CASE STUDY

Enviro-Syn® HCR-3000® Increases Production 8-Fold in Offshore Well Descale Treatment

North Sea, Norway

CHALLENGE

A North Sea operator working offshore Norway had an oil well with persistent precipitation of acid-soluble scale, predominantly calcium carbonate ($CaCO_3$) with some organic content from hydrocarbons. Hydrochloric acid (HCl) was used previously, causing significant corrosion issues on tubing and equipment during deployment and flowback to platform. The operator sought a solution that was safe to deploy, and had high dissolution capacity and rate to deal with the large volume of scale. In addition, the completion metals in this field are high chrome (e.g., L80-13Cr) requiring a product with ultra-low corrosivity to metals at high temperature, even with long exposure time.

SOLUTION

Enviro-Syn® HCR-3000® Synthetic Acid™ was selected and deployed using coiled tubing from the platform. Enviro-Syn HCR-3000 provides a safe, effective alternative to conventional strong mineral acids (e.g., HCl) to greatly reduce hazardous effects, such as fuming and corrosion on skin and metals, through unique control of reaction rates while providing many technical and operational benefits. Enviro-Syn HCR-3000 has similar solubilizing abilities to 20% HCl and reduces the amount of scale reprecipitated after injection compared to treatment with HCl.

Enviro-Syn HCR-3000 Synthetic Acid Technology

- Outstanding HSE profile
  - Non-corrosive to skin
  - Non-fuming
  - Biodegradable
  - Non-regulated for air, land and sea transport
- Non-chloride, synthetic acid system
- Free of nitrogen, phosphorous, and halogens
- Ultra-low metal corrosion
- Compatible with typical elastomers
- Methodical, controlled spend rate
- Higher spent pH than strong acids
- Minimal reprecipitation of scale as pH rises
- Minimal to no exothermic reaction when mixed with water

RESULTS

Pre- and post-treatment caliper readings demonstrated that treatment with Enviro-Syn HCR-3000 was very successful (Figs. 1 and 2). All the scale was removed and the well was restored to full production capacity as below.

- Oil production (Qo) increased by 83%, from 138 to 253 m^3/day.
- Gas production (Qg) increased by 134%, from 32,368 to 75,652 m^3/day.
- Gas needed for gas lifting (Qgl) decreased by 14.4%, from 116,325 to 99,538 m^3/day.

Before handing well over to production, a low pressure flush was performed with a closed hydraulic master valve (HMV) to get rid of any loose scale in the production line. Thereafter the bottom hole assembly (BHA) was rigged down and the well handed over to production.

The operator has subsequently made treatment with Enviro-Syn HCR-3000 a standard operating procedure (SOP) for their offshore well operations.

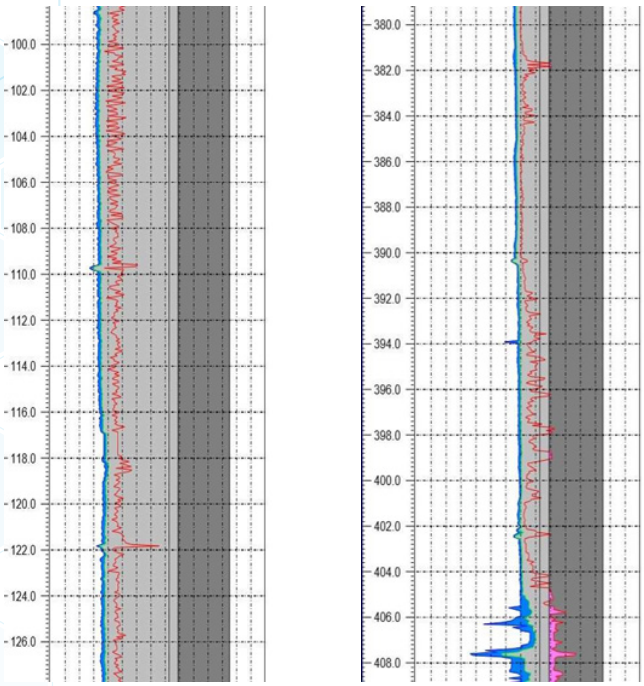

Figure 1. Pre-treatment caliper readings showing large scale deposits.

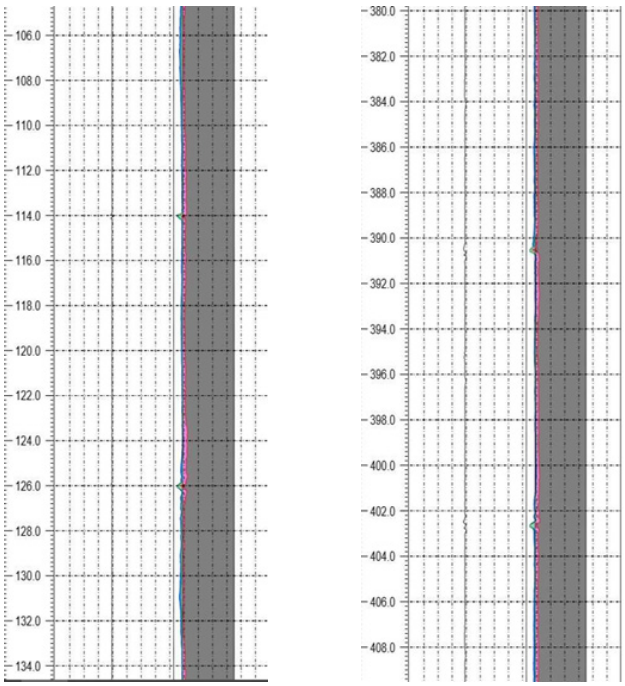

Figure 2. Post-treatment caliper readings showing that the scale has been removed.