Case study: South America

AquaCUT relative permeability modifier doubled oil production, reduced water by more than 700 BWPD in mature well

An operator in South America was experiencing high water cut from a high permeability zone (1+ darcy) in a mature sandstone reservoir. The operator's sellable production had become constricted by high disposable production, leading to high treatment and disposal costs. While the customer had pumped successful relative permeability treatments the same area, it had difficulty qualifying a product that would tackle the watercut in its high permeability zones.

Baker Hughes suggested the **AquaCUT™ relative permeability modifier (RPM)**. AquaCUT RPM is a subsurface water conformance product that decreases the water cut in mature sandstone wells, reducing associated processing and disposal costs while also extending the productive life of the well. By selectively targeting only the water phase of produced fluids, AquaCUT RPM products reduce the amount of produced water with minimal impact on hydrocarbon production. In the presence of oil, the AquaCUT RPM components deform and minimize the restriction of the formation pore throat, allowing oil or gas to flow unimpeded. Alternatively, in the presence of water, the water-wetting polymer expands, filling the pore throats which increases the resistivity of water flow.

For the qualification process AquaCUT RPM would need to show desirable results in the lab before it could be pumped in the field. A thorough testing matrix along with robust testing procedures was developed with inputs from the Baker Hughes R&D, region engineering, and customer representatives.

Flawless Execution

AquaCUT RPM was pumped in a rigless operation with zero NPT or HSE incidents. After a successful job performed with flawless execution, the well was put back into production. The water production was reduced by more than 700 barrels of water per day (BWPD) and oil production doubled.

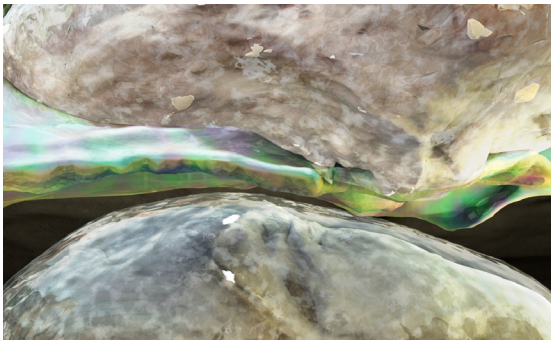
This successful application of AquaCUT RPM lowered intervention costs, doubled sellable production, lowered disposable production by more than 700 BWPD, and reduced overall carbon emissions. Pleased with the results, the customer plans to use AquaCut for upcoming jobs.

Challenges

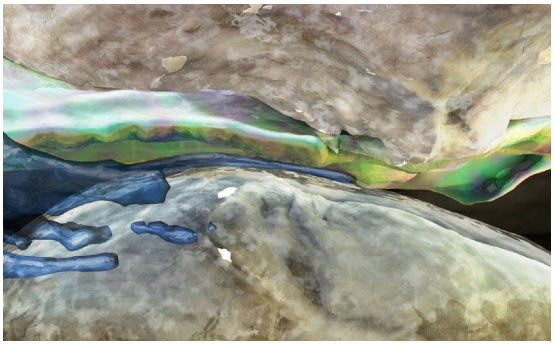
- Mature sandstone field
- High water cut restricting oil production
- High cost for rig intervention

Results

- Doubled sellable production
- Lowered disposable production by more than 700 BWPD
- Reduced overall carbon emissions by reducing water cut, requiring less treatment and disposal
- Lowered intervention costs by eliminating the need for a rig

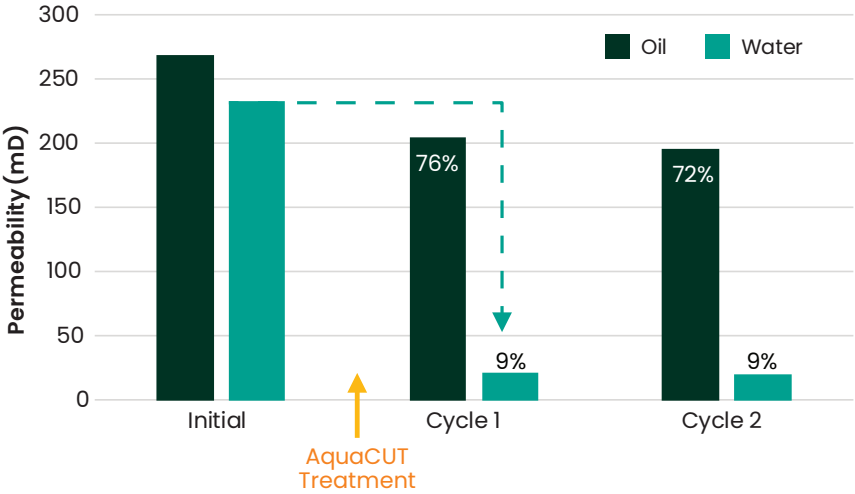


Polymer attaches to the sandstone formation through a covalent bond – preferentially in tight spots (pore throats). The highly water-wetting polymer "lays down" in the presence of hydrocarbons (repelled).



In the presence of water, the highly water-wetting polymer expands, filling pore throats, thereby increasing resistance to water flow (Rw).

AquaCUT Treatment Core Flow Test Results – Permeability Regain



After treatment, permeability to water was reduced by over 90% and remained constant after a second and third cycle, showing longevity of the treatment.

Baker Hughes

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