28,000 ft TVDSS.

The discovery well was drilled in 2002 in the Green Canyon 640 block and reached a total depth in excess of 28,000 ft using the drillship Discoverer Deep Seas. Initial evaluation indicated approximately 400 ft of net oil pay in the high quality Lower Miocene Sand. Subsequent appraisal drilling over the next two years resulted in confirmation of the size of the Tahiti Field and its status as one of the most significant net pay accumulations in the history of the Gulf of Mexico.

The discovery well was re-entered in 2004 and a well test conducted to verify deliverability, dynamic well data and reservoir properties. A frac-pack in the Lower Miocene M21A and M21B Sands was planned for the well test. The M21A Sand averages 60 to 80 ft thick and the M21B Sand averages 120 to 150 ft thick with initial oil permeability of 600 to 800 mD. The bottom hole pressure is 20,000 psi with a bottom hole temperature of 200 deg F. At the time, this was the deepest successful well test and frac pack completion ever carried out in the Gulf of Mexico at 25,800 ft TVDSS. The well test was successfully completed and results supported the continued development of the Tahiti Field, work which began in February of 2006.

Phase 1 drilling and completion operations concluded in the first half of 2007 with the completion of three additional development wells, the discovery well and two appraisal wells. Each well was designed for an anticipated well life of 20 to 25 years with maximum production rates of 25,000 to 30,000 bopd. Non-standard metallurgy was selected for the production wetted surfaces considering reservoir fluid properties, completion fluids and yield strength requirements. The surface locations of the wells were located within two distinct drill centers as shown in Figure 2. Two 5th generation dynamically positioned (DP) drilling rigs, Transocean's Discoverer Deep Seas and Cajun Express, were selected to simultaneously work the South and North drill centers, respectively.

This paper will discuss the efficiencies realized from the use of dual activity deepwater rigs and the technologies used to drill and complete the difficult Tahiti wells.