Schlumberger

# Petrogas Sees Dramatic Improvement in Sucker Rod Durability Despite Corrosive Well Environments, Oman

## Advanced tungsten alloy coating increases run life up to sevenfold in heavy oil wells

**Special corrosion-resistant coating combats effects of acid gases in wells, extends sucker rod life, and significantly improves opex.**

### Hostile downhole environment limited rod life

Petrogas Rima LLC operates more than 280 wells in the Rima Field of southern Oman, using sucker rod pumps to produce heavy oil with an average specific gravity of 21 API. The wells have high angles of inclination or complex trajectories and are characterized by high concentrations of $H_2S$, $CO_2$, and $O_2$. Because of the challenging environment, broken or parted sucker rods were common, amounting to over half the total field failures recorded. The resulting shutdowns were raising costs because of deferred production, workovers, and rodstring replacements.

### Proprietary coating addressed longevity challenges

Schlumberger proposed using its proprietary, field-proven tungsten-alloy-coated sucker rods. Couplings and rods feature high-bonded amorphous tungsten alloy plating over high-strength base metal to enhance resistance to delamination, wear, and corrosion stress cracking. Hardness after heat treating is ≥850 on the Vickers hardness scale. The coating improves corrosion resistance without sacrificing yield or tensile strength.

### Rod service life increased manyfold

The new rods were installed in seven wells and have exhibited a dramatically increased run life despite highly corrosive downhole fluids. By significantly reducing workovers, they have enabled Petrogas to lower opex and improve field economics.

| Well | Previous (Conventional) Rod Run Life, d | New Rod Run Life, d | Increase |
|---|---|---|---|
| 1 | 83 | 443 and still running | × 5.3 |
| 2 | 263 | 395 and still running | × 1.5 |
| 3 | 130 | 387 and still running | × 3 |
| 4 | 54 | 376 and still running | × 7 |
| 5 | 192 | 332 (stopped because of unrelated issues) | × 1.7 |
| 6 | 308 | 345 and still running | × 1.1 |
| 7 | 163 | 338 and still running | × 2.1 |

**"The trial with tungsten-coated sucker rods showed run-time improvement in comparison to previous installations, which saved workover costs and reduced deferment. The successful trial is a good example of how a service company together with an operator identifies the challenges and comes up with an efficient solution. Further installations of tungsten-coated sucker rods are planned."**

Christian Landgraf, Team Lead Rima South Asset
Senior Production Technologist, Petrogas Rima LLC

*The proprietary tungsten alloy coating has significantly extended sucker rod life in all the Rima wells where it has been used.*