Guidon AGSTM Acid Diversion System

REVOLUTIONARY DIVERTER TECHNOLOGY HELPS ACHIEVE OPTIMUM RESULTS FROM ACIDIZING TREATMENTS

OVERVIEW

The Guidon AGSTM acid diversion system is the basis of a new service that complements virtually any acid treatment to help assure that all targeted zones are acidized. This diverter service uses exclusive chemical technology developed by Halliburton. The Guidon AGS system is placed in alternating stages with the acid throughout the entire treatment. Because the system reduces the permeability to aqueous fluids, the subsequent acid stage is diverted to other zones. GuidonSTM AGS stimulation service helps improve acid coverage in sandstone and carbonate reservoirs, beyond the capabilities of conventional diversion systems during acid stimulation treatments. Once the acid stimulation treatment is completed, Guidon AGS can help provide potential reduction to formation water production.

Figure 1 shows the results of laboratory tests that demonstrate the effectiveness of the Guidon AGS acid diversion system. The tests involved parallel flow studies (water core at $S_{ow}$ and oil core at $S_{or}$) and used a “bullhead placement” technique. The graph on the left shows the results of acidizing without proper diversion, that is, the acid treatment went preferentially to the higher-perm, water-saturated core. The graph on the right shows the results using Guidon AGS as a diverter ahead of the acid, diverting the acid away from the higher-perm, water-saturated core. After Guidon AGS and acid stages, the permeability of the water core was reduced by 96 percent, while the permeability of the oil core was increased by 120 percent.

Figure 1 > Laboratory tests with sandstone cores with high permeability contrast in parallel. Left graph shows the results of acidizing without proper diversion (control test), while the right graph shows the results using Guidon AGS as a diverter ahead of the acid, diverting the acid away from the higher-perm, water-saturated core.

BENEFITS

» Effectively diverts acid stimulation treatments from high permeability to low-permeability zones.

» Provides diversion fluid properties for optimum coverage when targeting long intervals, independently of the pumping rate.

» Provides highly effective acid diversion without viscosity or gelation.

» Guidon AGS service immediately adsorbs to the rock surface to provide leak-off control at the matrix level.

» No mechanical isolation required. It can be bullheaded or pumped through a coiled tubing (CT) unit.

» Easily mixed (batch-mixed or pumped on the fly).

» No need for breaker or cleanup stage. Excellent regained permeability to hydrocarbons.

» Guidon AGS can help provide potential reduction to formation water production.

FEATURES

» Wide temperature range of application, up to 350°F (177°C).

» Applicable to sandstone, carbonate, and shale reservoirs. Compatible with most common acid stimulation treatments, including Halliburton's Carbonate 20/20™ and Sandstone 2000™ acidizing services.

» Service can be combined with SPECTRUMSTM Diagnostic service to optimize fluid distribution in real time.
THE GUIDON AGS CONCEPT

Guidon AGS reduces aqueous fluid permeability by adsorption of hydrophilic, water soluble polymer molecules onto the surface of the pores in the rock matrix, see Figure 2. This differs from most other diversion systems in that it does not rely on viscous fluids or a porosity fill gel that requires some type of breaker mechanism. The adsorption is essentially instantaneous, with the reduction in permeability of the treated zone resulting in diversion of subsequent fluids to other zones (basically, diversion of the acid to lower permeability zones). In scenarios with a water-producing zone, the treatment has the potential to actually reduce the water cut following the acid treatment.

FIELD PROVEN

More than 3000 treatments have been done up to date in new completions and re-stimulation treatments in mature, deepwater, and unconventional assets. Applicable to matrix acidizing and/or acid fracturing treatments.

Case History – An offshore, oil-producing, naturally fractured carbonate reservoir had an upcoming acid campaign of approximately 38 high-permeability wells, ranging from 1,000 to 6,000 mD. It was decided to use three different types of diverters for comparison purposes: (1) Guidon AGS™ service, (2) an in-situ crosslinked gel, and (3) foam. Production logging tool (PLT) data from these field cases exhibited a better response from those wells stimulated using the Guidon AGS™ service as the diverter compared to those using foam or in-situ crosslinked acid. Surface pressure response during acid treatments using Guidon AGS™ service exhibited more consistent indication of diversion compared to the other two diverter methods. Most importantly, the average productivity index exhibited superior results for wells stimulated using the Guidon AGS™ service as the diverter. Results from this field study show that diversion with Guidon AGS™ service is not limited to wells with high-water-saturation zones, but, rather, any well where high-permeability contrast exists independently of fluid saturation.

DIVERTERS’ PRODUCTIVITY INDEX COMPARISON

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