

TRUE SUCCESSES

CORROSION INHIBITOR EXTENDS DOWNHOLE EQUIPMENT LIFE

Challenge

The customer was experiencing corrosion wear on downhole equipment, both rods and tubing ID. Water chemistry was not indicative of a corrosive environment but downhole failures continued. This field also had a CO₂ Enhanced Oil Recovery flood, which leads to its own corrosive challenges. Mechanical wear associated with deviated downhole well profiles were the leading cause to the corrosion wear resulting in workover frequencies that did not exhibit a run-life greater than ~1 year. The biggest concern in CO₂ floods is the high CO₂ acid gas concentrations and solids.

Solution

Solids analysis, water analysis, visual inspections, copper ion displacement testing, and lubricity evaluations were all performed in PureChem's laboratory. It was also found that mineral scales, formation fines and free iron from mechanical damage can have an affinity to consume continuously applied corrosion inhibitor residual or potentially cause a tacky binding substance that can cause premature failures of stressed or corroded rod strings by sticking pumps. Various inhibitors were tested using RCE, HTHP Autoclaves, and lubricity evaluations. Testing was completed at 65°C to represent elevated temperatures. PureChem's CC-1510 was identified to provide 99.22% protection in this environment.

Area/Formation

Midale

Form of Lift

Pumpjacks, ESP

PureChem Product

CC-1510

Product	Corrosion Rate (mpy)	% Protection	Lubricity Steady State CoF
Blank	160.6	-	>0.4 (fail)
Product A	2.49	98.45	>0.4 (fail)
Product B	1.55	99.03	>0.4 (fail)
CC-1510	1.24	99.22	0.3701

All products were continuous corrosion inhibitors.

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Benefit

After identifying the challenges and completing the testing, PureChem then moved forward with a treatment plan to not only mitigate corrosion against the high levels of CO₂ acid gas concentrations, but also downhole corrosion velocities and mechanical wear issues. Continuous application of CC-1510 corrosion inhibitor was started at an initial concentration of 100 ppm based on produced water.

Workovers are now required less frequently resulting in more efficient operations. Intrusive corrosion coupons were utilized in the field to monitor corrosion rates upon program implementation.

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Coupon Position	Exposure (Days)	General Corrosion Rate (mpy)	Pitting Corrosion Rate	Pit Depth (mils)	Observations
Intrusive	289	0.07	0.0	0.0	Minor corrosion activity with minor color differences. No pitting observed.

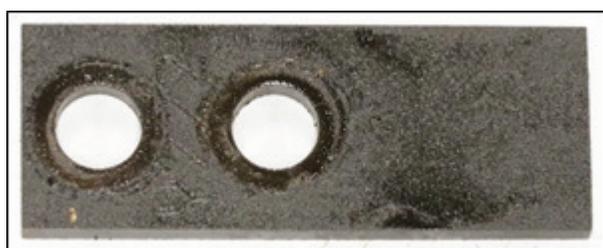


Figure 1: Top of coupon before cleaning



Figure 2: Top of coupon after cleaning



Figure 3: Bottom of coupon before cleaning



Figure 4: Bottom of coupon after cleaning