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THE UNIFORM EFFECT

DEEPA: 65% increase in Estimated Ultimate Recoverables (EUR) in a dual lateral well in Austin Chalk

"We had tried all the other acidizing systems on the market, but none could penetrate far enough into the carbonate formation to yield an EUR increase. DEEPA successfully extended the fracture network to yield an EUR increase of 65%. Only 800 bbls of treatment fluid and a single pump truck were used for the DEEPA treatment, so it was a very cost effective solution. The alternative would have been dendronic fracturing. This could have required injection of 40,000 bbls of water and multiple pump trucks."

Petroleum Engineer, Operator, Fort Worth.

DEEPA increased the EUR of an Austin Chalk well. Extension of the fracture network was achieved by DEEPA delivering acid deeply and uniformly into the fracture network. The DEEPA treatment proved a cost effective alternative to massive dendronic fracturing for extending the fracture network.

The challenge

Production from the Austin Chalk in Texas is mainly from natural fracture networks. Oil flows from the matrix into the fracture networks and wells are drilled to intersect the macro fractures and drain the matrix*.

Previous attempts to stimulate production in the Austin Chalk by acidizing had been ineffective. This was because the high rate of reaction between conventional acids and carbonate rock prevents acid penetrating deeply into the fracture network before it spends.

The solution

Through in-situ acid generation, DEEPA natural fracture stimulation treatments deliver organic acid deeply and uniformly into fracture networks in carbonate rocks. This can increase the conductivity of the fractures. DEEPA can also increase matrix permeability. In addition it can remove many types of near wellbore damage.

DEEPA in action

A DEEPA treatment was formulated, suitable for a bottomhole static temperature of 88-93°C. The treatment required 800 bbls of DEEPA formulation, which produced approximately 10% w/v organic acid in-situ. DEEPA was pumped into the formation down the tubing annulus. The combined volume of both horizontal sections was 100 bbls, so the volume of DEEPA fluid pumped allowed for 700 bbls to be displaced into the fracture network surrounding the new horizontal sections.

As DEEPA fluid is non-corrosive when pumped, the downhole pump and sucker rods were left in place. 50 bbls of water were then pumped to displace DEEPA from the vertical section of the wellbore. The well was shut in for 72 hours to allow in-situ acid production to occur.

Production was started and oil and water production rates were monitored to assess the effect of stimulation compared with the predicted production decline curve before the DEEPA treatment.

The result

The DEEPA treatment stabilized declining oil production at around 60% above the pre-stimulation rate. Significantly, the Estimated Ultimate Recoverables (EUR) increased by 65%, indicating that the fracture network had been extended. In the past, extending the fracture networks feeding Austin Chalk wells had only been achieved through major dendronic fracturing. This was a high cost solution, requiring rapid injection of tens of thousands of bbls of water at a high pressure, and deployment of multiple pump trucks. Because high pressures were not employed during the treatment, it is likely that extension of the fracture network was a result of DEEPA's success in delivering acid deeply and uniformly into the formation, rather than the effects of pressure.

Reference:
*SPE 84590 has proposed a reservoir classification for fractured carbonates. DEEPA treatments are likely to be suitable for Types I, II and III fractured carbonates, but may not be needed for Type IV. The Austin Chalk is a Type III fractured carbonate. Type III (microporous) reservoirs have high matrix porosity and low matrix permeability. Matrix provides the storage capacity and fractures provide the fluid flow pathways.

Get in touch

Cleansorb has a team of DEEPA specialists to advise you on the best strategy for your circumstances. Please e-mail **contact@cleansorb.com** for more information.

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