PowerReach® - Combination Strings

New PowerReach – Service Employs HWO / Snubbing, Coiled Tubing and a Unique Safety Valve

Halliburton’s PowerReach® service provides the ability to perform well stimulation and remedial operations in long horizontal wellbores without the limitations of small OD coiled tubing. A unique downhole valve has been developed to provide the ability to use combination strings of larger OD jointed tubing and coiled tubing under live well conditions. No one else in the industry can provide the capability.

The Industry Needed a Method to Reach, Stimulate and Intervene in Long Laterals

Unconventional reservoirs such as tight gas and shale are most commonly completed with horizontal wellbores, many with over 60 intervals per wellbore being treated. Today, many lateral sections are exceeding 10,000 ft in length with even longer laterals possible in the future with 100 or more entry points. Contingency plans for early screen-out, wellbore clean-out and plug drilling often involve the use of coiled tubing to enable continuous operations under live well conditions.

Longer, deeper lateral wellbores can create problems for conventional coiled tubing equipment:

- Reel capacity limits the length of coiled tubing.
- CT diameter is sacrificed for length.
- Smaller OD CT restricts the pumping rate.

The industry needed a method to reach, stimulate, and intervene efficiently in extremely long laterals. The new PowerReach system enables accomplishing those operations through seamlessly combing the capabilities of a hydraulic workover (HWO) unit and a coiled tubing (CT) unit to run a hybrid string. Such hybrid strings have been used in the past but never with a CT unit running a hybrid string into the lateral to perform treatments on a live well.

The major enabling technology of this new system is the unique PowerReach downhole valve that enables connecting and disconnecting the coiled tubing to and from the jointed tubing under live well conditions.

The advantages of performing pumping operations within the horizontal lateral with coiled tubing are significant:

- No need to stop pumping to add pipe.
- Continuous pipe movement with circulating.
- Improves operational safety.
- Improves clean-out effectiveness.
- Improves time efficiency.

The use of larger OD tubing also provides advantages:

- Enables deeper reach without lockup issues.
- Provides more weight-on-bit for drill outs.
- Deeper deployment of perforating and fracturing BHAs
- Larger pipe requires less hydraulic horsepower.

PowerReach® System Safety Advantages

The PowerReach system provides important safety advantages over a jointed pipe only approach, primarily from the perspective of enabling continuous operations in the lateral without stopping to add pipe. The PowerReach system was built with live well interventions in mind and seamlessly integrates with Pinpoint Stimulation processes. Custom-designed equipment and work practices specifically address the safest possible working conditions while limiting the number of trained people exposed to the potential hazards.
The PowerReach® Service Process
On a PowerReach service job a HWO Rig Assist unit, or HWO Quick Rig arrives on location prior to the fracturing equipment and coiled tubing unit. Using the HWO unit, the jointed pipe segment of the hybrid string is snubbed into the wellbore to the desired depth (somewhere above the top perforation). The jointed pipe is secured in slip rams. The downhole trip-in safety valve will be the primary barrier at this point.

The PowerReach safety valve is installed above the jointed tubing. The PowerReach safety valve allows us to break joints on the surface while controlling tubing pressure. This tool primarily serves as a safety valve in the contingency that the downhole tools fail to seal the tubing ID.

The HWO unit and stripping BOPs are rigged down while the CT unit and fracturing equipment are brought to location. The CT unit and work window are rigged on top of the BOP stack and the coiled tubing string is connected to the PowerReach safety valve.

From this point onward all movement of the hybrid string is handled by the CT unit until the job is complete. Normally after the CT is connected and the pipe is being run in the hole, the downhole trip in safety valve is opened which provides reverse pumping ability if required. The system can be used to perform fracturing treatments using dynamic fluid diversion, sand plugs or straddle packers to isolate fracturing intervals. The system can also be used to drill out plugs and clean out extremely long horizontal wells.

The PowerReach® System Improves Production and Profitability in Unconventional Formations
Operators are finding that extremely long laterals with fracturing treatments are necessary in many unconventional formations in order to achieve economic production levels. In addition, the long laterals can help improve reservoir drainage and potentially reduce the number of wells required to monetize an asset.

Case History
The system has been tested effectively in a completion that created 17 individual fracturing stages using the PowerReach system to implement Halliburton's SurgiFrac® service. The 4½-in cased and cemented completion was over 12,000 ft MD. The stimulation treatment used a combination of 6,000 ft of 2¾-in jointed tubing and 7,000 ft of 2¼-in coiled tubing.

The unique capabilities of the system came into play quickly. An early screen-out occurred on interval two and the wellbore was cleaned out immediately by reverse circulation. This allowed the process to continue for the remaining intervals with very little time lost due to the screenout. According to the customer, the wells that were completed using the plug and perf method were yielding an average 250 bpd. The wells using the PowerReach system were yielding as much as 400 bpd.

The PowerReach system exceeded customer expectations on four gas wells in the Marcellus Shale formation in the state of West Virginia. The longest horizontal well was completed to 10,950 ft MD. The highly efficient CobraMax® WF service was used to pinpoint stimulation, with one well completed in 29 frac stages.

The PowerReach combination string has exceeded 20,000 ft on several occasions involving a 11,000 ft horizontal wellbore.

For more information about the PowerReach® System, contact your local Halliburton representative or email completions@halliburton.com.

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