

Case History

Mitigation of Norm Active Scale & Corrosion in a GeoThermal System

Introduction

Roemex have developed a bespoke remediation treatment for geothermal facilities encountering issues with re-injectivity of the production fluids. Some corrosion inhibitors, if not correctly specified for the application, are known to generate organic residues in the form of a gunk. This blocks filters on surface infrastructure and screens downhole. These deposits were confirmed to have been attributed to the application of a conventional oilfield corrosion inhibitor. This deposition causes a reduction in injectivity and increases injection pressure which

progressively worsens, reducing flow rates until the facility can no longer inject the production fluid at safe injection pressures. The fiscal implication is significant due to a reduction in ability to meet heat demand and increasing injection pressures which will ultimately lead to plant shutdown. Roemex developed a combined scale and corrosion inhibitor, **GEOTECH 2**, which is fully water soluble and non gunking, designed specifically for geothermal facilities.

Development Process

The contaminant sample was characterised by compositional analysis and was deemed to be predominately unspent corrosion inhibitor, microbiological growth and corrosion products of L80

carbon steel. The deposition was sludge like in nature, as can be seen in the image below. One of the key development parameters for any solution is to have a high environmental profile.



Fig. 1 Gunk removed from filter units



Fig. 2 Gunk deposition on calliper

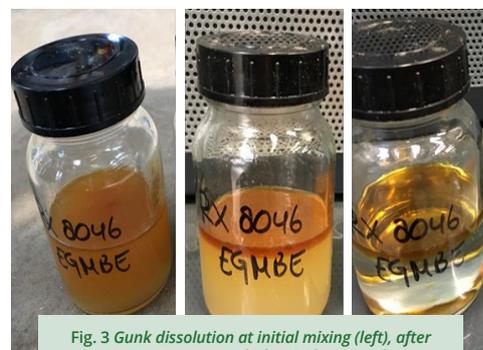


Fig. 3 Gunk dissolution at initial mixing (left), after 10 mins (centre) and after 24 hours (right)

Application

Roemex green chemistry, **RX-8046**, utilises chemistry derived from our well bore clean-up technology. This product was selected to mobilise the deposition and was circulated at 500 ppmv for 6—12 hours. This product, combined with heat, turbulent flow and shearing mobilised the agglomeration by altering wettability of

metal surfaces, breaking apart the gunk and then dispersing within the fluids. Thereafter a neat pill of mutual solvent was deployed at the sandface and permitted to soak for 6—12 hours, dissolving the remainder of the organic deposition.

Conclusion

Within 30 minutes of the facility being back online after the remedial treatment, injectivity was restored to “as new” levels thereby achieving a 100 % restoration of injectivity with the remedial treatment.

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Geothermal Inhibitor Field Application

Water Injection Pressure

Water injection pressure was closely monitored during the application of **GEOTECH 2**. The incumbent oilfield corrosion inhibitor resulted in a notable increase in injection well pressure within only 12 hours of increasing dose rate. The below figures display water injection pressure, corrosion rate and temperature

over the course of the initial implementation of **GEOTECH 2**. A slight increase in pressure was observed due to reducing water temperature, thereafter water injection pressure has remained stable.

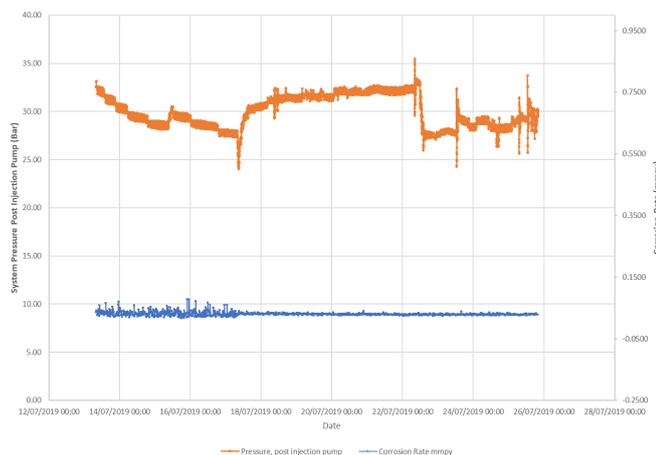


Fig. 1 Water Injection Pressure vs Corrosion Rate

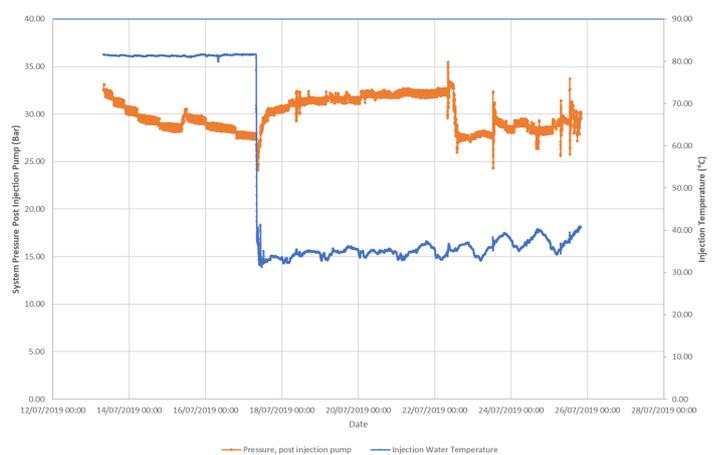


Fig. 2 Water Injection Pressure vs Water Temperature

Corrosion Protection

Upon application of **GEOTECH 2** to this facility, a corrosion rate similar to the oilfield inhibitor at 0.05 mm/yr was observed and since then a steady decrease in corrosion rate has been observed at approximately 0.03 mm/yr.

Conclusion

Application of **GEOTECH 2** to this system has provided an effective corrosion rate reduction without any adverse effects of gunk formation, mitigating high water injectivity pressures. Following application of **GEOTECH 2**, water production rates have been restored to a higher flow rate whilst maintaining system integrity.