FANGMANN ENERGY SERVICES

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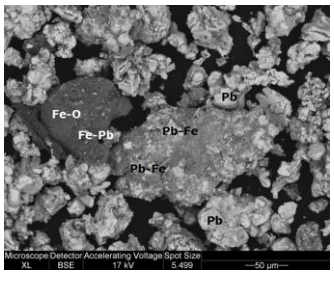
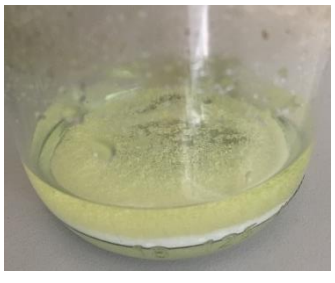
PREMIUM LEAD SCALE REMOVAL

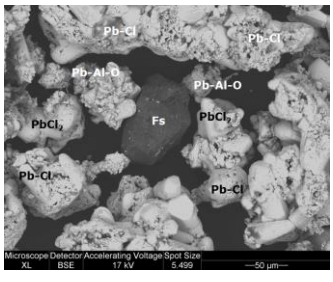
Fluid Development and Field Trial in a Geothermal Well

INTRODUCTION

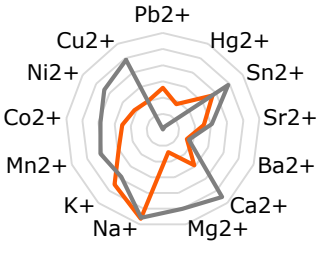


Lead scale formation drastically reduced the injectivity of a geothermal well in Denmark. As the use of HCl produces further precipitates, we developed an alternative treatment fluid.



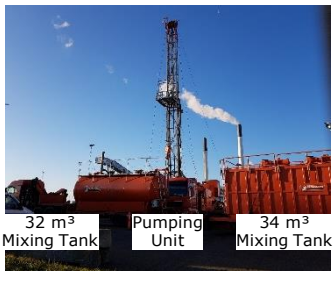


SUPREME EFFECTIVENESS



Extensive solubility tests with actual downhole samples confirmed the supreme effectiveness of the innovative fluid system ***SSB-007*** over *HCl* for lead (Pb2+) scale removal.

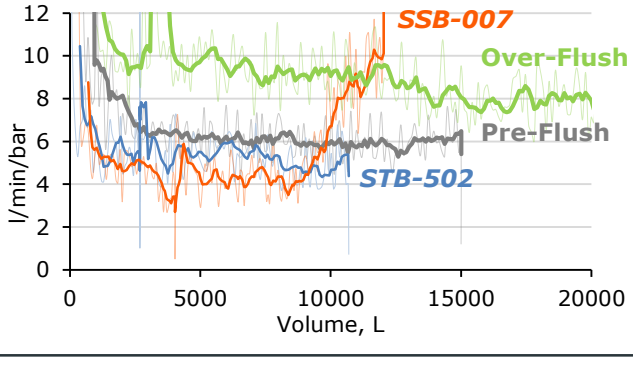
EQUIPMENT ON SITE



PUMPING SCHEDULE

Wash Interval	Top, TVD m	Bottom, TVD m	Pre-Flush (brine), m³	STB-502, m³	Displacement (brine), m³	SSB-007, m³	Displacement (brine), m³	Over-Flush (brine), m³
1	2520	2540	15.0	2.7	10.0	4.0	10.0	20.2
2	2500	2520	15.0	1.7	10.0	2.6	10.0	13.0
3	2480	2500	15.0	0.4	10.0	0.6	10.0	2.9

RESULTS



- ✓ Very effective chemical injection via tubing targeting eight different zones in the perforated liner section
- ✓ Premium fluid diversion and separation employing cup tools
- ✓ Successfully stimulated Bunter sandstone formation (TVD: 2500 – 2600 m; BHST: 60°C)
- ✓ Supreme chemical properties of fluid system resulted into a two-fold improved injectivity of the geothermal well