Produced Water for Well Treatment Fluids

Case study: Oxy uses customized produced water treatment and sees significant savings

Challenge
Prepare well treatment fluids with produced water to reduce water acquisition and disposal costs.

Solution
Add a customized compound to produced water, allowing its use in well treatment fluids.

Results
Reduced fresh water consumption and produced water disposal costs while greatly enhancing fluid performance.

Expensive water acquisition and disposal
Globally, oilfield operators must pay high costs for water acquisition and produced water disposal. Municipal and state restrictions make fresh water difficult to obtain and therefore more costly.

Faced with these challenges, Occidental Petroleum Corporation (Oxy) in Bakersfield, California, sought a cost-effective method of preparing well treatment fluids using oil field–produced water. In this effort, several serious problems had to be addressed:

- Conventional fluid treatments were expensive, time-consuming, and energy-intensive.
- Polysaccharide-based well treatment fluids prepared with produced water showed poor fluid viscosity.
- Pretreatment with biocide, an additive that kills bacteria, did not resolve the problem.
- Adding additional biocide or changing fluid formulas did not work.

Two fluids prepared for a treatment at 200 degF (93 degC)—Fluid 1 is a borate-crosslinked guar gel prepared with untreated produced water. Fluid 2 is a borate-crosslinked guar gel prepared with the fluid stabilizer–treated produced water.
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**New fluid stabilizer additive compound**
Schlumberger applied a simple, low-cost treatment for Oxy. A fluid stabilizer additive compound was developed that was added to produced water and mixed. In less than 10 minutes, the stabilizer-treated produced water was ready to use in well treatment fluid preparation. The resulting fluid did not suffer any of the fluid viscosity problems encountered with polysaccharides as guar, and it was capable of denaturing bacterial enzymes in produced water (the main cause of polysaccharide damage).

**Cost savings for 33 wells**
Using produced water for a 33-well campaign rather than custom formulations of fresh water and potassium chloride (KCl) saved Oxy a substantial amount of money. The company has since used the successful formulation in more than 100 jobs.