Insulating Packer Fluid Offers Cost-Effective Alternative in Deepwater Operations

Customer: Murphy Exploration  
Location: Mississippi Canyon, Offshore Louisiana

OPERATOR’S CHALLENGE – Murphy Exploration was seeking a solution that would prevent well failure caused by annular pressure buildup in three Gulf of Mexico, Deepwater wells. The operator considered using a vacuum insulated tubing (VIT) system to mitigate the risks associated with this pressure buildup; however, they knew that, by not having control over heat transfer to the outer annuli, higher production rates would have been restricted.

Furthermore, vacuum insulated tubing is complicated by the need for larger production casing, increased volumes of drilling fluid, larger-diameter bit sizes and extended drilling times — all equating to high indirect well costs for the operator.

Murphy Exploration challenged Halliburton to find a less-expensive and efficient insulation system that would prevent heat transfer and allow for increased flow rates.

HALLIBURTON’S SOLUTION – Halliburton approached this deepwater challenge with their high-performance, aqueous-based insulating packer fluid. N-SOLATE™ packer fluid is designed to keep heat away from the outer casing strings, dramatically reducing annular pressure buildup to extend the life of the well under high production rates.

Batch mixing of N-SOLATE™ high-performance, insulating packer fluid

Halliburton Baroid fluid experts custom-engineered the insulating packer fluid specific to Murphy Exploration’s Gulf of Mexico deepwater well conditions. The fluid was formulated for a delayed cross-linking until placed in the wellbore; at which point, full gelation of the system occurred.

For Murphy Exploration’s wells, N-SOLATE™ high-performance, insulating packer fluids offered:

- Low intrinsic conductivity
- Thick enough to prevent heat loss by convection
- Uncomplicated well placement
- Activation at required temperature
- Easy removal for well interventions
- Densities up to 13.6 lb/gal
- Environmental compliance

Saved nearly $2 million over vacuum insulated tubing.
Prior to pumping, the insulating packer fluid was quality screened and verified to comply with required well parameters; and, rheology, thermal conductivity measurements, cross-linking parameters and density measurements were confirmed.

In each well, 10 lb/gal packer fluid was blended on the rig site and pumped into the production annuli. Maximum flow-production temperatures for the wells were 210º F (99º C). The cross-linking occurred before reaching this temperature, activating the insulating gel structure.

**ECONOMIC VALUE CREATED** – By using Halliburton’s N-SOLATE™ high-performance insulating packer over the traditional vacuum insulated tubing system, nearly $2 million in cost-savings were realized after comparing all operational costs associated with both insulation systems.

Even after placing the high-performance insulating packer at a depth of nearly 22 thousand feet, it still took nearly 12 hours less rig time than the vacuum insulated tubing system would have to achieve a lesser depth of 10 thousand feet.

*Mixing of the formulation taking place at the Murphy rig site.*