

Operator Increases Production by Applying Integrated Services to Well Workover Campaign

HALLIBURTON COLLABORATES WITH OPERATOR IN ECUADOR TO COMPLETE SIX WORKOVER WELLS

ARMADILLO FIELD, ECUADOR

CHALLENGES

- » Find a technology solution to replace failed workover efforts of the past
- » Execute safe and efficient workovers for six wells
- » Lower costs while optimizing time, reducing risk, and increasing production

SOLUTIONS

- » Halliburton project management team – to lead integrated workover operations
- » Multiple Halliburton services – to conduct simulations and operations according to best practices
- » Multi-skilled/cross-trained crews – to successfully execute all services
- » Multipurpose BHA – to reduce time
- » Customized control fluid – designed to be compatible with the sandstone and fracking fluids
- » Integrated logistics services – to eliminate any delay in operations

RESULTS

- » Reported zero HSE incidents
- » Reduced workover operations by 18 days and added 1,000 oil production barrels to daily output resulting in \$468,000
- » Achieved cost savings for operator of approximately USD 1.9 million

**SAVED
18 DAYS
AND APPROXIMATELY
USD 1.9M**

OVERVIEW

Halliburton recently performed workovers for six wells located in Ecuador’s Armadillo field. The objective was to boost the production of these wells by implementing various stimulation methods, such as fracking, injection, perforating, and reperforating. As project management lead, Halliburton designed an integrated solution comprising a rig, slickline, diesel, and vacuums, as well as third parties. In particular, Halliburton applied a local contract to sell tubulars to the client, saving the project approximately USD 100,000. Other savings came from technology choices, expertise, and collaboration that drove efficient operations, risk mitigation, and accurate decision making – leading to the desired increase in production levels of 1,000 barrels of oil per day.



Hydraulic Fracturing and Perforating workover campaign executed onsite with Halliburton’s Integrated Services Team

PLANNING AND EXECUTION VIA INTEGRATED SERVICES

The initial workover scope comprised two fracking jobs, one injection well, and three perforating wells, with the common goal of getting to oil production as soon as possible in order to meet production commitments made to the client’s parent company. Due to low oil production in the last drilled well, it needed to be reperforated in the “Lower U” sandstone and communication with the oil production zone had to be confirmed. Halliburton performed this intervention utilizing existing drillstem testing (DST) and tubing-conveyed perforating (TCP) technologies to create new, unique, integrated solutions to significantly reduce time and cost. Based on this positive result, the client requested integrated services for its other workover campaigns, working in close collaboration with Halliburton to manage risk at every phase – from planning, to engineering, and through execution.

MANAGING RISK AND LEVERAGING TECHNOLOGY TO DELIVER RESULTS

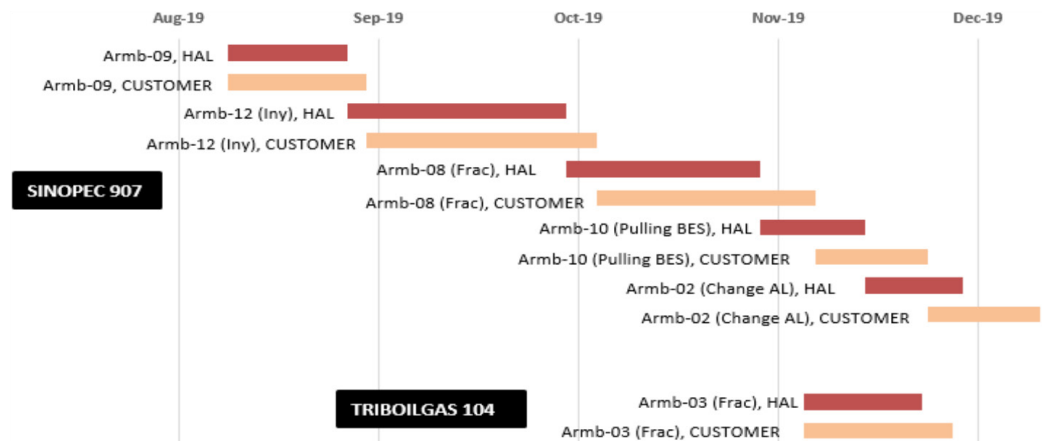
Local workover activity was typically very risky due to the advanced ages of many wells in the area. However, in this case, the wells were not more than five years old, with the main issue being petrophysics uncertainty and delivery of the closest simulations, especially for fracking jobs. The Halliburton team consulted with petrophysicists, geologists, and petroleum engineers in order to help analyze available data (logs, seismic, and test data), reduce uncertainty, and, ultimately, deliver the expected oil production for each well. An engineering design was presented to the local hydrocarbon government agency, and the

required approvals were obtained in a timely manner. Overall time reduction was accomplished by using a multipurpose bottomhole assembly (BHA), and fracking results were improved with the use of a customized control fluid that was compatible with the sand formation.

Halliburton cross-organizational knowledge and experience were essential to the successful delivery of the following services:

- » Fully compatible completion fluid
- » Wellbore cleanup as per requirements
- » Correct static and dynamic underbalances for perforating and reperforating
- » Single BHA for production well test, fracking, stimulation, and perforating
- » Fracking design to meet higher production rate
- » Squeeze jobs to isolate zones prior to perforating target zones
- » Artificial lift system to cover all production ranges

The integrated team from Halliburton prepared and submitted an optimized workover schedule proposal to deliver the expected oil production earlier than planned and to reduce the costs and times of the workover campaign. The proposal objective was to reduce the workover operations by 18 days and to save USD 1.9 million during the execution phase. Halliburton was able to accomplish these goals for the operator, and, consequently, the Halliburton team has been asked to leverage the previously captured technology and lessons learned as the customer takes on an additional six wells to deliver continuous improvement.



Workover schedule with Halliburton optimization

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