Advanced Fluid Loss Control Technology Helps Achieve Successful Gravel Pack

Location: Campos Basin, Brazil

CHALLENGE – During the completion of an openhole horizontal well located in the Campos Basin, the operator experienced problems with severe fluid loss through the filter cake that affected gravel pack placement downhole. The operator decided that the rate of fluid loss could compromise gravel placement, possibly leading to gravel pack failure and production loss.

SOLUTION – Halliburton proposed its advanced technology, LO-Gard® agent, a solids-free, low viscosity system. LO-Gard service helps control fluid loss in both casedhole and openhole gravel pack completions and has been used in vertical, deviated or horizontal gravel pack applications where fluid loss through the filter cake could lead to gravel placement failure. LO-Gard agent has several important benefits ideally suited to help the operator reduce fluid loss and place the gravel pack. Some of these benefits are:

- Applicable over a broad range of temperatures and permeabilities
- Easy to use, requires no breaker or shut-in time
- Does not require special equipment, uses standard mixing equipment
- Results in no significant permeability loss to oil or gas, > 95% retention is typical with 100 md core material
- Decreases formation permeability to aqueous fluids thus limiting leakoff into the following:
  - High permeability streaks
  - Leaky, thinned or eroded drill-in fluid wall cake
  - Breeched or fractured wall cake
  - Natural or hydraulic fracture networks
- Effective in both sandstone and carbonate lithology
- Can be formulated for a wide range of pill densities in specific brines

RESULT – During the gravel packing operation and prior to introducing LO-Gard service, the pumping rate was 6.5 bpm with a return rate of 5.7 bpm (14% loss rate). As soon as the LO-Gard agent pills reached the openhole section, the rate was completely restored and no measurable losses were observed during the gravel pack operation. The operator was very pleased with the results and looks forward to using this pill in subsequent jobs. This job is the first LO-Gard service application in Brazil during a horizontal gravel pack completion.

LO-Gard agent is a hydrophobically modified, water soluble polymer that has adsorptive properties on rock. It inhibits the flow of water with very little to no effect on hydrocarbon flow.

- Reduces water inflow during production
- Polymer can be removed if required
- Environmental performance: passes Gulf of Mexico oil and grease test for overboard discharge

The highest level of fluid loss that can be controlled with the LO-Gard system is unknown; however, in one example a well in Colombia showed equivalent to 50% losses after running the gravel pack assembly in a 750 ft openhole lateral. After treatment with LO-Gard agent, circulation losses were reduced to 25% enabling the gravel-pack job to be performed successfully.
Laboratory testing demonstrated the effectiveness of LO-Gard service for fluid loss control. The test shown exemplifies several tests performed in hollow rock cores in which a filter cake was first built on the inside (wellbore) of the core. The tests used Berea sandstone cores and were run at 120°F. With oil-based mud cakes, brine eventually broke through with a rapid filtrate loss rate. Incorporating LO-Gard agent into the brine dramatically slowed the leak off rate. In all tests, regained permeability to kerosene was virtually 100% following use of the LO-Gard agent.

For more information about how LO-Gard® service can help make your gravel pack operations more efficient, contact your local Halliburton representative or email sandcontrol@halliburton.com.