MICROBIAL INFLUENCED CORROSION OF COIL TUBING MILLING STRINGS IN THE EAGLE FORD SHALE

S. Sherman, SPE (Trican Well Service Ltd.) | D. Brownlee, SPE (Trican Well Service Ltd.) | S. Kakadjian, SPE (Trican Well Service Ltd.) | B. Luft, SPE, (Trican Well Service Ltd.)

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ABSTRACT

Microbial influenced corrosion (MIC) has been implicated in many corrosion related challenges in the well service industry in the past. Recently, the industry is observing an influx of MIC related equipment damage. The recurrence of MIC is coincidental with the switch to unconventional water sources. As fresh water for fracturing operations and well interventions becomes less available, operators are forced to use alternative water sources such as recycled flowback water, produced water, recycled frac water, and even ‘grey water’ from wastewater treatment plants. Regardless of the water source for a particular well treatment operation, the same water-hauling equipment and tanks are used for successive hydraulic fracturing operations.

This ‘communal’ use of water hauling and temporary water storage equipment is an ideal situation for bacteria to move from one water repository to another. Even if the water source used to supply water for oilfield operations is free from harmful bacteria, it may become contaminated - in transport or temporary storage vessels - before it is pumped downhole. This paper will highlight a recent discovery of MIC in coil tubing that has been used for milling frac plugs in the Eagle Ford Shale play in Texas. In this case, MIC had significantly decreased the life span of the affected coil tubing strings. Metallurgical analysis was conducted to determine if the corrosion was the result of sulfur-reducing bacteria (SRB) or anaerobic acid producing bacteria (APB) - two specific types of several microbes that can lead to MIC.

Bend fatigue testing was conducted on MIC-affected coil tubing samples, which showed a significantly reduced coil fatigue life when compared to non-affected coil tubing. This paper will explore the potential source(s) of the bacteria, the impact to the equipment that was exposed to the bacteria, as well as what is being done to mitigate the problem.

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