Raising the Bar on Refracs

NOV's Refrac completion liners bring new life to mature wells with a combination of SURESET Liner Hanger, Burst Port Toe initiator, and Wet Shoe Sub.

Background

Over the last decade, evolving fracturing technologies and downhole hardware have allowed for increasing reservoir pressures and temperatures. With this evolution, recently drilled wells are stimulated much more effectively and efficiently with enhanced and optimized production potential compared to older wells. Broadly, there are three primary factors limiting the production potential of older wells compared to newer wells:

- Stage Spacing – Previously, stage spacing of 300 - 1,000 ft exposed a large zone to stimulation pressures around the fracture initiation point. This stimulation pressure would mostly dissipate into weaker areas, leaving a large portion of the reservoir untreated. Stimulation efforts in newer wells with optimized stage spacing (100 - 200 ft) and improved technologies have been able to ensure that the reservoir is more effectively treated and production gains are maximized.

- Stimulation Pressure – Legacy surface and downhole equipment limited the amount of stress that could be generated in the rocks for fracturing. The lower stimulation pressure limited the effective length of fracture propagation and in turn limited the production interface of the given well. Enhanced technologies of surface and downhole equipment used for newer wells have enabled substantially higher stimulation pressures, ensuring a greatly improved production interface.

- DUC (Drilled but Uncompleted) wells with corroded casing – Corrosion on the casing prevents isolation devices (such as frac plugs) from sustaining sufficient stimulation pressures. Work-over and clean out operations may only partially restore the casing condition. Fracturing with such casing may cause plug slippage and/or parted casing, resulting in large remediation costs.

Installing a liner casing inside these wells and optimizing the stage spacing and fracturing pressures has boosted production. For DUC wells, refracs provide an opportunity to cover up corroded casing and breathe new life into an otherwise abandoned well. Choosing the right liner hanger system with all the needed capabilities has largely improved the ROIs. However, given the limitation of installed casing ID having the correct system configuration is critical to achieving overall success.

Case study facts

Location: Bakken

Customer: multiple independent oil companies

Products

- SURESET Liner Hanger Packer
- BPS Maxx
- Wet Shoe Sub
- SUPERDart

General well information

- Host casing/weight: 7" 26-32#
- Liner size/weight: 3-1/2" to 4" refrac string
- Lateral length: 1-2 miles
- Liner hanger installation depth: 8,500 ft
- Temperature: 250 °F

© 2024 NOV. All rights reserved. JIG 241045-EPS-CT-WC

Solution

NOV's unique approach to this application utilizes a customized package solution of the SURESET™ liner hanger system, Wet Shoe Sub with SUPERDart, and BPS™ Maxx. Our liner hanger system with specially design liner toe equipment fully delivered the desired capabilities. The SURESET system tested to API 19LH V2 standards delivered the hanger and packer capable of taking up to 417 klb of load and 10,000 psi pressure, which secured the refrac liner in place. The SUPERDart, a unique liner dart system, ensured cement/displacement fluid separation and cleaned the ID of both the drillpipe and the casing for plug and perf operations. The SUPERDart worked in conjunction with Wet Shoe sub to provide wet toe. Since the small ID of the refrac casing limits intervention capability in case of wet shoe malfunction, a flush OD Toe port – Burst Port System BPS was developed to provide contingency for wet toe. A tieback seal assembly ensures frac pressure integrity through the tieback casing and the liner casing.

Results

NOV's liner system removed the bottleneck on Refrac liner system capabilities previously available. From Toe to Liner top to Tieback, the entire system is designed to meet the technical requirements necessary in executing the refrac operation with minimal costs and improved ROI.

© 2024 NOV. All rights reserved. JIG 241045-EPS-CT-WC