

## DEEPA: increases oil production rates above operator expectations in San Andres dolomite formation well



"DEEPA is delivering excellent increases in production rates in a very mature field. It has exceeded our expectations, and we are using DEEPA extensively now."

**Operator, North America.**

DEEPA is known to achieve well production rates significantly greater than expected. When used in a mature oil producing well in the San Andres field in West Texas, DEEPA delivered an 80% rise in production rates, compared with a 20% improvement predicted by modelling. The improved rates strongly suggested that DEEPA had remediated some near wellbore damage. Before the DEEPA treatment was applied, the operator had believed that the wells were undamaged.

### The challenge

The operator wanted to increase oil production from producer wells without fracturing, which could have had a highly adverse effect on sweep efficiency. It was considered that production rates could be increased by improving the formation matrix permeability. Modelling indicated that a threefold increase in matrix permeability across a zone of 10-foot radius would produce an injectivity rise of 20%.

### The solution

Until DEEPA was developed, uniform acidizing to improve rock permeability was almost impossible to achieve with conventional acids. They tend to react on contact with the carbonate formation, forming wormholes rather than uniformly acidizing the whole rock matrix. Research has shown that the ideal matrix acidizing system causes no reaction while the acid is pumped into the reservoir. With DEEPA treatments, more than 95% of the total acid produced is generated in-situ, downhole, after the treatment fluid is pumped to fill the rock matrix. This provides excellent uniform acidizing throughout the zone, and ensures highly effective matrix stimulation.

### DEEPA in action

Laboratory evaluation confirmed that rock permeability could be increased by applying DEEPA. Core plugs were cleaned with chloroform and methanol, and measured to determine helium porosity and air permeability. The cores were then flooded with DEEPA, and the permeability to 3% KCl was measured again. The DEEPA treatment resulted in a threefold increase in permeability as the acid produced by DEEPA dissolved carbonate material (dolomite) within the core.

The components were mixed on site and pumped about 3 metres (10 feet) into the rock matrix. After leaving the treatment fluid shut in for the required period of time for in-situ acid generation to take place, the spent treatment fluid was back produced.

### The result

Following DEEPA treatment, the oil production rate rose from about 15 bopd to a sustained 27 bopd – an 80% increase. This was significantly more than the 20% increase predicted in the modelling.

Analysis showed elevated levels of calcium ions in the back produced water, compared to the make-up and formation waters. This indicated that dissolution of carbonate had occurred.

The operator had believed the well to be undamaged before the DEEPA treatment. However, the scale of increase in production suggested that DEEPA had removed some near wellbore damage, as well as increasing the matrix permeability of the formation around the wellbore.

The San Andres results were so impressive that DEEPA treatments were conducted at many more of the operator's wells.



### 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](mailto:contact@cleansorb.com) for more information.