Tartan Toe Xpress (TTX) System Enables Reliable Toe Initiation and First Stage Stimulation in Extended Reach Horizontals

OBJECTIVE

Operators using cemented plug-and-perf methods for their extended reach horizontals face the challenge of efficiently and reliably initiating stimulation operations at the toe. In addition to providing the initial flow path, operators are looking for a completion that can capture the pay zone at the toe – an area often left unstimulated.

Most toe initiation subs are not capable of achieving the high rates required for stimulation of the formation. Complex toe sub designs can also be expensive and unreliable, resulting in additional remedial operations and expenses. Even if the toe sub opens, getting the first stage stimulation off by running plug and guns presents challenges from total depth, and inability to achieve designed pump rates coming out of the hole.

SOLUTION

The Tartan Toe Xpress system is designed to enable operators the ability to initiate through the toe at designed stimulation rates, pressure test the casing if desired, and perform a full first stage limited entry stimulation. By combining Tartan's patented Cemented Initiation Sub (CIS), Ball-Drop CIS and MultiFrac™ limited entry sleeves, the TTX system can be customized depending on the desired operational sequence.

The CIS and MultiFrac™ sleeves feature patented BurstPoint™ ports that keep the system internals completely sealed during installation and the cementing process, eliminating the risk of debris and cement invasion. The patented MultiFrac™ sleeves enable cluster stimulation by opening multiple sleeves with one dissolvable ball. Once the sleeves are shifted, liner pressure is increased to fully open the BurstPoint™ ports and begin efficient limited entry fracturing operations.

RESULTS

A large operator working in the D-J Basin installed the TTX system in two cemented wells on the same pad in Weld County, Colorado – one targeting the Niobrara formation and one targeting the Codell. Each TTX system was 2 CIS tools with 3 MultiFrac limited entry sleeves (Fig. 1). The operator had originally planned to use the CIS tools only for flow initiation, but Tartan encouraged them to pump a full stage treatment to capture the pay zone at the toe.

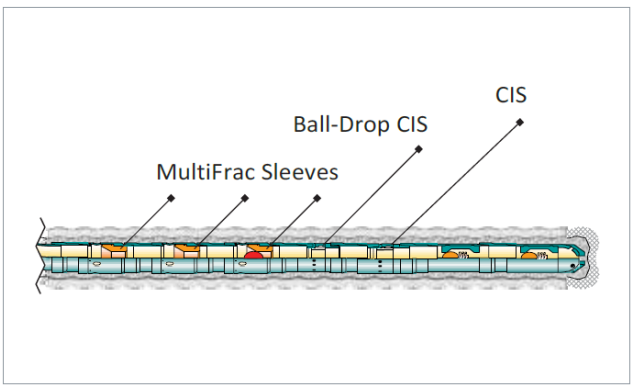

Fig. 1 ***Tartan Toe Xpress (TTX) Cemented Initiation Assembly***

RESULTS (CONT.)

The uphole CIS utilized the Ball-Drop version to enable pressure testing of the casing string prior to stimulation operations, and a solid-seat was used for the last MultiFrac™ sleeve in the cluster. This configuration enabled stimulation through the 2 CIS tools as the toe stage and the 3 MultiFrac™ sleeves as the first limited entry stage.

A pressure truck went to location before the frac crew to pressure up the casing and open the 2 CIS tools. After fluid feed rate was established, a dissolvable ball was pumped to the Ball-Drop CIS to conduct a casing pressure test. The full frac crew then came to location and successfully pumped 50-75% of the designed full stage proppant treatment at the toe stage through both CIS tools at 60 bpm (Fig. 2).

A large actuation ball was then pumped down to open the 3 MultiFrac sleeves, which were spaced out to provide an effective cluster stimulation. The first stage was completed using a limited entry stimulation design with an estimated 95% cluster efficiency (Fig. 3). The remainder of the well was then completed using the plug-and-perf method.

The first stage stimulation was consistent between both wells and had lower breakdown pressures than previous wells completed with plug-and-perf. The operator now uses the Tartan Toe Xpress system as their standard operating procedure when drilling and completing new wells in the D-J Basin.

LOWER RISK

- Casing pressure-test and well initiation are taken out of the critical path for the fracturing crew, reducing the chance of costly delays
- Massive flow area prevents debris plugging
- No Coiled Tubing or Wireline required at the toe
- First frac stage cleans and prepares casing for subsequent plug-and-perf operations, lowering risk

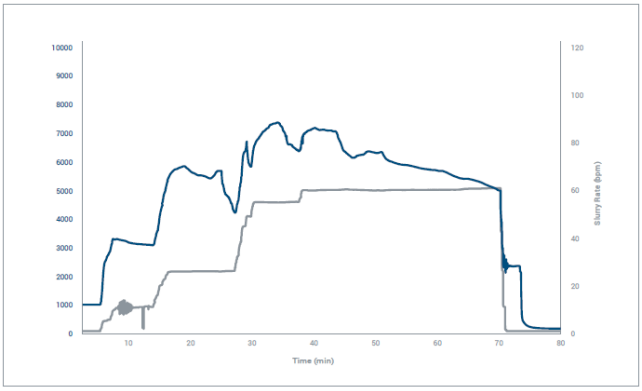

Fig. 2 ***Treating Pressure and Slurry Rate of CIS Stage***

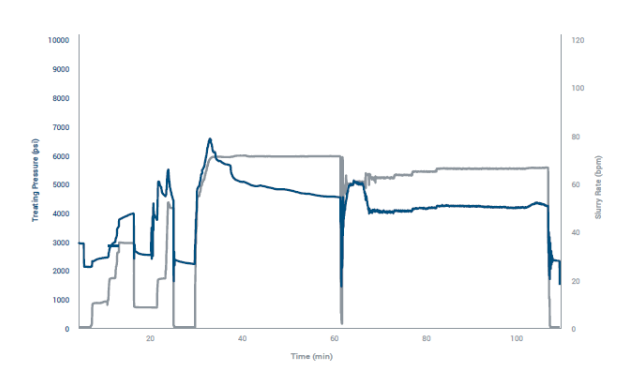

Fig. 3 ***Treating Pressure and Slurry Rate of MultiFrac™ Stage***