

LOCATION: GULF OF MEXICO

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SandStoneDivert System More Than Doubled Production Gains



In 2015, an operator working in deepwater Gulf of Mexico performed a sandstone acid treatment on a well with bottomhole static temperature of 200°F. The approximate total depth of the well was 27,000 ft, and the perforated interval was approximately 100 ft. The operator performed the acidizing treatments using organic mud acid but without using any diverter.

In late 2016, the production of this well dropped off and the operator decided to re-stimulate it using the same organic mud acid system. Concerned about uneven treatment, the operator asked Baker Hughes, a GE company (BHGE) for a chemical diverter to be incorporated into the job design to ensure that the large volume of acidizing fluids were distributed evenly across the perforated intervals.

The Solution

BHGE recommended the SandStoneDivert™ system, a temporary viscoelastic surfactant (VES) diverter system that works at elevated temperatures up to 300°F. The SandStoneDivert system is pumped as a viscous gel and is designed to maintain sufficient viscosity while it travels bottom hole to divert at the formation face.

Stimulation treatments were blended onboard a BHGE stimulation vessel and pumped via a low pressure transfer hose to a multi-purpose support vessel (MSV). BHGE's high-pressure skid pumps were rigged up on the MSV along with the coiled tubing that was utilized to pump treatments to the subsea well.

Results

- Increased production gains compared to prior re-stimulation by 121%
- Stimulated without the need for a platform or jackup rig

Challenges

- Increase production in deepwater well
- Minimize equipment needed for treatment

BHGE solution

- SandStoneDivert viscoelastic surfactant diverter system

Two stages of the SandStoneDivert system were mixed and pumped on the fly at 4 bpm, with each diverter stage totaling approximately 20 bbls.

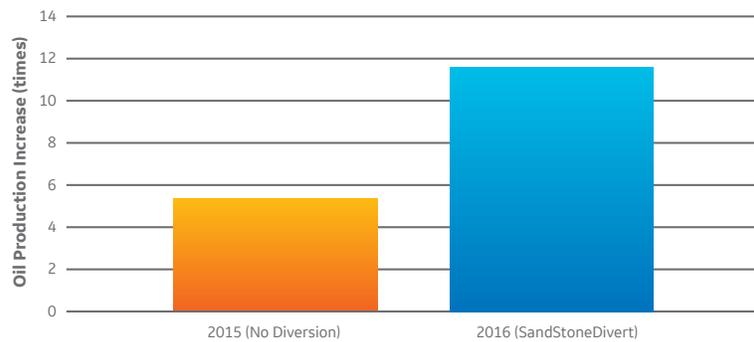
Results

When the diverter pills hit the formation, bottomhole pressure significantly increased, indicating the SandStoneDivert system was effectively diverting to the target zones. After the job was complete, initial production results showed increased production over 120% higher than the percentage increase from the previous acid treatment where no diverter was used.

In addition to increasing production, the SandStoneDivert system has proven to be a more economical solution than other common chemical diverters in the GOM, such as foam. In one instance, the operator saved approximately 25% by using the SandStoneDivert system rather than a foamed brine diverter. The operator was very pleased with the results and plans to use it on future projects in the Gulf of Mexico.

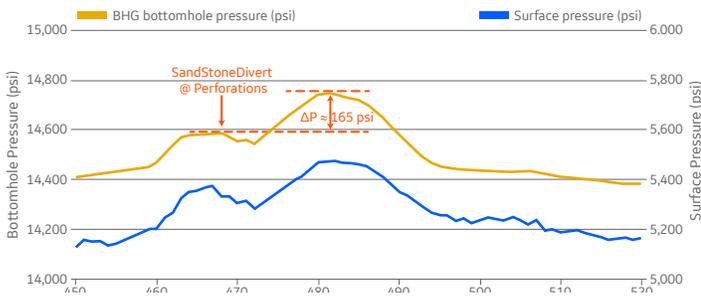
| Properties and Specifications | |
|---------------------------------------|------------------|
| Main fluid type | Organic mud acid |
| Number of SandStoneDivert stages | 2 |
| Total volume of SandStoneDivert agent | 44 bbls |
| Total volume of fluid | 1,945 bbls |
| Average rate | 4 bpm |
| Average surface pressure | 5,003 psi |
| Total pump time | 15 hours |

Production Gains from Stimulations



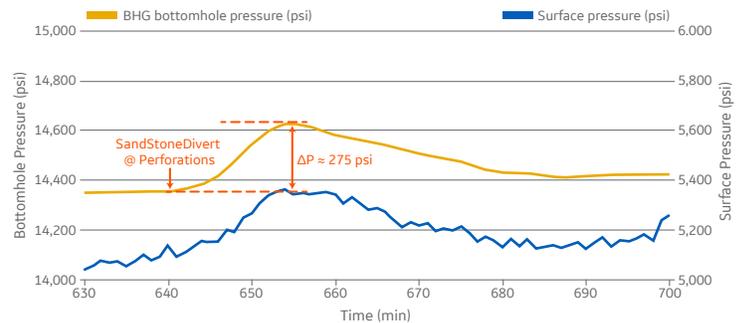
After re-stimulation with the SandStoneDivert system, production increased by over 11 times compared to before the stimulation. In contrast the stimulation with no diverter only increased production by 5.4 times.

SandStoneDivert Pressure Response - Stage 1



When the diverter pill hit the formation, bottomhole pressure increased 165 psi, indicating that the diverter was packing off in the near wellbore.

SandStoneDivert Pressure Response - Stage 2



When the diverter pill hit the formation, bottomhole pressure increased 275 psi, indicating that the diverter was packing off in the near wellbore.

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