Stimulation of a Nonproductive Horizontal Well Boosts Production to more than 10,000 bbl/d

StageFRAC services turn openhole well into highest rate oil producer in Kuwait field

CHALLENGE
Revive production from a nonproductive openhole horizontal oil well.

SOLUTION
Combined mechanical isolation from StageFRAC™ multistage fracturing and completion services with chemical diversion from VDA™ viscoelastic diverting acid.

RESULTS
Produced 100% oil within 2 hours of treatment and achieved production three times that of the highest-producing horizontal wells in the field—five times the average well in the field.

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Majdi Al-Mutawa
Field Development, North Kuwait
Kuwait Oil Company

Nonproducing horizontal openhole well in limestone formation
Production from a Kuwait Oil Company (KOC) horizontal oil producer in the Sabriyah field dropped to zero shortly after the well was completed in 2004. The well had a 2,462-ft openhole completion through the Mauddud limestone producing formation. Formation permeability ranged between 5 and 100 mD across the openhole section. KOC expected that the well would require an electric submersible pump (ESP) for production.

Maximized stimulation with multistage fracturing system
Based on the reservoir petrophysical model and interpretation, four intervals in Mauddud C2 and Mauddud D were selected for stimulation. They were compartmentalized into six stages based on permeability contrast. KOC selected the StageFRAC multistage fracturing and completion service because it employs mechanical isolation for the life of the well. The SXE™ emulsified acid was chosen to maximize penetration, and VDA acid was chosen because it offers chemical diversion.

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Treated well trajectory showing the six stages placed in Mauddud C2 and D formations.
The combination effectively stimulated multiple stages while ensuring maximum zonal coverage and selective treatment in long openhole sections. The system provides zoned isolation in an openhole completion, so that selected sections can individually be stimulated evenly and inflow contribution from the entire openhole section can be maximized. The treatment used SXE acid to achieve deep penetration and better etched fracture conductivity. VDA acid was used as the chemical diverter to assure good zonal coverage across each stimulation stage. The technology successfully stimulated six stages within three hours, and the well was flowed back immediately after the treatment was complete.

**Stabilized production increase of 10,000 bbl/d**

This combination of technologies allowed successful stimulation of a well with 20:1 permeability contrast with only a workover rig (drilling rig not required). The entire well was immediately flowed back and cleaned up to 100% crude oil within two hours. The last stabilized measurement indicates sustained natural production of more than 10,000 bbl/d of oil, which is five times the field average and three times greater than the best well in the field. This well did not require artificial lift.

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Production rates of the nine horizontal wells in the Sabriyah field. Wells 1 through 8 were stimulated with a CT acid wash and chemical diverter fluid system.