

Figure 2: Compatibility testing with formation water (FW).

Fluids	Increase in weight of Nitrile after 40 hours @ 63°C, wt%
H <sub>2</sub> O	0.7
H <sub>2</sub> O + 25 kg/m <sup>3</sup> STB-502	0.8



Fluids	Increase in weight of Nitrile after 40 hours @ 63°C, wt%
SSB-007 (20%)	0.8
HCl (15%)	0.9

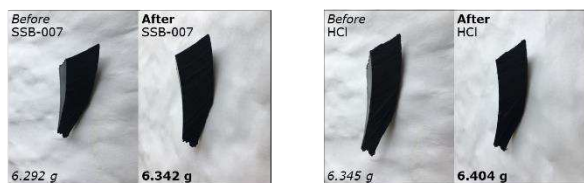


Figure 3: Compatibility of different fluids with Nitrile, as determined after 40 hours at 63°C.

#### 4. FIELD TRIAL

Chemical injection via tubing targeted eight different zones in the perforated liner section of the Bunter sandstone formation (TVD: 2500 – 2600 m; BHT: 63°C). In the course of the three treatment steps planned for this application, cup tools provided fluid separation and diversion. Figure 4 shows equipment on site and pumping schedule.

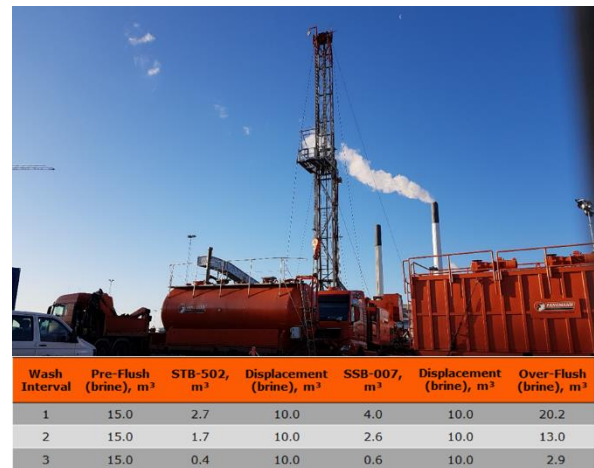


Figure 4: Equipment on site and pumping schedule.

The superior chemical properties of this biodegradable treatment fluid system combined with an optimized pumping schedule resulted into an greatly improved injectivity of the geothermal well (see Figure 5).

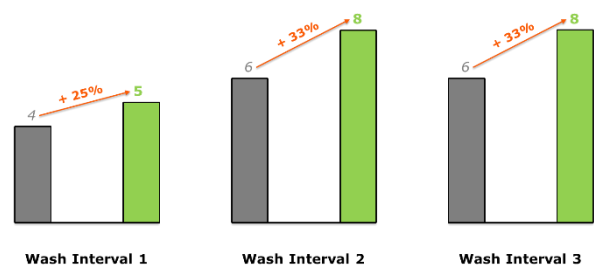


Figure 5: Injectivity index in L/min/bar before (grey) and after (green) fluid treatment.

#### 5. CONCLUSIONS

Based upon excessive lab testing and vast field experience, the biodegradable acid system presented here was specifically customized to meet unique project-related demands. Its biodegradability, low corrosion tendency and excellent compatibility profile complement this state-of-the-art treatment fluid system.

Table 2: Summary

New fluid system for dissolving lead scale
✓ Very effective chemical injection via tubing
✓ Premium fluid diversion employing cup tools
✓ Successfully stimulated Bunter sandstone formation
✓ Supreme chemical properties of fluid system resulted into a greatly improved performance

#### REFERENCES

N. Recalde Lummer, O. Rauf, S. Gerdes, Next generation stimulation system – First field trial of a new biodegradable fluid in a sandstone/granite formation, SPE-174242, SPE Formation Damage Conference, Budapest, Hungary (2015).