

# Rig concept speeds sidetrack drilling, reduces cost

Jack Hardy, ISS, a subsidiary of Superior Energy Services Inc

**A BETTER METHOD** to sidetrack wells from offshore platforms was one of the major opportunities identified in the early stages of an operator's efforts to accelerate the use of new technology in the Gulf of Mexico. Experience with a new platform rig concept has proven the viability of sidetrack drilling and broadened the application of the technology.

In 1998, **Chevron's** Gulf of Mexico Shelf Business Unit set up a group of "Technology Brokers" to accelerate the application of new technology and innovation to improve profitability. Six Technology Brokers with multi-discipline backgrounds were selected to interface with field management teams across the Gulf of Mexico Continental Shelf.

A major opportunity identified in the early stages of the Technology Broker effort focused on finding a faster and more cost-effective method to sidetrack wells from offshore platforms. The operator recognized that there were many sidetrack candidates adjacent to existing offshore platforms that were marginal, or using uneconomical conventional methods.

As the idea was researched further, it became clear that a more cost effective sidetrack approach could add tens of millions of barrels to these resources. A project strategy was developed using decision analysis and organizational learning principles. The project was known as "DESSERT," an acronym coined from the phrase, "Development of Small Reserve Targets."

## BACKGROUND

The "conventional method" of sidetracking for this major operator consists of the following sequence:

- A field management team identifies one or more prospects adjacent to a particular platform;
- Geological and reservoir parameters related to the prospect(s) are evaluated and drilling and completion cost estimates are generated. The prospect is then matured, an AFE written and approved by local supervisors;
- A rig is selected, the wells are plugged back, drilled, and completed (at 25-30 days/well);
- Often, after the well (or two), is finished on that platform, the rig is released.

Sidetrack drilling, under this scenario, is a major part of the offshore budget for operators in the Gulf of Mexico. Often, business drivers dictate a short lead time, and the reserves justify the premium paid to contract a rig and move it on a platform for one or two wells.

There are inherent inefficiencies with this approach, such as looking at each platform as a stand-alone project. The process is repeated several times for a period of years on locations

from High Island to Main Pass. The Technology Brokers researched offsets at some of these marginal platforms and found that wells were being planned and executed by different teams, but many issues and challenges were common.

With different company people, rig crews and service personnel required to drill and complete wells across a business unit, there can be a significant learning curve at each platform.

## THE DESSERT PROJECT

There were more than 100 sidetrack prospects across the Gulf that were marginal or uneconomical when considered from an individual platform or field perspective. The decision was made to focus on the marginal prospects which were at depths of less than 12,000 ft MD and were normally pressured. "Normal pressure" was defined as formation pressures less than 12 lb/gal and 5,000 psi maximum surface pressure.

The goal set for the DESSERT Project was to develop a systematic approach to sidetrack drilling and completion of marginal (+/- 500,000 boeg) targets for less than \$2 million per well. In addition to the depth and pressure criteria, other criteria for "DESSERT type" wells included selecting sidetracks from existing platforms offshore, a 4-pile or larger platform, and a maximum of 5,000 ft of open hole.

The Technology Brokers assembled a list of 100 such wells. Average recoverable reserves of 500,000 boe per well for the 100 candidates represented a potential upside of 50 million bbl. It was believed that the drilling of these wells could be made profitable by

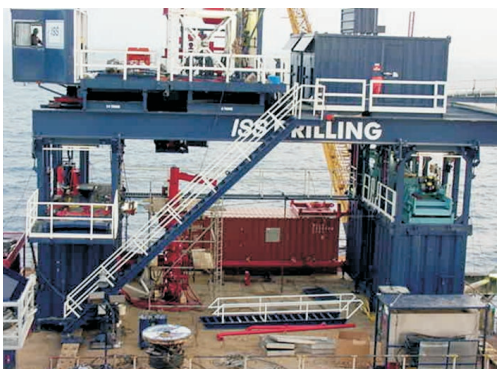
using a more consistent approach, and a platform-drilling rig designed specifically for DESSERT wells.

## RIG AVAILABILITY

A big part of the challenge—and opportunity—with drilling these wells was related to the available drilling rigs. Many of the platforms are located in 150-200 ft water depths. Jackup drilling rigs capable of moving on structures in these water depths are 250 or 300 Class rigs with horsepower far in excess of that required for the sidetracks.

With regard to existing platform type rigs, the problem is space. By the time a 1,000-hp platform (workover) rig was mobilized, added pump horsepower and pit volume for drilling, living quarters, and a rental crane covered the platform deck completely with equipment. There is little space for tubulars, materials, cement, wireline units, etc and the operation must be supported by workboats.

It was concluded that a rig with the appropriate horsepower rating for DESSERT type wells, which was also small enough to operate efficiently on a 4-pile platform, did not exist.



ISS #17, a hydraulically-powered platform rig, has small footprint, robust components, basic automation.

## THE DESSERT RIG ISS #17

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Following its analysis, Chevron hired **International Snubbing Service Inc (ISS)**, a subsidiary of **Superior Energy Services Inc.** ISS had been drilling sidetracks using snubbing units and used the experience to develop a new platform rig concept.

The derrick design resulted in a small, yet powerful hoisting structure. The derrick is 8 ft by 8 ft, and capable of handling double joints of drill pipe during trips. All of the load bearing beams are at right angles, resulting in a smaller, stronger derrick and a simpler design. The derrick is rated at 420,000 lb, which is more than adequate for the moderate depth sidetracks for which the rig is intended. The derrick is mounted on four 60-ft x 36-in. I-beams designed to span conventional platform rig skid beams.

Hoisting the drill string is done by stroking 3 large, parallel hydraulic cylinders, each 23 ft long and 10 in. in diameter. A series of sheaves is incorporated using conventional drill line so that a full 23-ft stroke of the cylinders results in 46 ft of movement of the traveling assembly. The traveling assembly itself is an innovative design that incorporates hydraulic slips, and a top drive rate to 20,000 ft-lbs.

ISS developed the concept and contracted **Pyramid Manufacturing** in Houston to build the new API monogrammed derrick and supporting structure. The new derrick and substructure was assembled with a custom mud handling system, hydraulic

power units, mud pumps, BOP's and the top drive at ISS's facility near Lafayette. A test well was drilled onshore near Lafayette to debug the rig equipment and orient the crews.

The new rig, ISS #17, is a hydraulically powered platform drilling rig, comparable to a 1,000-hp diesel electric rig. All together, the Hydraulic Drilling Unit (HDU) is deployed with a total of 3,300 hp. The packages are modular and the loads can be kept to 10-ton to 17-ton packages. The normal move and rig up times for the ISS rigs are 3-5 days.

Benefits of the HDU include a small footprint for the capabilities of the drilling package; simple, redundant and robust hydraulic power and drilling components; and basic automation for ease of operation.

## RESULTS

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An area for improvement identified by the Technology Brokers was to increase the level of consistency in the way DESSERT type wells were planned and executed. To work on this, a core group of personnel was assigned to 3 platforms that comprised the "proof of concept" phase. The following are examples of the success of the "proof of concept" phase.

*East Cameron 272 Field.* On June 23, 1999, work began on the first platform on the East Cameron 272 Field. The work was successfully performed in 26 days at an estimated cost of \$2.1 million. After the work, fieldwide production was doubled and upgrades to separation facilities were needed to accommodate the increased flow rates.

*Viosca Knoll 900 Field.* The work on the VK 900 platform moved with considerable speed. The entire package was moved in 2 days and rig up was accomplished over 3 days with minimal production shut in and without a safety or environmental concern. Weathering difficult circumstances such as disappointing production results due to salt on 2 of the 3 sidetracks, experience gained at VK 900 proved the viability of ISS #17 under difficult situations.

*South Pass 49.* The results of the SP 49 program were positive. Drilling was completed on the first well for approximately \$1.4 million or 15% below the AFE. A major rig workover on the second well was also successfully completed within the appropriated AFE days and dollars. The entire program was performed without a single safety or environmental incident.

Completion of the work at SP 49 represented the end of the proof of concept phase. Operation of the rig has been turned over to the Business Unit and work is expected to continue.

## FUTURE PLANS

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Based on demand from the industry and its experience, ISS is planning improvements to the ISS #17 operation. ISS commissioned Pyramid to engineer a 600k unit that will be capable of working in a typhoon/earthquake environment.

The performance that has been demonstrated over the last 2 years, along with numerous inquiries from other operators, reveals the need to accelerate this technology.

It is apparent that a fleet of small hydraulic rigs is needed, specifically for the hundreds of DESSERT type sidetrack candidates that exist today in the Gulf of Mexico. ■