**AllSeal Service with Particulate Gel Simplifies Water Shutoff for Kuwait Oil Company**

Single-additive water-based fluid shuts off high-permeability water zone without detrimental effects on oil production in the Ahmadi field, South Kuwait

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**CHALLENGE**

Restore oil production and decrease water cut without mechanical intervention or complicated fluid mixing in a challenging high-permeability sandstone formation.

**SOLUTION**

Engineer an AllSeal* water conformance service to suit the specific well conditions, selecting a new single-additive particulate gel treatment pumped through coiled tubing to efficiently shut off the water zone without damaging the lower producing zone.

**RESULTS**

- Shut off the water zone after injecting only a few barrels of particulate gel.
- Achieved 100% oil and 0% water production posttreatment.

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Kuwait Oil Company experiences high water cut from dual-zone oil well

In Kuwait, an oil-producing well in the Ahmadi field became overloaded with water production, eventually reaching a 90% water cut. Wellbore restrictions prevented mechanical isolation with a bridge plug. Although a cement plug or squeeze was possible, these options would have required the use and expense of a rig to clean up the lower interval, which was still producing oil.

These factors made chemical treatment the only option to isolate the water zone, but the operator wanted to avoid using complicated chemical formulations such as resins and crosslinked polymers because they require several additives and precise mixing, increasing the risk of failure. The high permeability (greater than 2 D) of the water-producing formation precluded conventional water shutoff systems that met the operational simplicity criteria. A new, simpler treatment option was required.

AllSeal service is engineered to isolate water zone

To resolve the issue, Schlumberger proposed an AllSeal service to engineer the optimal treatment for the well conditions and pump it through coiled tubing to ensure accurate spotting. The engineered fluid solution was a new particulate gel system comprising just one additive dispersed in water. This option was determined to be the most effective for the well—and it simplified operations and logistics.

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**Engineered Water Shutoff Treatment**

After pumping only a few barrels of the new particulate gel treatment, engineers determined the water zone was effectively plugged, as demonstrated in multiple hesitation squeezes.
**Particulate gel treatment cuts water but enables oil production**

For the shutoff operation, the lower producing zone was first isolated with degradable material to prevent any potential damage from the water control treatment. Preinjectivity tests in brine were performed at flow rates between 0.3 and 1 bbl/min [0.05 and 0.16 m³/min] followed by squeezing the particulate gel starting at 0.6 bbl/min [0.09 m³/min]. After only 7 bbl [1.11 m³] of injection, the wellhead pressure reached the maximum allowable limit. Hesitation squeezes were performed and confirmed plugging of the zone. Further squeezing attempts were done after 1 h and 9 h of soaking time, all showing the pressure increases characteristic of permanent isolation.

After the treatment, the lower interval was reperforated and the well activated with nitrogen. After the well returned to production, three samples were collected and tested in the laboratory to check the water-cut reduction. Results showed that the well produced at 100% from the lower producing zone with zero water cut.

The AllSeal service was successfully engineered and delivered using the particulate gel through coiled tubing in the Ahmadi field. Further water shutoff operations are planned to resolve water production issues, which are extremely troublesome in southern Kuwait.