

## Case History

## Completion Solutions

## First Delta Stim® Completion System Deployed in the Eagle Ford Shale; Saves Customer \$1 Million

Location: South Texas

**OPERATOR'S CHALLENGE** – A major operator in South Texas was looking for the most cost-effective way to achieve multi-zone interventionless stimulation in an Eagle Ford shale reservoir while effectively compartmentalizing the intervals.

Running completion equipment into the well was also a concern due to past performance issues the operator had experienced, including trouble getting to depth due to hole geometry and to inadequate hole reaming procedures. The customer was concerned with high temperature conditions as well as possible hydrogen sulfide (H<sub>2</sub>S) influx and was looking for equipment that could withstand these conditions. Completion design and well performance were critical points in making this shale play economical for the customer.

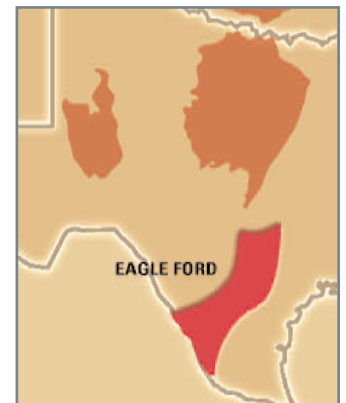
**HALLIBURTON'S SOLUTION** – Due to the challenging well conditions, Halliburton's South Texas team performed an extensive well analysis and evaluation in order to design the most optimal simulation and completion design. Torque and drag analysis was conducted to ensure that the entire assembly could run to bottom efficiently. To help ensure the design met the customer's expectations and requirements, including that the completion system could handle all wellbore fluids, extensive simulations to model different Swellpacker® isolation system solutions for the customer were conducted.

Based on the torque and drag analysis, a stiffer, more robust reaming assembly was proposed that would help better replicate the completion assembly. Although the Halliburton team followed best practices for well reaming, they also created unique solutions for the assembly to help make the process more successful. The Halliburton Reaming/Drift assembly was enlarged to be the same length of the Swellpacker isolation system.

Three multi-zonal completion/stimulation methods were tested in the field to determine which completion system was the most cost effective without compromising value and results—leading to the recommendation of the Delta Stim® completion service which included the following components: VersaFlex® liner hanger, Delta Stim® Lite sleeves and Swellpacker OBM HT Xtreme packers.

### VALUE CREATED –

After successfully reaming the wellbore, the completion assembly was run to TD in less than 18 hours without incident. In addition to running the assembly so quickly, being able to run 24-hour pumping operations and interventionlessly stimulate multiple zones in less than two days saved the customer time and money.



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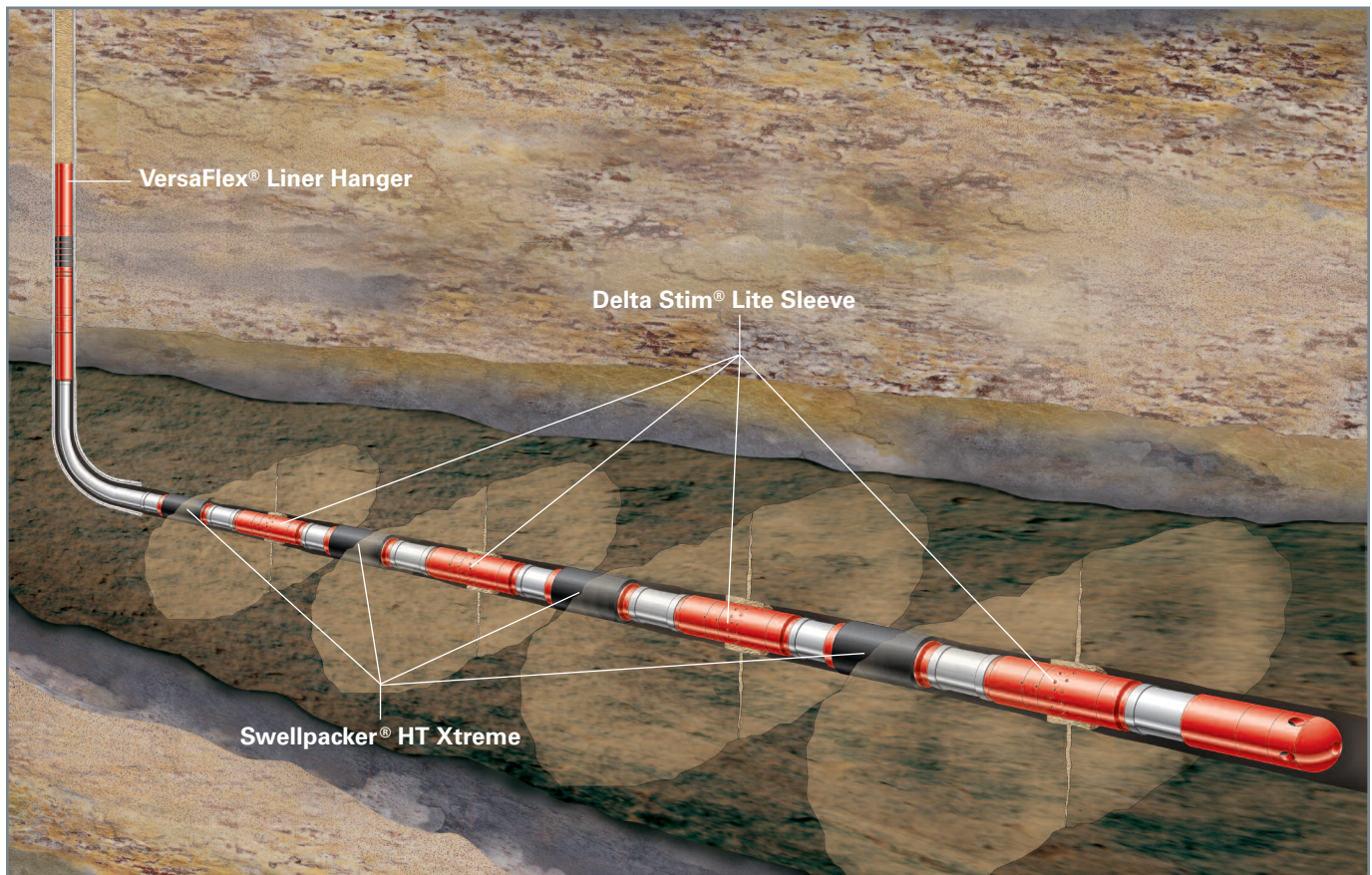
Using the pneumatic ball dropping head, all Delta Stim Lite sleeves were opened while continuously pumping, allowing each stimulation treatment to be accurately placed. The use of Swellpacker isolation systems as the primary isolation method reduced treating pressure versus previous exploratory wells drilled. When comparing the Delta Stim completion service to previous wells in the field, Halliburton delivered a cost savings of \$1 million to the customer.

**TECHNOLOGIES USED** – Halliburton's Delta Stim completion service provides operators new options for completing horizontal multizonal wellbores to enable highly accurate placement of fractures, with minimal or no intervention.

The VersaFlex liner hanger system offers a simple, yet rugged design with no moving parts, slips or cages compared to conventional liner hangers. The system helps eliminate the risk of presetting, while also allowing the customer to rotate and reciprocate. Multiple elastomeric elements maintain pressure integrity and the absence of slips provides even stress distribution into the support casing, while eliminating potential sites for corrosion.

**TECHNOLOGIES USED CONTINUED** – The Swellpacker isolation system is a self-healing packer based on the swelling properties of rubber in a liquid hydrocarbon. The Swellpacker HT Xtreme system has been designed to operate in higher temperature and oil-based mud environments—from temperatures of 230-400 degrees F with differential pressure capability of up to 10,000 psi.

When incorporated with the Delta Stim Lite sleeve, it allows selective multi-zone operations through the production string. Opening a sleeve that is isolated between two Swellpacker HT Xtreme packers, permits selective stimulation by diverting the flow through the Delta Stim Lite sleeve ports. After stimulation, clean up is assisted by flowing all lower zones simultaneously.



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