Mesophase technology leads to new fluids for cased hole remediation, optimized displacement

FOUR OR FIVE years ago, Baker Hughes Drilling Fluids (BHDF) was asked by a major operator to develop a fluid that would destroy oil-based mud filter cake depositions for water injection applications. What resulted from their R&D effort was MICRO-WASH, which has been commercially available for about a year. It is based on mesophase technology, a chemistry developed by BHDF that can solubilize oil on contact and water-wet all damaged surfaces. Field results have indicated that MICRO-WASH can significantly improve water-injection rates or increase hydrocarbon recovery by removing emulsion blockage.

BHDF recently launched two more mesophase systems: MICRO-CURE, a cased hole remediation system to remediate damage in the perforation zone, and MICRO-PRIME, a displacement fluid system to optimize wellbore casing cleanup while displacing to a completion brine.

MICRO-CURE
BHDF began by designing MICRO-WASH for open-hole completions in wells drilled with oil-based mud. This development led to the next-obvious progression, MICRO-CURE, a remediation system for cased-hole or perforated completions. Using a similar mesophase design, MICRO-CURE remediates damage in the perforation tunnels or nearby fractures. The damage removed might include accumulations of heavy oil molecules or solids pulled along with hydrocarbon flow, water blockage, or emulsion blockage. All can restrict the flow potential of a producing well.

The mesophase chemistry of MICRO-CURE solubilizes oil and damaging emulsion on contact, without agitation or added temperature, said Robert Peresich, BHDF product line manager for reservoir services. The system also water-wets all solids and surfaces it comes into contact with, promoting their mobility and removal from the wellbore.

While MICRO-WASH is customized for each oil-based mud application to remove skin damage in open hole completions, MICRO-CURE is intended to remediate a wide range of damage mechanisms. Additionally, because MICRO-WASH targets open-hole comple-

MICRO-CURE has been successfully used on wells that have produced oil-based mud that had been lost to the formation during the drilling phase. BHDF was asked by a major operator to develop a fluid that would destroy oil-based mud filter cake depositions for water injection applications. What resulted from their R&D effort was MICRO-WASH, which has been commercially available for about a year. It is based on mesophase technology, a chemistry developed by BHDF that can solubilize oil on contact and water-wet all damaged surfaces. Field results have indicated that MICRO-WASH can significantly improve water-injection rates or increase hydrocarbon recovery by removing emulsion blockage.

BHDF recently launched two more mesophase systems: MICRO-CURE, a cased hole remediation system to remediate damage in the perforation zone, and MICRO-PRIME, a displacement fluid system to optimize wellbore casing cleanup while displacing to a completion brine.

MICRO-CURE
BHDF began by designing MICRO-WASH for open-hole completions in wells drilled with oil-based mud. This development led to the next-obvious progression, MICRO-CURE, a remediation system for cased-hole or perforated completions. Using a similar mesophase design, MICRO-CURE remediates damage in the perforation tunnels or nearby fractures. The damage removed might include accumulations of heavy oil molecules or solids pulled along with hydrocarbon flow, water blockage, or emulsion blockage. All can restrict the flow potential of a producing well.

The mesophase chemistry of MICRO-CURE solubilizes oil and damaging emulsion on contact, without agitation or added temperature, said Robert Peresich, BHDF product line manager for reservoir services. The system also water-wets all solids and surfaces it comes into contact with, promoting their mobility and removal from the wellbore.

While MICRO-WASH is customized for each oil-based mud application to remove skin damage in open hole completions, MICRO-CURE is intended to remediate a wide range of damage mechanisms. Additionally, because MICRO-WASH targets open-hole comple-

In a MICRO-PRIME trial well, the riser brush is seen being pulled out of the hole after displacement. It looks as clean as it did going into the hole, BHDF noted.

MICRO-PRIME
By removing oily debris and water-wetting all metal surfaces, MICRO-PRIME optimizes the displacement of oil- or synthetic-based muds in wells before completing the well with clear brine. “You’re going from an oil-wet environment to a water-wet environment, and it’s important to leave the wellbore as clean as possible so there are no complications when running the completion assembly,” Mr Peresich said.

BHDF initially targeted deepwater wells drilled with synthetic-based mud, he added. Why? Synthetics tend to be more tenacious and difficult to remove from metal surfaces than oils, and oil-based muds tend to be harder to remove in colder temperatures (for example, risers can be very cold near the seabed in deepwater drilling). “We knew that if MICRO-PRIME could work in the hard-to-clean deepwater environment, that it would work well on warmer applications,” he said, such as land and shelf wells.

MICRO-PRIME has been successfully field-tested on land, in the US, in the Gulf of Mexico on shelf and deepwater wells and in the Middle East.

So far, the mesophase chemistry has progressed from open-hole remediation (MICRO-WASH) to cased-hole remediation (MICRO-CURE) to displacement technology (MICRO-PRIME). BHDF sees potential for many more products in the same line, though Mr Peresich said he couldn’t discuss the specifics yet. “We see a significant number of additional applications and are now working on them.”