Saudi Aramco and Baker Hughes Introduce Innovative Cable-Deployed ESP System

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ransCoil rigless-deployed ESP expands the operating envelope and improves reliability vs. existing alternative deployment systems

HOUSTON--(BUSINESS WIRE)--Feb. 9, 2017-- Saudi Aramco and Baker Hughes (NYSE:BHI) announced today the first installation of the TransCoil™ rigless-deployed electrical submersible pumping (ESP) system, which is designed to help operators bring wells on production faster and lower the costs associated with installing and replacing ESPs. Because they can eliminate the need for a rig in fields where rig availability is a concern or where high intervention costs can limit artificial lift options, operators can minimize deferred production and lower their overall lifting costs to extend the economic life of their assets.

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The TransCoil rigless-deployed ESP system features an inverted ESP with the motor on top connected directly to the power cable. This unique design eliminates the motor lead extension entirely, removing the weakest connection in traditional ESP systems. (Photo: Business Wire)

The TransCoil system—developed in participation with Saudi Aramco—features an inverted ESP system with the motor connected directly to a new, proprietary power cable configuration, eliminating the traditional ESP power cable-to-motor connection, which improves overall system reliability. Unlike wireline-deployed ESPs, the fully retrievable TransCoil system does not have an in-well “wet connection,” which requires a rig to pull and replace if the wet connection fails.

The innovative power cable design enhances the reliability of the deployment string compared to coiled tubing-deployed ESPs that simply pull the power cable through the coiled tubing. Extensive fatigue testing and thermal growth analysis were conducted at the Baker Hughes Coiled Tubing Research and Engineering Center to enhance materials selection and system design. The TransCoil system cable design also extends the operating range to 12,000 ft compared to traditional coiled tubing-deployed ESP systems, which are limited to approximately 7,000 ft because, at greater depths, the weight of the power cable will cause it to collapse inside the coiled tubing, creating an electrical failure.

The TransCoil system can be installed in 4½-in. to 9-in. casing in wells with flow rates up to 18,000 BPD. In mature offshore fields, where high

intervention costs can limit the application of ESPs, the system can be deployed through the existing 4½-in. tubing, saving the time and money required to pull the existing completion. Another advantage of the TransCoil technology compared to wireline-deployed ESPs is that it can be installed through a deviation in the wellbore. This capability allows operators to land the ESP closer to the producing zone for greater reservoir pressure draw down and reserve recovery.

A TransCoil system was recently installed and commissioned in Saudi Aramco's Khurais field. Rig-based work to replace the completion and install a vertical electrical penetrator system was completed ahead of the rigless operations. A Baker Hughes coiled tubing team helped plan the operation, delivered a surface unit to the wellsite, and worked with artificial lift engineers to install the TransCoil system at 4,900 ft in 7-in. tubing. The first-time rigless operation improved efficiency by reducing installation time nearly 50 percent over a rig-based installation and further deployment efficiency improvements are expected in the future.

"With a large ESP installation base, including many ESPs installed in our offshore fields, the ability to rapidly deploy ESPs riglessly provides tremendous cost benefits to our overall operations. The TransCoil system is particularly beneficial in our challenging high H_2S fields as the premium metallurgy in the system can significantly extend the ESP operational life in harsh environment wells," says Mr. Nasir K. Al Naimi, Vice President, Petroleum Engineering and Development at Saudi Aramco. "Collaboratively working with Baker Hughes, we have developed a solution that meets our immediate challenges and enables our long-term vision of one-day ESP change outs. We will push the envelope more to have the remaining part of our vision, which is to have 10-year ESP service life."

"Working together with Saudi Aramco, we have addressed the industry's critical need for a reliable alternative deployment option that reduces the cost and time associated with deploying ESP systems without introducing new potential failure modes," says Ryan Moore, Vice President, Artificial Lift Systems at Baker Hughes. "In the new normal for oil prices, this technology can be game-changing for operators looking for pathways to extend the productive life of their fields."

The TransCoil rigless-deployed ESP system is the latest example of Baker Hughes' strategy to improve well efficiency, optimize production and increase ultimate recovery.

Baker Hughes is a leading supplier of oilfield services, products, technology and systems to the worldwide oil and natural gas industry. The company's 33,000 employees today work in more than 80 countries helping customers find, evaluate, drill, produce, transport and process hydrocarbon resources. For more information on Baker Hughes, visit: www.bakerhughes.com.

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