

## Stimulation

# DuraKleen<sup>SM</sup> Service

## Long-term Solution for Removing Asphaltene Deposits

**D**uraKleen service uses an environmentally enhanced water/aromatic solvent emulsion system that represents an important advancement in maintaining long-term production rates.

- Cleans and dissolves asphaltene deposits.
- High solvency power is enhanced by the dispersing effects of the surfactant.
- Strips asphaltenes and waxes from tubulars as well as the formation.
- Provides a longer-lasting treatment.
- Leaves the formation in a water-wet state which delays deposition of asphaltene deposits.
- Improved environmental and safety footprint as compared to traditional asphaltene removal systems.
- Contains no BETX (benzene, ethyl benzene, toluene, or xylene).
- Flash point greater than 145°F (63°C).
- Requires less transport of chemical components due to high water content.
- All components are fully miscible.
- May be batch mixed or easily mixed on-the-fly.
- Can be applied wherever heavy oils are produced.

### The Asphaltene Challenge

"Asphaltene" is the term given the black, carbonaceous components of petroleum which occur in many crude oils in the form of colloidal, suspended, solid particles.

Under static reservoir conditions, asphaltenes are normally held in a stable suspension. Changes in fluid temperature and pressure associated with oil production may cause the asphaltenes to flocculate and precipitate out of suspension and adsorb to the rock or pipe surfaces creating production problems and increasing the possibility of expensive mechanical failure.

Historically, xylene has been used to remove these deposits; however, xylene does not change the wettability of the rock surface, resulting in treatment effectiveness that is often short-lived. Further, xylene mixtures have a low flash point (77-84° F) and contain objectionable components such as benzene, ethyl benzene and toluene (BETX).



*Figure 1 - Bottomhole assembly fouled with asphaltene (left) prior to DuraKleen service and (right) following the service.*

A wide range of hydrocarbon-based solvents has been proposed as substitutes for xylene. Some solvents with higher flash points have been tried, but traditionally they have lower solvency power and are used as dispersants, not true solvents. In addition, water-based removal systems using a surfactant in the water have been utilized. These, however, disperse the asphaltenes and are not true solvents. While these may be effective when there is sufficient mechanical action to break up and disperse the deposits, the asphaltene remains as suspended solids. If this material is injected into the formation it may cause damage as the suspended solids are filtered from the water.

DuraKleen service was developed for use in one of the most environmentally sensitive regions of Italy, DuraKleen agent has proved highly successful in cleaning/dissolving paraffin and asphaltene deposits for the long term.

## Case History

### DuraKleen Service Helps Double Production and Provides Significantly Longer Treatment Life

**Southern Italy:** Reservoir pressure decline and resulting asphaltene deposits were severely impacting an Operator's production from an otherwise prolific well. The well was producing from a 6-1/4-in. ID, 3,280 ft horizontal hole in a naturally fractured, carbonate reservoir at a vertical depth of 10,500-12,500 ft. Produced oil is 30- to 40-API gravity with an asphaltene content of 0.5-0.7%.

Asphaltene agglomerates were causing the choke to be plugged with an increasing frequency, up to several times per day. The fluctuations in pressure and rate cause further damage to the fracture network by accelerating asphaltene deposition. Also, the fluctuations promote debris movement along the horizontal section and transportation of the debris towards the surface, exacerbating the choke plugging problem.

The tubing was cleaned previously using a CT unit in an attempt to stabilize the production. This had the opposite effect and the well started to have more problems. Halliburton worked with the Operator to assess the well and recommended a treatment using DuraKleen service. The treatment included both bullheading and coiled tubing placement of 2,200 bbl of DuraKleen agent.

**Results:** Following completion of the treatment, the coiled tubing tools were inspected. The inspection found them to be completely clean with no asphaltene deposits sticking to or deposited on the tool (Figure 1). The well started to produce oil immediately and was placed on production with no blockages from debris returning to the surface. Production doubled following the treatment and treatment life was significantly longer than with previous solvent treatments (Figure 2).

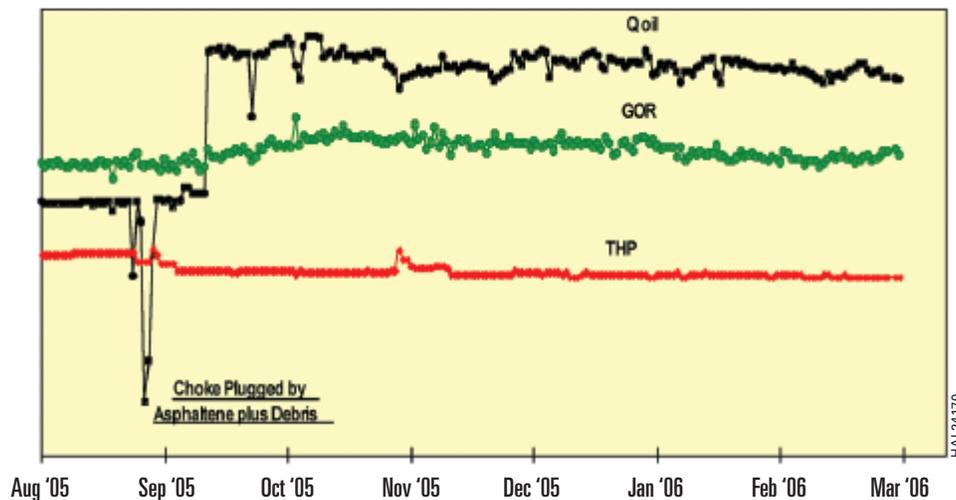


Figure 2 - Note that following the DuraKleen service, the production increased by about two-fold and showed no decline for several months. Prior to the treatment, the choke had to be cleaned sometimes several times a day.

**For more information about how DuraKleen<sup>SM</sup> service can help restore your production, contact your local Halliburton representative or email [stimulation@Halliburton.com](mailto:stimulation@Halliburton.com).**