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SBOP Drilling Enables Efficient Drilling in Extreme Water Depths

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Abstract

Since 1995, drilling with a surface BOP (SBOP) from a MODU has been executed successfully by operators in various offshore locations around the world. With the increasing interest in ultra-deepwater exploration, and the tight floating rig market, the SBOP high pressure riser when deployed from an upgraded older generation rig, provides a solution to controlling the cost of exploratory and development drilling.

This paper demonstrates that a SBOP with 13-3/8" casing riser can be used efficiently from an intermediate specification drillship, the Frontier Phoenix, to economically drill wells in extreme water depths, and in onerous environments. Feasibility is demonstrated by detailed site-specific analyses performed in depths of up to 9000 ft, for key modes of operations. The time and cost savings are explained, the riser hardware and the vessel upgrade are presented, the operations drivers and envelope are identified, and the application to HPHT drilling and field maintenance is noted.

The riser employs a seafloor isolation device with 18-3/4" wellhead connector. This shut-off device interfaces with a lower stress joint, which is made-up to the riser mid section of 13-3/8" 72# casing with fatigue-resistant connectors. The casing is connected to an upper stress joint which interfaces with the SBOP. The SBOP is bolted to a flanged structure which rests in the tension ring.

The Phoenix has been upgraded for SBOP operations, and is now under a 5-year contract for Shell.

Key load cases are analyzed with the riser in two depths (5800 ft and 9000 ft) and in various modes of operation: normal drilling, connected non-drilling, shut-in, drift-off, hang-off, running/pulling, and recoil all of which demonstrated that the riser's responses remain within the mechanical limits: maximum stresses are within their API allowables, fatigue lifetimes are acceptable, and the moon pool clearance is satisfied. The main drivers of the operation are: the size of the SBOP relative to the moon pool of the drill ship, and in swell-dominated environments, the driver is the drillship heading. It is concluded that the SBOP drilling riser not only controls drilling costs in extreme water depths, but is also feasible for developing HPHT fields and maintaining them.

Introduction

High-specification deepwater drilling rigs continue to fetch expensive dayrates despite the sharp drop in oil & gas prices by the end of 2008. Data for January of 2009 [Rigzone] indicated an worldwide average dayrate for deepwater rigs of US$366,500, and their utilization remains high. Ultra deepwater new builds cost more than $500 million and some exceed $1 billion, and their dayrates are significantly higher than the average. While these modern rigs may expedite field development due to their enhanced capabilities in simultaneous operations and large deck space, they are not cost effective for drilling exploratory wells and remote tieback subsea wells.

To control the cost of field development, operators are drilling adjacent wells from production platforms, and producing them using dry tree risers, with the risk of delayed production. For exploration and tieback wells MODU drilling is necessary, and a SBOP riser system controls the cost of drilling especially in deepwater, because a rig with average capabilities can be used, and because of the lighter and simpler configuration and operation of the SBOP riser system by comparison to a conventional 21" ssBOP riser.