New CW-Frac<sup>SM</sup> service provides several important benefits that can help increase hydrocarbon production and decrease water production:

- Enables fracture stimulation treatments to be applied in intervals that were previously bypassed because of proximity to mobile water
- Helps extend the economic producing life of the well by controlling the influx of water into the producing interval
- Entails little to no risk of reducing permeability to hydrocarbons
- Does not require special placement techniques
- Provides long-term performance; does not chemically or mechanically break down within the recommended temperature range
- The treatment can be removed if desired
- Effective below a bottomhole static temperature of 325°F

- Compatible with CO<sub>2</sub>, H<sub>2</sub>S, and high-salinity brines after placement
- Applicable with virtually any of Halliburton’s fracturing systems
- Can be added to the prepad, the pad or the fracturing fluid
- No additional shut-in time is required other than normally required for frac fluid breaking
- Simple to use – batch mixed or metered in on the fly

CW-Frac service combines Halliburton’s revolutionary relative permeability modification polymer with fracture stimulation. This technology literally changes the permeability of the zones so that water is less able to enter the production zone (Figure 1). By reducing the matrix relative permeability to water, oil-saturated intervals competing for drawdown pressure with the highly mobile water can gain easier access into the created fracture.

**Figure 1** – The polymer used in CW-Frac service adsorbs to rock surfaces and inhibits water flow with virtually no risk of reducing oil or gas flow.
Applications

CW-Frac service is especially applicable to wells with evidence of water coning or wells in layered reservoirs with early water breakthrough in some but not all of the productive layers. The process works best in reservoirs that have unswept, low water-saturation intervals that can be contacted with a fracturing treatment. The most effective treatments are for wells with water-drive or low mobility ratio or layered reservoirs with distinct vertical permeability barriers.

The polymer system is designed to leak off into the near-fracture rock matrix. The polymer attaches to the walls of the pore throats in the rock and has hydrophobic polymer “branches” that can help reduce the flow area of the pore throat in a high water-saturation matrix.

The polymer has little impact on the effective permeability of the rock to oil or gas but dramatically decreases the permeability to water (see Figure 2). The polymer system does not seal the matrix pore throats and some continued water production should be expected.

Case History: CW-Frac Service Results in Twice the Hydrocarbon Production with Half the Water Compared to Offset

Argentina – An operator in the western area needed to stimulate a 75-ft zone with a significant amount of moveable water in the zone. Another service company had fractured a very similar zone in an offset well resulting in production of about 90 BOPD with 70 percent water. Halliburton implemented an 11,000-gal Delta Frac® service treatment that included running a KCl water stage containing CW-Frac polymer. Results: 220 BOPD with 40 percent water. The operator considered it a great success.

For more information about how CW-Frac<sup>SM</sup> service can help you effectively stimulate bypassed zones near water, contact your local Halliburton representative or e-mail stimulation@Halliburton.com.