

## Enviro-Syn<sup>®</sup> HCR-7000 Increases Production 8-Fold in Offshore Well Descale Treatment

West Africa

### CHALLENGE

A major operator working in West Africa had an offshore oil well that was not producing to its potential. Investigation revealed that scale was restricting production. Scale samples (Fig. 1) were extracted and analysis showed predominantly calcium carbonate ( $\text{CaCO}_3$ ) with some acid insoluble clays and organics originating from formation water precipitation and drilling fluids. The operator required a descaler product with high dissolution capacity and minimal corrosion effects based on the anticipated long exposure time to downhole completions tools and equipment with high-chrome metal composition.

### SOLUTION

Laboratory testing was performed on several different products including Enviro-Syn<sup>®</sup> HCR-7000<sup>®</sup> Modified Acid™ with a built-in solvent to address the organics. The results showed that the scale was highly soluble in Enviro-Syn HCR-7000 at 50°C (122°F), requiring less than 10 minutes to dissolve the acid soluble and organics part of the scale, with some remaining insoluble residue. No visible reprecipitation was observed when seawater was added and mixed for 2 hours. In addition, corrosion testing showed very low corrosion rates on the completions tools and equipment.

Enviro-Syn HCR-7000 provides a safe, effective alternative to conventional strong mineral acids, such as hydrochloric acid (HCl) to greatly reduce hazardous effects, such as fuming and corrosive effects on skin and metals, through unique control of reaction rates while providing many technical and operational benefits. Enviro-Syn HCR-7000 has similar solubilizing abilities to 15% HCl and reduces the amount of scale reprecipitated after injection compared to treatment with HCl.



Figure 1. Scale sample from West Africa offshore well.

#### Benefits of HCR Modified Acid Technology

- ✓ Outstanding HSE profile
  - Non-corrosive to skin
  - Low fuming
  - Biodegradable
- ✓ Ultra-low metal corrosion
- ✓ Compatible with typical elastomers
- ✓ Linear pH control
- ✓ Methodical, controlled spend rate
- ✓ Minimal to no exothermic reaction when mixed with water
- ✓ Higher spent pH than strong acids

## RESULTS

The operator selected Enviro-Syn HCR-7000 for the operation due to superior product performance and health, safety and environmental (HSE) profile, as well as corrosion prevention requirements from the operator and equipment service provider.

400 m<sup>3</sup> (2,516 bbl) of Enviro-Syn HCR-7000 was deployed via coiled tubing to the affected zones to treat and stimulate the well. The operation was highly successful, with a change in the mechanical skin value from 14 before treatment to 0 post treatment.

This resulted in an 8-fold increase in Productivity Index for liquids from 22 sm<sup>3</sup>/d/bar to 175 sm<sup>3</sup>/d/bar in pseudo steady-state and a production increase of >2000 bopd, equating to approximately USD\$140,000 per day in additional cash flow at \$70/bbl for the operator.