

[FEATURE]

DeepStar program explores new deepwater technology

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With the recent surge in oil prices, the oil industry has started to search for the latest, most innovative technology to help lower these costs. Deepwater areas throughout the world contain a major amount of reserves and remain one of the best exploration and development opportunities.

In order to reach these reserves, however, technology must continuously be improved and updated. To assist in the development of ideas for new deepwater technology, the DeepStar program was implemented more than 10 years ago.

According to Sean Hanrahan, director of the DeepStar program, DeepStar is an operator-led forum to develop and advance deepwater technologies. The program is a joint industry project (JIP) between oil companies, vendors, regulators and academic and research institutes that are focused on creating value in the development of deepwater assets.

Benefits of DeepStar

This program has been very beneficial, and the industry has had a positive response to the projects, according to Hanrahan. One advantage to the program is the ability to advise and further technology by having the knowledge required to economically develop the deepwater resources, he said.

DeepStar's vision is to have a cooperative working environment within the industry and to create synergy between the companies involved. To accomplish this, DeepStar tries to bring the industry's leading experts together in a common multi-discipline forum to address technical issues that are confronting economically viable deepwater production.

DeepStar has also established a relationship with both the Minerals Management Service (MMS) and the U.S. Coast Guard to help resolve regulatory issues, a major benefit according to Hanrahan.

"We can sit down with MMS and the U.S. Coast Guard and say, 'Here's some of the new technology we are working on that we think might have an impact on ultra-deepwater'," Hanrahan said.

Hanrahan said that by sitting down with MMS, the agency can educate itself on what is next in technology and this can help the agency update regulations. By keeping MMS involved, operators have a reduction of schedule risks, he said.

"The worst case scenario is that we're working on new technology and it comes time to submit our field development plan that includes a new technology and MMS says, 'Oh, what's this? We might need more time to understand and learn the implications,'" Hanrahan explained. "We want to avoid that to where it could potentially slow down the development of the project."

Phase VII — A 'work in progress'

The DeepStar program is currently in its

seventh phase. Each phase lasts approximately two years. DeepStar is organized by Chevron on behalf of all members. For Phase VII, Chevron appointed Hanrahan as the project manager.

Phase VII's focus is to create technology development to:

- Enable 10,000 feet water depth production and transport.
- Enhance 4,000-6,000 feet water depth capabilities.
- Deliver on the 50-mile tie back challenge for oil.
- Address the high pressure and high temperature (HPHT) challenge in a deepwater environment.
- Improve the economic threshold for small stand alone deepwater fields.

The current phase began in January 2004 and completion is expected by December 2005. Phase VII has been a "work in progress," according to Hanrahan. With more than 20 projects scheduled for Phase VII, several are on the way to being completed by the end of the year.

The projects of DeepStar have evolved and increased in size with each phase.

"We used to do a lot of smaller jobs, but now we are doing larger and more meaningful projects," Hanrahan said.

One example of how the projects have changed over the years is DeepStar's involvement with flow assurance. This is a new term in the industry, becoming a recognized discipline only 10 years ago. However there has been an increase in the amount of information provided, and DeepStar has played a significant role in the development of flow assurance. The program has addressed three important issues including hydrates, waxes and asphaltenes. DeepStar's research has helped to provide a global forum to leverage flow assurance; it has increased the industry's knowledge in blockage safety, prevention and remediation; and it has provided industrial "best practices" in several activities. Flow assurance remains one of the key technical challenges operators face in ultra-deepwater activities.

"We're at the forefront of a lot of development with flow assurance," Hanrahan said.

Flow assurance is not the only project that DeepStar has focused on. Phase VII has several other projects that are on the agenda including a project that deals with vortex-induced vibration (VIV). VIV often affects risers that are in deepwater or ultra-deepwater and can increase riser fatigue. The current equipment that protects against VIV is expensive and is not feasible in deepwater and ultra-deepwater. The projects in Phase VII are planning to address the development of more advanced technology to tackle this difficult problem.

DeepStar has also conducted a study during Phase VII that looks at the difficulties in designing wells and facilities that can handle HP/HT and ultra-deepwater conditions. This study focused on how a semisubmersible concept could tackle these challenges. The conclusion of the study determined that a semisub-

mersible is a viable solution for ultra-deepwater HP/HT production. However, it was also evident that developing cost effective alternatives to heavy pipe-in-pipe catenary risers would add value via reducing installation, VIV and facility load challenges.

The role of participators and contributors

No single company can financially afford to develop all the technologies required to meet their deepwater business needs. For many deepwater technologies, collaboration is the best approach as it enables the leveraging of technical and financial resources to address common challenges. DeepStar participators include Anadarko, BP, Chevron, Conoco-Phillips, ENI, Kerr-McGee, Marathon, Petrobras, Total and Unocal. These 10 companies work together to develop the technologies required to meet the goals for each phase and help fund the projects as well as offer



A DeepStar team member performs field work as part of the vortex-induced vibration research project.

input and knowledge into each project. The input from each company is invaluable in that it helps to ensure no project has previously occurred.

It is not only these 10 companies that are involved in the planning and input of the DeepStar projects. More than 50 other companies that include drilling contractors, engineering companies, service companies, marine construction and transportation companies, and research groups, also work to help achieve the goals of the program. These companies are known as Contributor members. According to Hanrahan, the vendors/contributors have full participation with the projects, which creates a unique aspect to the project. Each company volunteers its time and services in its area of expertise to help with the DeepStar program. The companies also organize workshops within DeepStar, which are attended by the vendors themselves.

The individual projects in each phase are determined by a majority vote of the management committee. The management committee provides leadership and approval for the performance and execution of the projects from Phase VII. This committee is comprised of the 10 participator oil companies and one representative from the vendor/contributor companies.

"Funds come from the 10 oil companies and as we are seeking the technologies to meet our deepwater business needs, the operators decide on what projects DeepStar works on," Hanrahan said. "Contributor members are an



The DeepStar program utilizes its resources to advance the technology for deepwater exploration. Photo courtesy of Chevron.

integral part of the technical committees which develop proposals, discuss the merits of each project and submit to the management committee for funding."

The future of DeepStar

"Each year, discoveries are happening in deep water and we have to come up with developments in these areas," Hanrahan said.

For this reason, the need for deepwater technology development will continue for several years. With oil prices steadily on

the rise, it is imperative that new technology be developed. The plans for Phase VIII have already started to take place, according to Hanrahan.

"The overall indication is positive that there will be a DeepStar Phase VIII," Hanrahan said.

Hanrahan said that the challenges of deepwater Gulf of Mexico will likely continue to dominate the focus for Phase VIII. He also mentioned that DeepStar will continue to drive advances in the flow assurance area. For Phase VIII, DeepStar is using identified emerging deepwater business targets in the Gulf of Mexico, West Africa and Brazil as the basis for defining the priority technology developments for the phase.

For more information about the DeepStar program, please visit the Web site at www.deepstar.org. □

The goals of DeepStar

Throughout the years, DeepStar has been guided by the goals set forth in the beginning of the program. These goals include:

- To enhance deepwater technologies.
- To develop new enabling deepwater knowledge by advancing new technologies.
- To gain the acceptance of these technologies by industry and regulators.
- To provide a forum for discussion.