Casing integrity issues overcome for a successful stimulation
Location: Texas - Barnett Shale

OPERATOR’S CHALLENGE – This horizontal well was drilled to facilitate maximize exposure to the Barnett Shale. During the original completion, the casing in the vertical section of the well parted with only 50% of the stimulation program completed. Once the casing was patched, it presented the dilemma of a restriction above the horizontal lateral and subsequently lowered the pressure rating for the entire casing string. A re-design of the completion program was required since the traditional pump down plugs and perforation guns could not pass through the casing patch. If a simple, safe and reliable stimulation method could not be designed and implemented, then 50% of the lateral was at risk of being non-productive.

HALLIBURTON’S SOLUTION – The key to a successful completion was to ensure the new perforations could be isolated below the restriction of the casing patch. Additionally, any technique used must function at the reduced pressure rating of the casing patch. Halliburton recommended its Biovert NWB near field biodegradable diverting system to separate stages of a high rate water frac treatment. The diverting material is pumped in a low concentration (0.25 ppg – 1.00 ppg) as it own unique stage within the fracturing treatment. The material readily passes through the restricted ID but yet builds up on the perforation(s) and fracture.

The material has two distinct particle sizes where the larger particle blocks the majority of a perforation (or opening) and the second smaller size bridges on the larger particles dramatically reducing the permeability by 95% or more. The system is capable of building up pressure resistance sufficient enough to redirect subsequent frac stages.

Biovert NWB will auto-degrade based on time, the static temperature, and the in-situ water provided by the carrier fluid. Therefore no special clean out operation would be required to remove the diverting agent.
**ECONOMIC VALUE CREATED** – Prior to demobilizing the drilling rig, the casing patch and additional perforation clusters were installed. Halliburton designed a treatment schedule where sand laden fluid stages were separated by Biovert NWB diversion stages. 15% Hydrochloric acid stage was also incorporated to help reduce the breakdown pressures of the next zone to be treated.

During the treatment the casing pressure was the key limiting factor which dictated pumping rates, sand volumes and diverting stages. On-site real time evaluation of the treatment's effectiveness further optimized the sand volumes, diverting stages and subsequent acid stages. The pressure response from one diverting stage was over 1200 psi, which was more than adequate to redirect subsequent stages.

Once the well was cleaned out of bridge plugs, it was brought on line. Its production rate places it in the upper 10% of the wells that make up the production unit.