

**Case History**

Stimulation

**Re-stimulation of well with collapsed casing**

Location: Texas – Barnett Shale

**OPERATOR’S CHALLENGE** – The original completion of this 1500 ft lateral included five fracturing stages. Upon reentry to drill out bridge plugs, collapsed casing prevented access to the bottom 70% of the completion interval. Attempts to produce the remaining 30% were not successful. Even though 30% of the perforations were above the highest remaining bridge plug, the well would not flow. To salvage the investment made in the well, the reservoir needed to be re-stimulated through the remaining perforations.

**HALLIBURTON’S SOLUTION** – Halliburton recommended and designed a “re-frac” consisting of two treatment stages separated by a diverting stage. Halliburton recommended its Biovert NWB near-field, biodegradable diverting system to separate the stages of a high rate water frac treatment. The particle sizes contained within the Biovert NWB are ideal for bridging off in perforations, fractures and open hole sections. The diverter materials are carried by the fluid flow to the portions of the reservoir that is accepting fluid. The diverter material will build up thus restricting further fluid flow and redirecting the fluids to a different portion of the reservoir.

Some of the characteristics that make Biovert NWB an appropriate selection include:

- Greater erosion resistance than rock salt or perforation balls
- Compatible with most Fracturing Chemistry
- Compatible with most Production Chemicals
- No specific actions required to remove diverting agent
- Self removing as it degrades with time and temperature
- Benign degradation byproduct which permits flowback water to be reused or recycled

A small acid stage was recommended to follow the diverting agent to ensure the next set of perforations would more readily accept the stimulation fluids.



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**ECONOMIC VALUE CREATED** – The treatment was performed through the wellhead and no rig was required to insert or remove mechanical isolation hardware. The utilization of degradable technology (See Fig 1) that is placed as an integral part of the pumping program eliminated the cost of the rig.

As the Biovert NWB accumulated in the perforations, a pressure build up of more than 1000 psi (See Fig 2) was noted on the pumping data acquisition. The small acid stage was utilized to facilitate opening up the remaining perforations to accept the second fracturing stage.

The treating pressure, treating rates and sand volumes were nearly identical to the original stimulation treatment.

The well was jetted in and it cleaned up in a fashion similar to offset wells.

No special clean out trip was required to remove the diverting agent as it degraded with time and static temperature.

At the time of documenting this application the well remains shut in while a field management study is ongoing.

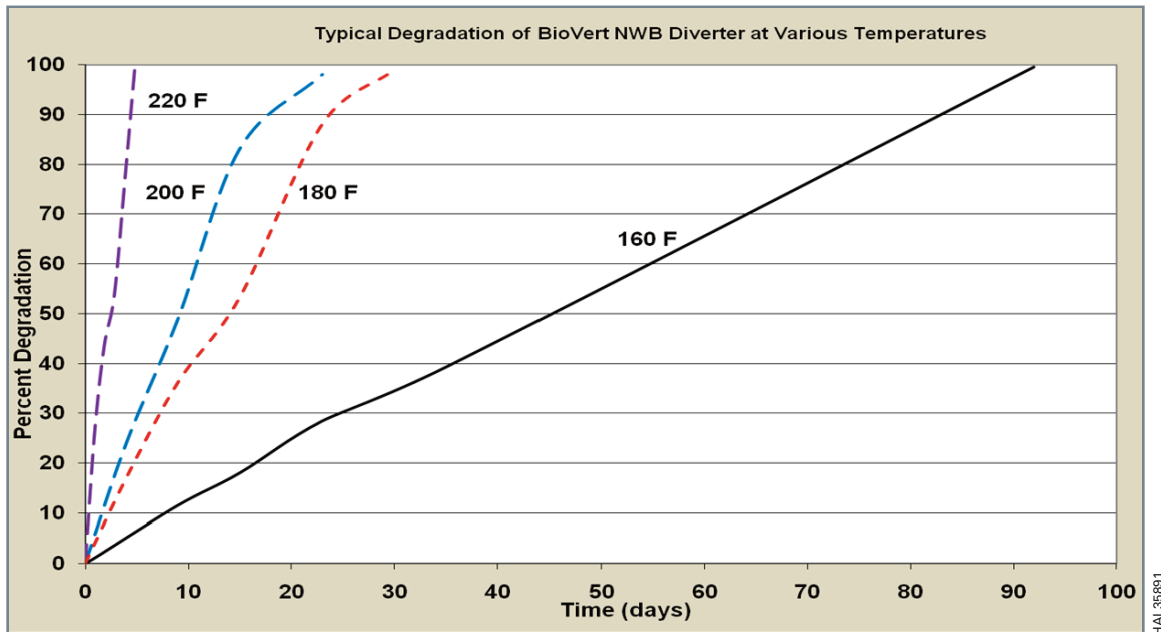


Fig 1 Degradation Rates for Biovert NWB

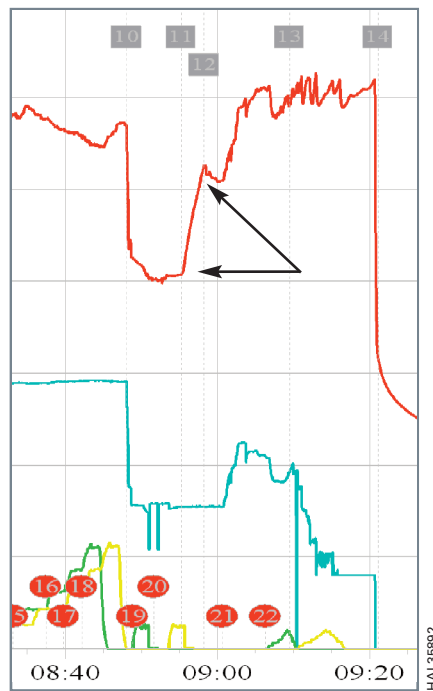


Fig 2 Excerpt from Treatment Chart. Arrows indicates 1190 psi pressure response as Biovert NWB builds up. Treatment rate is approx. 40 BPM