DRILLING CONTRACTOR

DRILLING AHEAD

Journey to the center of the Earth: Rennaissance for deep land drilling?

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AFTER A LONG hiatus, onshore deep drilling may enjoy a renaissance. But are existing rig designs and downhole technology up to the challenge of a discipline that has lain fallow for decades?

Deep drilling onshore reached its zenith in the mid-1970s and early '80s. The generally accepted oil-and-gas world depth record was set more than 30 years ago by **GHK/Lone Star**'s Bertha Rogers 1-27 well in the Anadarko Basin of Oklahoma. Big Bertha reportedly TD'd at 31,441 ft (9,583 m), an achievement that still stands unrivaled. Austrian operator **OMV** set the non-US record of 8,553 m (28,050 ft), drilled during the 1980s. (Geotechnical wells reach astonishing depths, drilled without the encumberment of BOPs and sundry impediments. The deepest to date remains the USSR's Kola well, which broke the 40,000-ft barrier in 1994 – 12,262 m or 40,809 ft. However, it took 24 years to get there, and the initial goal of 15,000 m was abandoned.)

In the subsequent double decades of low-commodity prices, the industry shifted from extended depths to extended reach. **BP** pioneered ultra-ERD at Wytch Farm in the early 1990s. **TOTAL** set the probable world record in 1999 at the Cuenca Austral concession in Argentina's remote Tierra del Fuego. The monster well spans nearly 7 miles, with a measured depth of 36,693 ft and a horizontal displacement of 31,728 ft.

Deep land drilling may be ancient history, but offshore is a different story. Encouraged by government incentives, deep wells in the US Gulf of Mexico have achieved depths of 25,000 ft to 30,000 ft+. **ExxonMobil**'s Blackbeard and **Chevron**'s Cadillac spring to mind. Drilling contractors astutely eyed these trends. **Rowan Companies**, for example, has specifically guided design of newer jackups to tap deep, HPHT resources.

Hermann Spoerker, OMV E&P's Head of Well Engineering, has pondered the prospects for onshore deep drilling in the light of existing technology. Speaking at IADC World Drilling 2006, held during June in Prague, Mr Spoerker noted that the challenges of deep drilling differ fundamentally from those of ERD.

Drilling long conjures mechanical issues—drillstring torque and hydraulics, well path design, "floating in" casing strings, among others. Conversely, physics dominates the deep-well scene—prevalent sour environments, rock compressive strengths (UCS) of 30,000 psi+, and, of course, grueling HPHT conditions of 20,000 psi and 300° C.

Unfortunately, few land rigs are capable of drilling to 30,000 ft or beyond, particularly outside the US, Mr Spoerker observed. Without higher dayrates, he added, contractors are unlikely to expand that fleet.

As for H_2S, the Austrian engineer said, "There has been no quantum leap in the last 25 years to take us into deep, sour environments."

The story on HPHT tools is more upbeat. At the recent Drilling Engineering Workshop in Galveston, a number of papers focused on overcoming HPHT. Major efforts by **Sandia National Laboratories** are geared toward high-temperature electronics, batteries and fiber-optic systems for deep drilling and completions, as well as an HT diagnostics-while-drilling system. Meanwhile, **Honeywell** is developing HT electronics components within the US Department of Energy's Deep Trek program.

But costs could stymie deep drilling. Mr Spoerker placed the cost in 2006 money of OMV's record well at a staggering US$ 115 million. The high costs of deep wells, he added, reflect associated service costs far more than rig dayrate.

Mr Spoerker urges operators to share information to accelerate the learning curve for all. At most, he predicted, a single company will drill 1-2 deep wells per year. That's not enough to master the science of deep drilling. "Team up!" he says. "If you decide to keep your cards to your chest, be prepared to pay for the train wreck!" ■

What is your perspective on the need and outlook for deep drilling? Where are the economics and technology headed? E-mail mike.killalea@iadc.org.