

WELLBORE SOLIDS AND FLUID QUALITY IMPROVED BY RENEWIQ™ SOLUTION ANNULAR CLEANUPS



SITUATION

Conventional plays throughout the US often experience iron sulfide deposition issues throughout the production fluid stream. Iron sulfide species are especially prevalent in downhole equipment and fluids, which can lead to problems with wells utilizing rod pumps. Historically, remediation methods were often large scale acid or cleanup treatments, which were costly and increased asset integrity concerns.

CHALLENGE

When iron sulfide deposition occurred, producers often witnessed a vast decrease in well performance through pumping conditions and dynamometer scans. Residing within the annular working fluid column, iron sulfide would fraction from the oil/water interface into the hydrocarbon phase and become oil-wet. This viscous, solids-laden emulsion would stick to critical pump components resulting in restriction of pump fillage, delayed standing valve closures, increase or erratic pump friction, increased restriction of fluid flow-through, pump sticking, and delayed traveling valve closures.

INSIGHT

During field evaluations with Nalco Champion BIOC16734A biocide, a peracetic acid-based RenewIQ™ solution chemistry, the chemistry oxidized the emulsifying iron solids and broke the surface tension enough to resolve the emulsion. Nalco Champion utilized this knowledge to design downhole treatments that performed this same task in annular fluids feeding the pump.

SOLUTION

Wells exhibiting pump performance issues were first base-lined via wellhead fluid grindouts and dynamometer scans. From this information, candidates were selected for trial annular cleanups. Treatments utilizing BIOC16734A biocide and FESD11088A combination surfactant/iron chelant product, were designed to focus on removing iron solids from the near wellbore fluids, resolving the associated emulsions, and moving the negative fluids through the pump. This approach was implemented to restore pump performance and reduce the risk of failure.

RESULTS

Baseline dynamometer scans and wellhead grindouts performed on a trial well indicated significant downhole pump issues. Grindouts indicated approximately 1.0% oil-wet iron sulfide within the production fluids, while pump and surface dynamometer cards indicated poor pump fillage along with subsequent rod stacking. The data highlighted the likely cause of the decreased pump performance to be solids-laden emulsions residing within the annular fluid column. To assist in cleaning this fluid column, consecutive annular batch treatments utilizing 1 gallon of BIOC16734A biocide and 1 gallon of FESD11088A surfactant/chelant were performed. Follow up wellhead grindouts were completed and data showed a shift from oil-wet to water-wet iron sulfide, indicating a positive effect from the treatment. Additional samples were gathered in the subsequent days, and they showed a continual reduction in the amount of oil-wet and total iron sulfide. (See Figure 1 below).

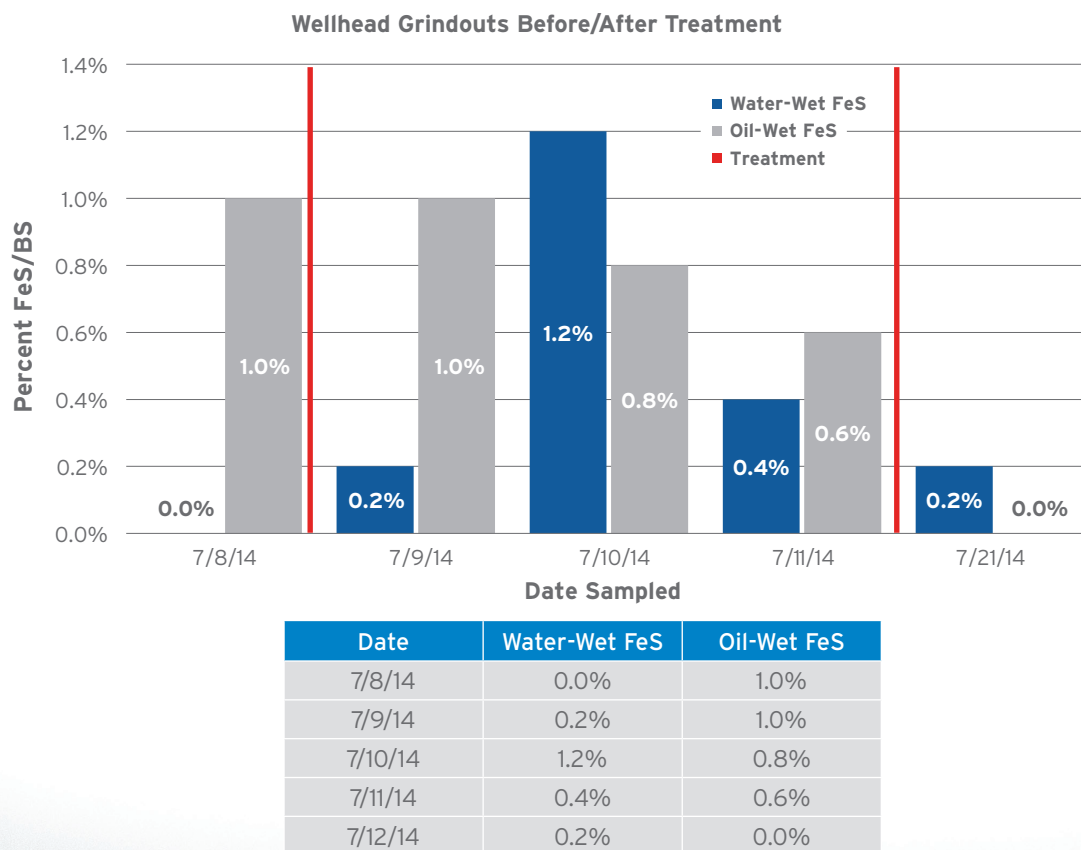


Figure 1 - Wellhead Grindouts Before/After Treatment

After the second treatment, dynamometer scan results were again positive, with a noticeable improvement in both surface and pump dynamometer cards. A pump fillage of 100% was noted, improving 64% from the baseline level. (See Figures 2 and 3 below). The Nalco Champion RenewIQ solution, which focused on improving the quality of fluids

entering the pump, improved the overall pump efficiency of the well and cost much less than conventional remedies.

This solution is a breakthrough in mitigating stress-related failures, which translates into reductions in equipment replacement and workover costs.

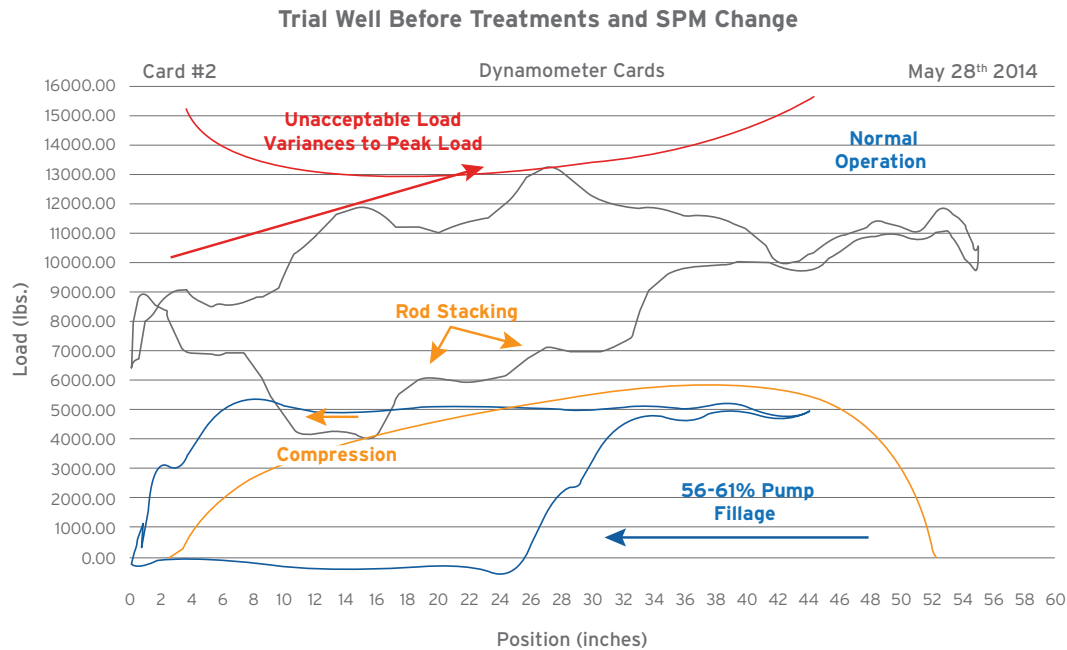


Figure 2 - Trial Well Before Treatments and SPM Change

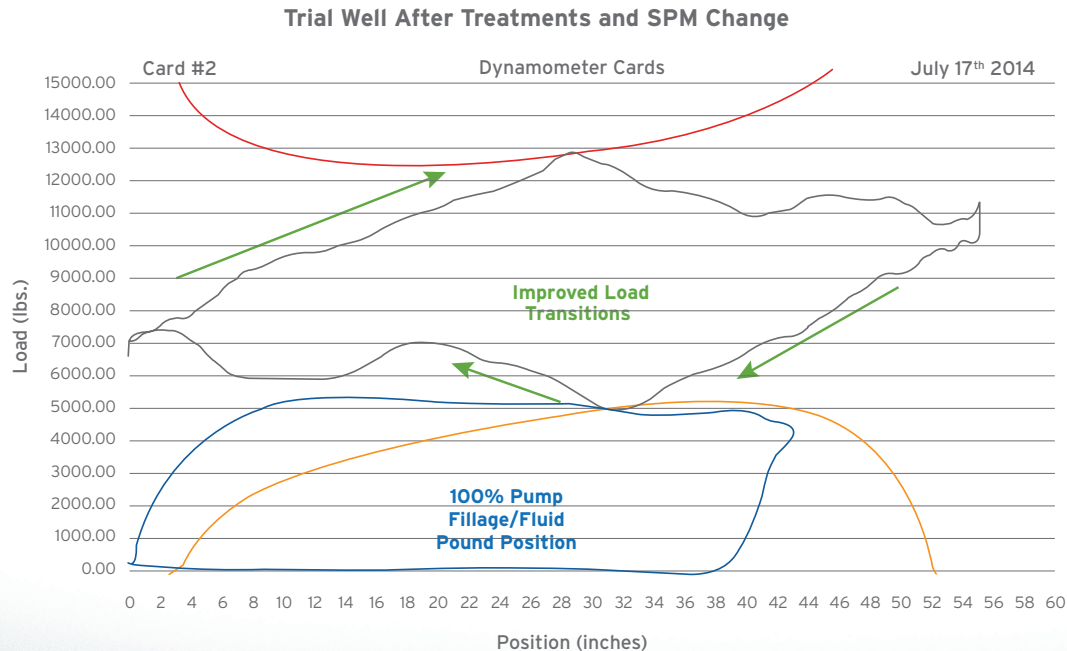


Figure 3 - Trial Well After Treatments and SPM Change

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Nalco Champion Headquarters
7705 Highway 90-A
Sugar Land, TX 77478
Telephone: +1-281-263-7000

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nalcochampion.com

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