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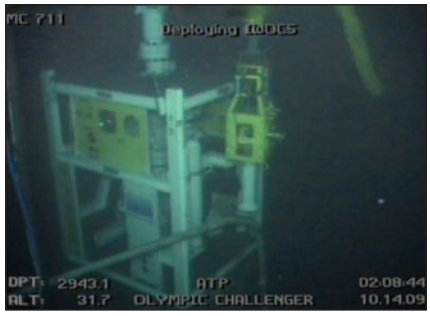
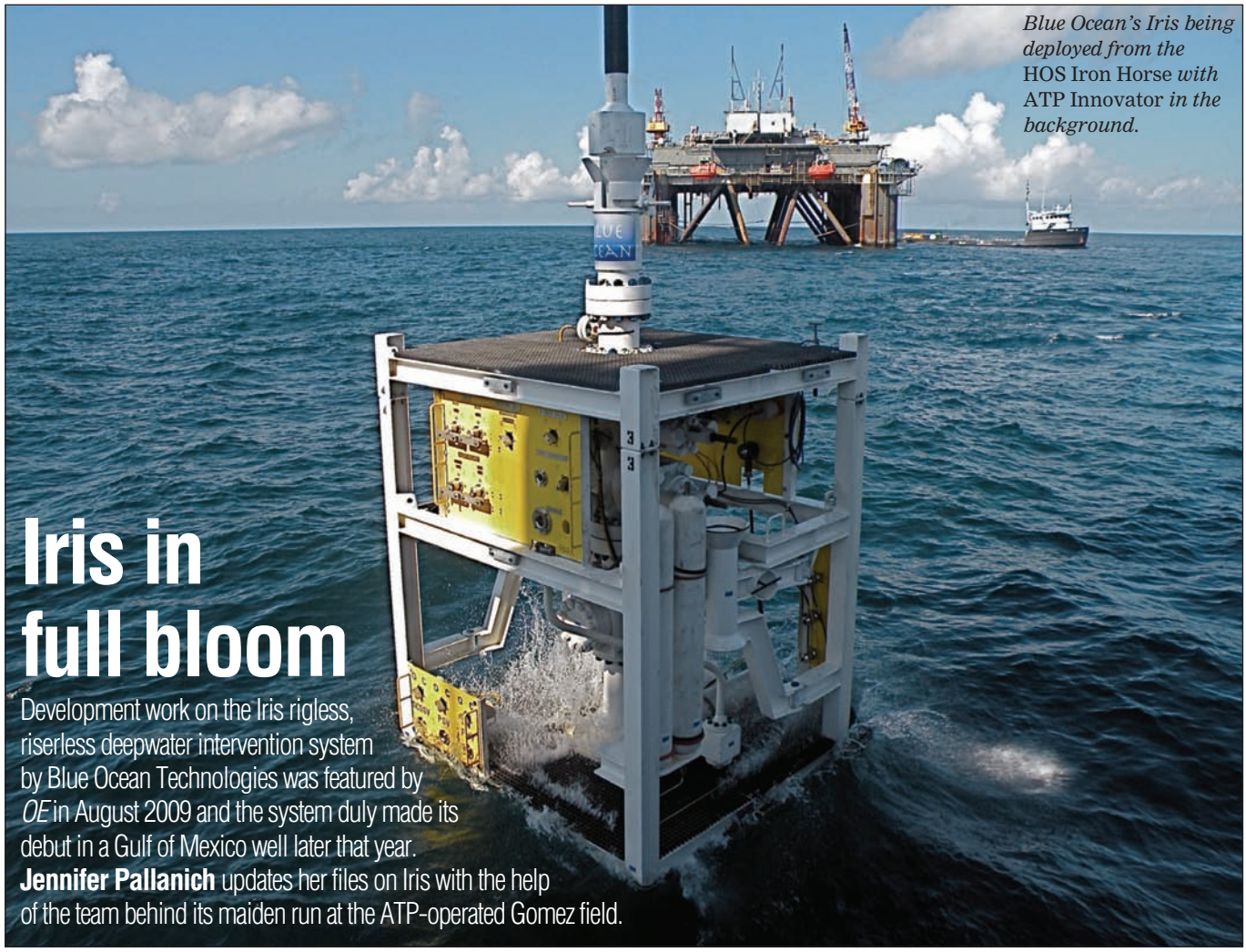


Iris on well at 2950ft water depth.



Blue Ocean's Iris being deployed from the HOS Iron Horse *with* ATP Innovator *in the background.*

Iris in full bloom

Development work on the Iris rigless, riserless deepwater intervention system by Blue Ocean Technologies was featured by *OE* in August 2009 and the system duly made its debut in a Gulf of Mexico well later that year. **Jennifer Pallanich** updates her files on Iris with the help of the team behind its maiden run at the ATP-operated Gomez field.

ATP Oil & Gas wanted to commingle the mostly oil-bearing 3750C sand, which had been producing since 2005, with the shut-in mostly gas-bearing 3750B sand to maximize recovery rates at the Mississippi Canyon block 711 No4 well. In October 2009, the well was producing 1.9mmcf/d of gas, 1750b/d of oil and 2500b/d of water. The task was to shift a sleeve in the 3750B sand of the No4 well to allow production from the 3750B sand to commingle with the production from the producing 3750C sand in the field, which ATP operates with 100% interest. After the intervention was completed on 23 January 2010, gas production from the well increased by 800%, oil production increased by 300% and water production dropped to 30% of the October rates.

After obtaining approval from the US Minerals Management Service to commingle production from the two sands, ATP considered the various ways to make that happen, says James Wells, a senior engineer at the Houston-based company.

'Those options were to get a mobile drilling unit out to do the intervention, use a dynamically positioned vessel capable of handling a riser that extends from the sea floor to a surface work platform or, as a third option, to use a riserless system similar to Blue Ocean Technology's Iris that allows for subsurface wireline work with a riserless intervention system.'

Iris, or the Interchangeable Riserless Intervention System, adapts several typical well control and sub-surface intervention pieces of equipment to subsea conditions, including, to the future, a subsea injector head that allows the use of coiled tubing in a well without a riser. It can be deployed from a DP2, 100m-long vessel with a knuckleboom crane; the system itself is rated for 10,000ft of water and 10,000psi and can work on both horizontal and vertical trees. Iris is designed to handle slickline and e-line operations and has a stack and lubricator ID of 6in.

On evaluating the costs involved in the various approaches, ATP selected IRIS as the most cost-effective route.

'Going deeper is the main strategy.'
Neil Crawford, Blue Ocean

ATP organized the major contracts for the work: Blue Ocean for the Iris system, Global Industries for the *Olympic Challenger*, Wright's Well Control for the e-line and Welltec for the bottomhole toolstring.

In October 2009, Wright's Well Control rigged up and performed multiple test tool runs to ensure the wellbore was clear and the tool weight was appropriate. During test runs, they found a blockage.

Welltec did a 'little well cleaning' and 'what we ended up finding was essentially paraffin and sand. The cleaner we had was more for sand. We switched out and ran (Well) Miller, which has a small bit on it, and milled through it,' says Chuck Wells, senior business development manager – Gulf of Mexico, of Welltec.

In all, Welltec deployed its cleaner, miller and tractor. After using the Well Miller to clean out the paraffin and asphaltenes, Welltec rigged up the Well Stroker, ran back in and opened the sleeve at 11,400ft.

During the ATP job, Blue Ocean found the need to create a subsea grease delivery system.

'Working in these new uncharted depths, we realized we weren't getting sufficient grease supplied to the system to make the seal satisfactory,' says Ian Still, operations manager at Blue Ocean.

ATP's Wells elaborates: 'While running the test tool, it became apparent that the grease injection system was not supplying sufficient pressure to the subsea lubricator to create the proper grease seal. We found that while operating in 3000ft of water utilizing an 8000ft reel umbilical, we could not transfer enough pressure from the surface pumps to the subsea grease seal.'

Blue Ocean's preliminary subsea grease injection system designs removed the effects of the umbilical, and ATP and Blue Ocean discussed how to bring those plans to the project. The job demobed in October, and Blue Ocean got to work on refining its design, building the system and testing it onshore. By early December, it was time to get back out to the No4 well with Blue Ocean's newly designed – and patent pending – subsea grease injection and delivery system.

Around the same time, Global

Testing of Blue Ocean's subsea grease system on a land well.

'We anticipate having production from the Gomez facility for at least 10 more years.'
James Wells, ATP

Industries informed ATP that the *Olympic Challenger* was due to begin a long-term contract with another company. ATP struck a deal with Hornbeck Offshore for the *HOS Iron Horse*.

Finally, it was time to run Iris with the new subsea grease delivery system.

'The subsea grease system worked tremendously,' Still says. The new system provided a greater and more responsive control over the grease supply, he says. The issue with the grease system is being aware of the e-line system, the pressure of the well, and the make up of the well, Still says. 'We have a volume [of grease] on the Iris system that we think is sufficient for several runs, but then what we do is we have a subsea skid that we can retrieve to surface and we can replenish the system.' The slick line used for the intervention was $^{9}/_{32}$in rather than the traditional $^{7}/_{32}$in because of the tooling being used and the power requirements. 'To be able to seal against $^{9}/_{32}$ instead of $^{7}/_{32}$ was a big, big step,' Still says.

Hydrates did form, Wells notes, during the test tool runs. 'As the lubricator connected to the tree, the lubricator was flushed with MEOH and it became apparent that some seawater remained un-flushed. When the wellbore fluids were exposed to the seawater in the lubricator, hydrates formed. But the problem was eventually solved by extensive flushing with methanol, which cleared any hydrates,' he says.

After all outstanding issues were resolved and the test tool runs were completed, the intervention opened the 3750B sand to commingle the two reservoirs. After shifting the No4 well sleeve, the team moved to another well.

On checking production rates, it became apparent the well was not producing at the rate that had been hoped for. The team refocused its efforts on the No4 well.

'We perforated the well with explosive charges because the sleeve didn't slide the way we expected it to. So we went back into the well, and we perforated the well to bring the well on,' Still says. Wright's Well Control carried out that job. In all, the team carried out 14 wireline runs across two wells. The job marked the first time wireline has been successfully run in open water at 2950ft of water depth, the companies say.

When the No4 well came back online in January 2010, it was producing at 16.6mmcf/d and 6250b/d of oil, and water output had dropped to 900b/d. In all, Wells says, the intervention has maximized reserve recovery from the well while laying the groundwork for two to three more years of production at the well.

Gomez itself has been a success story for ATP, which originally contemplated depleting the field via a single subsea producer tied back to a third-party platform. ATP subsequently decided the field had larger potential, so the operator completed the No4 well in 2004 and carried out a well test to determine productivity. That test confirmed Gomez could justify its own floating production facility on Mississippi Canyon block 711. ATP organized the conversion of the *Rowan Midland* drilling rig hull and installed a topside production module, which together formed the *ATP Innovator*. Gomez began first production in March 2006 to the *ATP Innovator*.

The operator then decided to develop the field in phases with production from wells No4 and 6 in the first phase. Phases 2 and 3 followed with output from wells No5 and 8 and the tie in of the No2 well at Mississippi Canyon block 755. This year ATP plans to drill two more wells at Mississippi Canyon block 711 and to tie in production from Anduin West in neighboring block Mississippi Canyon block 754.

'We anticipate having production from the Gomez facility for at least 10 more years,' Wells says. 'With additional development and tie-backs, as well as successful interventions, that time span may stretch beyond a decade.'

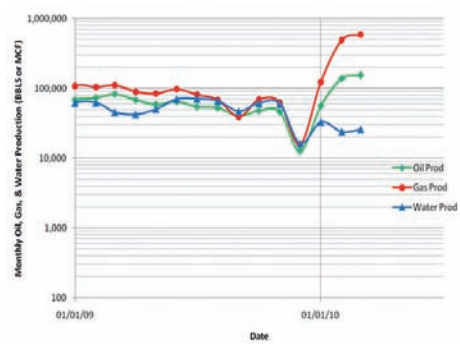
Iris upgrade

Right now, Iris' iron is rated for 10,000ft, but the current umbilical for Iris is 2200ft long. 'Going deeper is the main strategy,' says Neil Crawford, president of Houston-based Blue Ocean. It can be a challenge, he adds, because the umbilical is free in the water rather than strapped to a riser. 'It's a balance between the buoyancy and the strength, given that you've got currents down there that can apply quite a load, and then you've got the weight of the umbilical.' Blue Ocean has been in talks with several umbilical contractors about the design needed to work in 10,000ft water depths.

A second area for development is working with coiled tubing. Still says coiled tubing is 'something that's very much in our minds as the next step in intervention.' Coiled tubing provides some benefits with its increased functionality, range and speed. Still says when he speaks with potential clients about the rigless riserless intervention method using wireline, they say, 'That's fantastic, but are you going to have coiled tubing capability?' According to Still, coiled tubing will be a Blue Ocean offering 'in the not-too-distant future.' He notes the company is working to improve and upgrade the ROV interfaces as well as add more hydrate remediation functions.

Blue Ocean expects to commission a second Iris system – to be known as Idris (interchangeable deepwater riserless intervention system) – by end 2010. **OE**

The ATP Innovator *produces the Gomez field in MC711 in 3000ft of water.*



MC711 #4ST1 monthly production chart.