

Weatherford prepares for UB drilling projects

Darrell Johnson, Weatherford International

ADVANCEMENTS IN technology have greatly improved the effectiveness of underbalanced drilling (UBD) techniques but with greater sophistication comes increased complexity in preparing and mobilizing for these projects. This article discusses how one organization gears up for two large underbalanced projects being launched almost simultaneously, including:

- Assigning people, resources and equipment;
- Integrating them with the QHSE components;
- Executing the operational and logistical concerns while taking care of day-to-day business and monitoring the global UBD horizon.

This year **Weatherford International Ltd** was awarded two Tier 1 underbalanced systems (UBS) contracts in Southeast Asia. Preparations are under way for two distinct applications of underbalanced (UB) technology.

With the **PetroChina/CNPC** project, the major emphasis is on reducing drilling costs using UBD's performance benefits; while the focus of the **Kufpec Indonesia Limited** project is reservoir drilling and mitigating damage to increase productivity.

According to Darrell Johnson, Vice President of Weatherford's UBS product line, "It takes a large commitment and a wealth of experience to put projects like these together."

COMMAND-AND-CONTROL CENTER

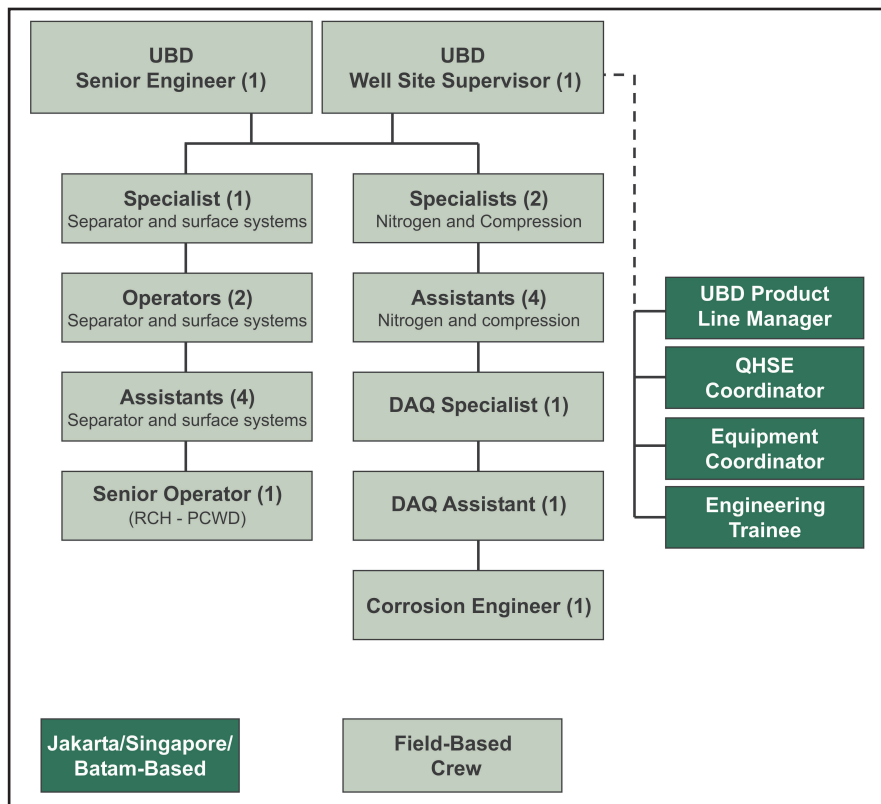
A major vehicle for bringing it all together will be Weatherford's new Center of Excellence. Located on Batam Island, just offshore Singapore, the Center services its Asia-Pacific clients.

"We decided that by consolidating our resources we could offer clients improved service deliverability," Mr Johnson said. "Instead of having equipment scattered throughout the region, we decided to pull everything into one base, where we could maintain it and track it. The Center of Excellence gives us the ability to train our people, main-

tain and keep track of our equipment, be more consistent in our pricing, and better serve our clients."

The Center is busy these days in preparation for upcoming operations under the Kufpec and PetroChina contracts.

encompasses quality, health, safety and environmental (QHSE) support; office and wellsite engineering; and rig site supervision and operational personnel. Weatherford will provide a compression package, nitrogen generation, separation equipment, data acquisition equipment, RCD and corrosion management.



The flow chart illustrates the hiring process for the Kufpec underbalanced drilling project in Indonesia.

CONSOLIDATE EQUIPMENT

All equipment for Weatherford's UBS projects in Asia is being centrally located and tested at the Center. Most of the equipment for the Kufpec and PetroChina projects is the same, which lowers costs; but technical and logistical criteria necessitate some differences.

Kufpec. Most of the equipment for this Indonesian project was either already available in the region or is being built there. The only equipment that Weatherford had to modify are the rotating control devices (RCDs) in the United States.

The Kufpec project is on Seram Island in the Maluku province. Under the \$11.3 million contract, Weatherford will supply a complete UBS package that

An estimated 15 development and exploration wells will be drilled.

Brian Hergert, UBS engineer for the company, explained that Weatherford first looked to its regional inventories to meet tender specifications and then turned to global inventories. In cases where it was not available from the regions, Weatherford identified the equipment to be built, sourced fabrication providers and sourced steel in a market where steel is at a premium. With industry suppliers and clients very busy these days, keeping to schedules and budgets is not always easy. And the sheer remoteness of Seram Island complicates matters.

"Everything has to be shipped by sea to Seram Island, about a 2,000 km journey

from Batam," Mr Hergert said. "Barge time is about 20 to 23 days, so a lot of equipment that would not normally be air freighted has had to be sent by air to meet schedules."

Part of the preparation for such remote operations, he explained, is ensuring that equipment is fit for purpose and that critical service spares are identified and readily available. All of the equipment for the Kufpec project is first rigged up at the Center and tested. Oil company representatives are present to affirm that the equipment meets their specifications. Meantime, the rig was enroute from Australia.

"The general view here is when we can get all of the equipment out on the lease on schedule and operating as planned, we've done the hard part," said **Carl Donoclift**, well site supervisor and manager of the Kufpec project. "Logistically, this is an absolutely mammoth project."

Greg Caraway, product service line manager for Weatherford UBS Asia Pacific region, cited another challenge on the Kufpec project. "We can't pump with cryogenic nitrogen because of long transport times and resulting product loss. If we put the tanks on a barge to Seram, in this hot climate, they would be empty by the time they arrived."

The solution is membrane nitrogen, patented Weatherford technology that pulls nitrogen out of the atmosphere at the well site and concentrates it to a form that is about 95% pure.

Mr Caraway explained that the RCD is one of the distinguishing pieces of equipment between the two projects. "The RCD for the Kufpec project has an active element. It's a much more sophisticated piece of equipment than the one for the PetroChina project. You can apply and hold pressure on it, a capability needed in this project, where much higher pressures will be encountered.

PetroChina. The PetroChina project is located in the Yumen field, one of China's strategic brownfields. The work under this six-month, \$2.4 million contract is slated to begin in September. Weatherford will provide engineering expertise, a UB performance drilling team, a compression package and a low-pressure Williams RCD.

An added engineering twist is the high

elevation (about 9,000 ft) of the Yumen field. With the thinner atmosphere, the compression equipment is not as efficient, so more demands are made on the fluid carrying capacity. Contingency equipment for pumping foam to retrieve cuttings will be onsite. In contrast, "thin air" is not a factor on Seram Island, where Weatherford will be flow drilling.

THE RIGHT TEAM

In addition to serving as a hub of equipment, the Center centralizes UB technology training and support activities.

"Managing equipment is critical to our success," Mr Johnson said, "but when you really boil it down, it's our people. Underbalanced technology, although not new, is becoming increasingly sophisticated and being taken to new environments every day. There are not a lot of people out there with the experience or knowledge to walk out onto a lease and design and execute these wells."

"Our biggest challenge for the Kufpec and PetroChina projects has been getting the most qualified people pulled together," he said.

"Most of the team has been selected, and they're involved with getting equipment ready, writing procedures and working to meet the QHSE and technical training requirements."

The project team will be engaged in a drilling-the-well-on-paper (DWOP) exercise for three days and discuss every aspect of drilling the well, looking for gaps and planning contingencies. Weatherford's Kufpec project team consists of a business manager, an engineering manager, an on-site engineer and a UBS QHSE coordinator.

Johnson also pointed to the need to nationalize the workforce, to train more local people in UB technology for the Kufpec project and elsewhere. "If you want to talk about the growth of this technology, we need to train local. We need to nationalize our workforce."

Training is under way and ongoing at the Center, including courses for well control, health and safety, and equipment operations. "When you start dealing with releasing hydrocarbons to surface while you're drilling, the risk is considerably greater than it is with some of the other things that we traditionally do as a

company," Mr Johnson said. "The most important component of our projects is QHSE."

Additionally, UBS wrote a QHSE program specific to UB applications.

ON THE UB HORIZON

Mr Johnson sees great potential for UB applications across the globe. "The market for underbalanced is growing at a high rate," he said. "For example, opportunities abound in China for performance and reservoir drilling."

He points out that the current Yumen field project marks the first time that PetroChina has hired a foreign company to provide multi-well drilling services on a large scale. Weatherford is currently providing underbalanced services in Thailand, and potential UB work also exists throughout Asia, from New Zealand to China.

"In Asia I can look at each country and see opportunity onshore and offshore, and we're starting to see what the industry has done to drive the technology forward."

"There are not many places in the Middle East where we're not drilling UB right now," he said. "We participate in the hemisphere's largest UB campaign currently ongoing in Oman, and we drill in UAE, Yemen and Syria."

UB activity and potential are high in Europe as well. In the former Soviet state of Georgia, the company has been awarded a 15-well CT-UBD project. "They need our UBS technology to go back and redevelop their brownfields," Mr Johnson said.

Weatherford also hopes to drill a wells for a couple of major operators in the North Sea.

Johnson also sees similar opportunities in the United States, where the company's UB candidate screening tool (SURE) is already rapidly gaining favor with operators. It recently was used to support a major's UBD program in South Texas.

UB technology is transitioning from the "early adopter" stage to the "early majority" phase as more operators discover its benefits. As it evolves, it presents more options, better solutions, and new levels of complexity. ■