

## **CASE STUDY**

**Yates Petroleum Company**

**105 South 4<sup>th</sup> st.**

**Artesia, NM 88210**

**Bruce Lanier, Corrosion Technician**

**(505)748-4240**

### Description

A New Mexico Operator was experiencing rod, pump and tubing failures in an older field containing 120 pumping wells, most of which were 30 to 35 years old. The wells were 1800' to 3500' deep, typically yielded 1 to 2 barrels per day and had low bottom-hole pressures due to the age of the wells.

The Operator typically had to repair wells after 2 to 4 months of operation and it was not uncommon for 8 to 10 months to pass before a work-over rig was available to pull the string and repair the tubing. The holes in the tubing and damage to the string was usually caused by corrosion from sulfur reducing bacteria, which was also responsible for hydrogen sulfide gas, black water and extra effort by the pumper to clean the oil up to sell it.

The Operator learned about a process called Electro-Chemical Activation (ECA) technology, which allows for a powerful, but environmentally responsible, biocide to be produced from salt, water and electricity. Not wanting to further contaminate the formation, the Operator purchased a device which uses ECA technology to produce electrolyzed oxidizing (EO) water that could be placed down-hole to reduce tubing failures due to corrosion by destroying the microorganisms that were causing the failures.

### Application

The Operator began producing EO water which contained hypochlorous acid as the predominant active chlorine specie and which is more efficacious and faster acting than the hypochlorite ion, bleach.

With low formation pressures and flow, the EO water could be pumped down the well annulus and applied directly to the desired treatment area as the wells were kept pumped off to the perf.

Typical treatment regimens were to pump 10 barrels of the EO water into the well, followed with a 100 to 200 barrel water "push" that forced the EO water into the formation and in contact with the bacteria causing the problem.

### Results/Observations

The Operator began keeping records of rod, pump and tubing failures in 2000, and maintained records for comparison as new techniques were employed to reduce tubing failure, the most prevalent failure encountered. Early in 2004, as wells were repaired, defective tubing was replaced with poly-lined strings, which after 2 years, showed annual tubing failures dropped from 42 to 28. In January, 2006, the Operator began to use the

EO water to reduce the external bacterial induced corrosion and by the end of 2007, only 26 tubing failures occurred during that 24 month period.

The combination of poly-lined tubing and well treatment with EO water dramatically reduced tubing failures due to corrosion, improved fluid quality and eliminated hydrogen sulfide in the wells.

### Conclusions

Many older producing fields are located in formations which harbor bacteria. The bacterium creates hydrogen sulfide gas, black water, lower quality fluids and bacterial induced corrosion in rods, pumps and tubing. The lower formation pressures and low flow rates allow for simple well treatment regimes with EO water which can reduce tubing failures, improve well quality and increase profits.