Deep drilling requires correct execution for success

DEEP AND ULTRADEEP exploration in the Gulf of Mexico and onshore in south and southeast Texas pose significant challenges. However, these exploration plays are some of the best ways to grow a mid-sized E&P company, according to **Elliott Pew**, Vice President of Exploration for **Newfield Exploration Company**. But if poorly executed, it can be the best way to destroy value very quickly.

A successful deep drilling program requires several items to be executed correctly. For example, geological and geophysical models have to be right and the projects have to be run efficiently.

Deep Shelf - Summary Economics

Deep Shelf Wells Drilled to Date	19 (12 successful)
Success Rate	63%
Gross Reserve Exposure	551 BCFE
Average Gross Exposure / Well	29 BCFE
Average TD	16,090'
Average Dry Hole Cost	$8.1MM
Gross Reserve Additions	238 BCFE
Net Reserve Additions	82 BCFE
Average Working Interest	41%
Average Initial Production / Well	20 MMCFE/D
Total Finding & Development Costs	$1.64

GULF OF MEXICO

In an effort to expand its exploration program, Newfield began a deliberate re-evaluation of its US Gulf of Mexico exploration program back in 2001. The company decided to move in a counter-intuitive direction by increasing its risk profile and seeking larger targets in a time when much of the industry was moving in the opposite direction.

The nature of Newfield's study centered on understanding large recent discoveries, assessing the pool of remaining opportunities, and then defining workflows on how the company might find more of these types of prospects.

The US Gulf has a very high density of wells that were drilled to depths of less than 14,000 ft, and yet there have been only a handful of recent large discoveries that are 50 bcf or greater, according to Mr Pew. Virtually all of the large discoveries have been made in depths of 14,000 ft or greater, he noted. They were all in geopressured reservoirs and mostly in Miocene rock. Additionally, Mr. Pew explained, most of the new deeper discoveries were found by drilling subtler, higher risk amplitude responses which had previously been bypassed or not recognized.

"One of the drivers for us has been very high quality regional seismic data," Mr Pew explained. "The reprocessing of the data is absolutely critical."

Newfield has specialists who do nothing but calibrate amplitude responses on seismic data to determine whether it is gas-bearing and how thick the sands might be, etc. "It is much more challenging when you are drilling at depths below 14,000-15,000 ft," he said. "You have to have regional knowledge of the total petroleum system, the trap, reservoir, seal and charge."

Another driver for Newfield is to drill the best prospects. "There is no shame in not drilling your entire inventory," Mr Pew said.

Operational excellence is doubly important when drilling wells that can cost $12 - $15 million.

"All of these factors must come together to make a return in the deep shelf," he explained, "and that is why it has been a tough play for a lot of players."

HIGH COSTS

"One of the real challenges about a deep shelf effort is that it takes a lot of money before you have any idea if you are on the right track," Mr Pew said.

For example, the data alone in certain of Newfield's deep shelf areas was about $18 million. That was before the company obtained leases and before it drilled a well. "The data should cost no more than about 20 cents per million cubic feet equivalent for reserves ultimately booked," Mr Pew explained.

For example, if the company wants a total finding and development cost of $1.60 per MMcf, drilling and development costs should be about $1.40 with data accounting for another $0.20.

The operator should be able to say with assurance that to amortize the data cost at that rate, it is going to be able to find about 90 Bcf of gas net to the operator, or 180 Bcf gross. "We know that the average discovery size has been about 29 Bcf," he said, "so to pull the trigger on buying the (seismic) data can you say with assurance that you will find, not look for, but find, six fields in the 30 Bcf range?

"Otherwise, you may not make a return on your investment."

NEWFIELD'S RESULTS

Newfield drilled 19 deep shelf wells with 12 successes, posting a success rate of about 63% during the first three quarters of 2004. Gross reserve exposure has been 551 Bcf with average gross exposure per well of 29 Bcf. Average total depth of the wells was 16,090 ft. Gross reserve additions were 238 Bcf with net reserve additions to Newfield of 82 Bcf.

The average dry hole cost was just over $8 million, with total finding and development costs at $1.64 per MMcf. "Our finding and development cost is within $0.02 of what we predicted," Mr Pew said. "We predicted our average working interest at about 50% but we are coming in around 40%."

The program results in 6-8 wells per year, and Newfield will continue that size drilling program going forward, according to Mr Pew. "That is about what we are capable of in terms of finding prospects and deciding to drill them.

DEEP ONSHORE ACTIVITY

"A lot of what we do on the deep shelf right now relates to ideas developed onshore years ago," Mr Pew noted.

Newfield has drilled several deep and geopressured reservoirs along the Texas Gulf Coast.

However, the deepest of the company's Gulf Coast prospects was a Tuscaloosa prospect in Louisiana at a depth in excess of 22,000 ft.

Much of Newfield's deep exploration activity is centered in the Wilcox in central and south Texas and the Vicksburg in south Texas.

Of seven deep Texas fields and two Louisiana fields, Newfield is currently producing approximately 190 MMcf/d gross. All of the wells are deeper than 14,000 ft.

SHELF EXPLORATION

Newfield has interest in 86 Gulf of Mexico shelf blocks that are targeted for ultradeep exploration. The company has formed partnerships for ultradeep drilling targeting intervals in excess of 25,000 ft.

For example, the company is a partner with **ExxonMobil**, **Petrobras** and **BP** in the Blackbeard prospect with a planned spud early in 2005.

This well will target intervals in excess of 30,000 ft. Newfield has a 23% working interest in the block.

"That is a tremendous drilling challenge but there is very large reserve potential," Mr Pew noted.

Newfield is also planning another deep well in the Treasure Bay prospect in which it is partnered with **BHP Billiton** and Petrobras.

SUMMING UP

Deep gas reserves and drilling opportunities are a very meaningful part of Newfield's portfolio, and consumes about one-third of its drilling budget and reserve exposure.

"You have to have meaningful risk mitigation strategies in place as well as operational excellence," Mr Pew said.

"Many things have to come together from geological and geophysical models to excellence in drilling, dedicated deep drillers and excellent partnerships with the vendors to really make it work.

"There are probably 10 ways that it could go wrong and one or two ways that it can go right," Mr Pew continued. "That is the risk of the entire play.

"And what we harp on over and over is, drill only the best. Many of our prospects in the deep shelf environment won't get drilled.

"We continually look back at our results and see what we have learned and move on from there," he said.

"It's a great play for us," Mr Pew concluded, "and without the active cooperation from the drilling community we wouldn't have enjoyed the success we've had." ■

Ultra-deepwater development can mean high costs

ECONOMIC CHALLENGES facing ultra deepwater (7,500 ft and greater) development drilling includes supply, or lack of supply, of the latest and most efficient offshore rigs; CAPEX for rigs; and for the completions themselves. Establishing goals and project objectives to achieve a certain performance level and reduce uncertainty are also among the challenges.

Steve Nowe, Project Drilling Manager for **BHP Billiton Petroleum**, discussed the company's ultra-deepwater operations in the Gulf of Mexico. From 1999 through 2003, there were 13 announced discoveries in greater than 7,000 ft of water. Another three have been announced in 2004.

There were 12 ultra-deepwater discoveries (7,500 ft and greater), 25% of which were made by BHP, according to Mr Nowe.

Since 1996, Mr Nowe noted, the industry drilled around 40 exploration and appraisal wells in water depths greater than 7,500 ft but no development wells in that depth through the end of 2003.

In 2004, he said, **Shell** drilled and completed two wells in the Mississippi Canyon area in about 7,000 ft of water.

HIGH COSTS

Texaco's Deep Star project estimated that about 54% of a typical Gulf of Mexico deepwater development would be consumed by drilling and completion CAPEX, Mr Nowe said.

"That is fairly close with our projections," he said. "(One) particular development involves a TLP facility and subsea completions, so the key point is that completions account for nearly half of total project's capital costs.

"Of that, roughly 60% goes to the completions phase."

He notes also that the industry's experience in completing ultra-deepwater wells is beginning to result in slightly lower costs due to less drilling time.

The industry is approaching 2-2 ½ days per 1,000 ft drilling on a fairly regular basis. He noted, however, that the industry does not have very much experience in completing the wells.

As a result, the industry needs to focus on ultra-deepwater developments in as efficient a manner as possible. He said that about 80% of the completions CAPEX is spent on time-sensitive operations. The next highest is 14% for tangibles.

Approximately 40% or more of the costs are attributed to the dayrate for the drilling and completion rig. The next highest cost is for completion services and consumables, which account for approximately 17% of the total costs.

"With nearly 40% of our well's AFE on the rig rate," Mr Nowe said, "this is an area that gets our attention. We spend a lot of time and effort determining what we need in a development rig."

In an ideal world, Mr Nowe said, BHP would like to have a high specification, highly efficient 5th generation rig. The company breaks 5th generation rigs into three categories, each with their purpose and efficiencies.

The first is the conventional 5th generation unit where all activities are conducted on the critical path. Offline-capa-

ble rigs are those where some efficiencies can be gained though certain operations conducted off the critical path such as picking up and racking casing while drilling ahead or tripping.

Finally, a true dual activity rig would capture all the advantages of offline capable rigs and then go a step further in streamlining well operations with such things as running BOPs while drilling and cementing surface casing.

"We figure, and most of the industry supports, that an offline-capable rig can achieve gains of 15% of more over a conventional rig," Mr Nowe said, "and a dual activity rig can probably save 30% over a conventional rig at a minimum."

Mr Nowe presented example figures illustrating that for total time-sensitive costs, using a conventional rig would cost about $877 million over three projects compared with $833 million for an offline-capable rig and $764 million for a dual activity unit.

For all of the projects, the dual activity rig offers potential savings of $82 million over the conventional rig and $44 million over the offline-capable rig.

SUPPLY AND DEMAND

Mr Nowe noted that following the delivery of **GlobalSantaFe's** two Development Driller deepwater semisubmersibles, set for delivery in 2005, demand for ultra-deepwater rigs could sharply outpace supply.

There are no other ultra-deepwater newbuild rigs after the Development Driller units, and a newbuild 5th or 6th generation unit could take three years to construct.

As far as the Gulf of Mexico is concerned, there has been an exodus of ultra-deepwater rigs to other areas such as West Africa.

"In order to take advantage of the highly efficient rigs," Mr Nowe said, "many operators are contracting more than they theoretically need for their development programs.

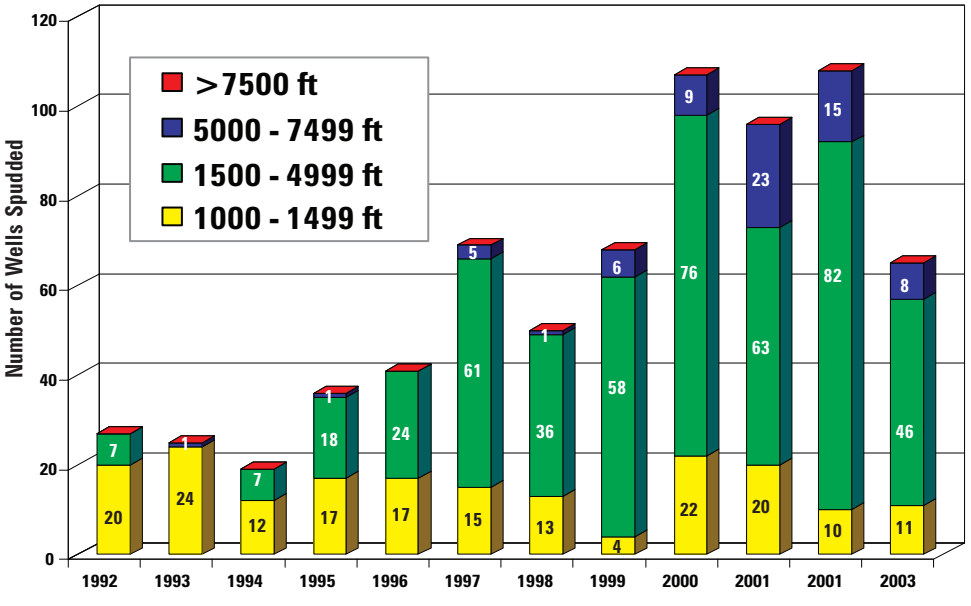
"They are willing to paying a premium to capture the efficiencies."

Additionally, operators are revising their oil price forecasts upward, which make previously marginal fields more attractive. This could mean more ultra-deepwater projects and the need for more rigs.

"There is a reasonable international deepwater market that is shaping up in India, Indonesia, Australia, Norway and Canada," Mr Nowe said.

Within the past two months there have been about eight rigs fixed under long term option contracts.

Deepwater Development Wells Drilled in GOM



Source: MMS - Deepwater Gulf of Mexico 2004: America's Expanding Frontier

"So the market is good if you happen to own ultra-deepwater rigs," Mr Nowe explained, "and potentially bad if you are an operator in that you could be forced to take a lower specification rig for your development program, or, worse, you could be facing delays in your programs."

MANAGING COSTS

There are additional hazards when trying to manage costs in ultra-deepwater developments, including additional risks and high exposure to losses, Mr Nowe said, but there are a number of basic fundamental steps that the operator can follow in order to effectively manage its exposure to costs.

"First, we need to set well defined, justified goals and project objectives," he said. "We need to manage projects rather than solely drilling and completing wells."

Another way to manage costs is to achieve consistent performance to reduce uncertainty during the planning phase, and being flexible enough to react to changing information.

"Gathering information comes with an associated price tag," Mr Nowe explained. "We need to determine what information is essential and what information is nice to know."

He also noted that the industry doesn't do a very good job of sharing failures and successes with others in the industry. He added that new technology in the ultra-deepwater environments offers the potential for huge savings.

"Our strategy going forward is to leverage proven technology and processes, and borrow other's good ideas," he said.

"We will also seek to implement new technologies and processes as our comfort level increases."

Finally, he emphasized, "in order to make sound operational business decisions, risks need to be identified, fully understood and communicated in terms of probability, consequence and contingency planning."