

KelaStimSM Service

KelaStimSM Service Brings USD 2.6 Million in Value in Angola

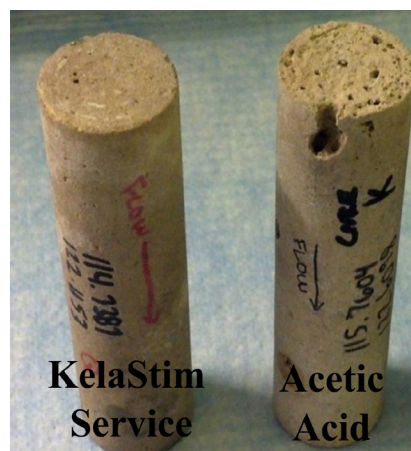
Location: Offshore Angola

Overview

In the offshore waters of Angola, a principal customer was losing production from one of its best wells. Well history showed various degrees of scale and halite buildup, causing a significant decrease in production. Five previous hydrochloric-acetic acid blend treatments had brought only short-term increases, failing to sustain higher levels of production.

The customer engaged Halliburton to provide a stimulation design that would sustain a production increase. The treatment for the tubular and near-wellbore area had to be tailored for the removal of halite, iron carbonate, and calcium carbonate scale over a 2,400-ft (731-m) perforated interval, with bottomhole temperatures exceeding 300°F (149°C) and a low bottomhole pressure of 2,470 psi (170 bar).

Testing on formation cores revealed hydrochloric-acetic acid blends to be highly reactive, and in many cases, causing a considerable level of



Core samples showing treatments using KelaStimSM service (left) and acetic acid (right) at 350°F (177°C). The KelaStim service can have considerably lesser risk of formation damage than regular organic acid.

CHALLENGES	SOLUTIONS	RESULTS
Acid stimulation of the Pinda formation in offshore Angola included high bottomhole temperatures (305°F (152°C)); low reservoir pressure (0.22 psi/ft); highly heterogeneous, multi-layered formation with large perforated intervals (greater than 1,300 ft net and 2,400 ft gross); and scale in wellbore, perforations, and possibly near-wellbore area.	The chelant-based stimulation fluid KelaStim service provides deeper stimulation treatments because of lower reaction rates and a more effective wormhole type of reaction. BioVert , degradable particulate diverting agent enhances full coverage of the entire targeted interval.	Average daily production increased 35% during the first 90 days, adding over 31,000 barrels of oil to production and USD 2.6 million in revenue to the customer's bottom line.
Minimizing formation damage experienced in the past when pumping 7.5% hydrochloric acid and 10% acetic acid.	KelaStim treatment increased depth of stimulation and reduced rock deconsolidation due to its slower reaction rate and decreased near wellbore spending.	Longer sustained production rates when compared to conventional organic acid treatments.
Decreasing necessary fluid volumes with lower loadings of corrosion inhibitors, demulsifiers, and anti-sludging agents.	KelaStim treatment provides low corrosivity compared to hydrochloric-acetic acid blends and can sustain dissolved minerals in solution with no sludge-forming tendencies.	Improved iron stabilization from the dissolved scale at a greater temperature with less corrosion potential.

rock dissolution and non-uniform core treatment. A different approach was necessary to optimize treatment for enhanced production.

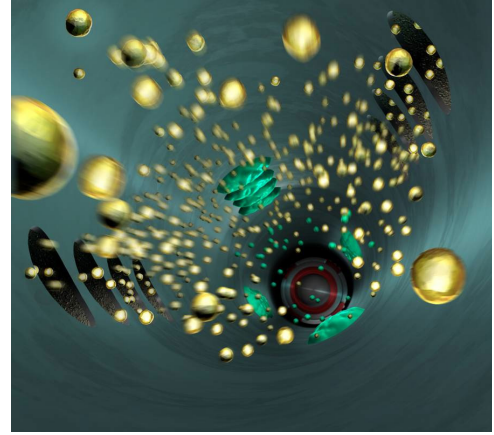
Following rigorous qualification testing of formation cores, Halliburton proposed using the new KelaStim treatment, a chelant-based acid system. Compared to other treatments, the KelaStim service delivers improved versatility for heterogeneous reservoirs with varying mineral composition. The KelaStim service was combined with the BioVert® biodegradable diverting agent to provide stimulation across the entire perforated interval.

Accurate formation data and core analysis coupled with the technical knowledge and synergy of all participants proved successful. The treatment was executed safely and according to design. After stimulating the well with three stages of the KelaStim system (separated by two stages of the BioVert diverting agent), production was monitored for 90 days to evaluate the long-term response.

The enhanced production achieved with the KelaStim service proved to be significantly better than previous treatments. Average daily production increased 35% during the 90 days, adding over 31,000 barrels of oil to production and USD 2.6 million in revenue to the customer's bottom line.

Compared with previous acid stimulations, KelaStim service delivered technical benefits including: (1) improved iron stabilization from the dissolved scale and tubing pickle to minimize damage; (2) increased depth of stimulation and reduced risk of rock deconsolidation, for sustained stimulation effect; (3) uniform rock matrix stimulation; and (4) greater stability and lower corrosion potential at this elevated temperature.

To date, the well continues to produce at a high rate, and the customer is eager to see the results of using KelaStim service in its other wells in the area.



BioVert® degradable diverting agent

HALLIBURTON