

CASE STUDY

TRIPLING THE RUN LIFE OF AN ARTIFICIAL LIFT WELL IN OMAN USING ELECTROMAGNETIC SCALE CONTROL.

LOCATION: Oman.

APPLICATION: Artificial Lift System / Beam Pump / Rod Pump.

In the mature carbonate reservoirs of North Oman, an artificial lift oil well in Daleel Petroleum Block 5 faced severe flow challenges due to recurrent scale deposition. Rapid mineral accumulation regularly choked production tubing and caused catastrophic mechanical failures, limiting run life to an average of just 159 days.

Seeking a sustainable, chemical-free solution to replace traditional inhibitors, Daleel Petroleum deployed ClearWELL's electromagnetic technology. The surface-mounted solution completely transformed well reliability and flow assurance. Following installation, the well achieved an unprecedented run life of over 627 days - a nearly fourfold (3.9x) uplift compared to historical averages and with zero scale-related downtime before a corrosion related tubing failure.

THE CHALLENGE: HIGH-SCALING ENVIRONMENTS IN MATURE WELLS

Daleel Petroleum extracts light crude oil from the Shuaiba and Natih carbonate reservoirs. As natural reservoir pressure declined over time, the field transitioned to artificial lift systems, primarily relying on beam pumps and ESPs. However, the combination of high salinity, elevated water cuts and sharp downhole pressure drops created an ideal environment for severe scaling.

In this beam / rod pump oil well, the primary scale culprit was calcium carbonate (calcite). Thick mineral deposits rapidly coated the inside of production tubing, sucker rods, pump barrels and travelling valves which triggered a cascade of operational issues:

- **Mechanical Failures:** Increased friction led to rod loading spikes, stuck pump plungers and parted rods
- **Restricted Operational Lifespan:** The well logged 18 structural string failures, averaging a run life of just 130 days before failing.
- **Escalating Costs:** Frequent workovers, intense chemical treatment regimens and extended non-productive time (NPT) inflated operating expenses (OPEX) and heightened field safety risks.

THE SOLUTION: CLEARWELL™ ELECTROMAGNETIC TECHNOLOGY

To eliminate downhole mineral adhesion without introducing toxic chemicals or disrupting existing operations, Daleel Petroleum installed a ClearWELL™ unit at the wellhead.

ClearWELL™ technology operates via a non-intrusive, surface-mounted design that can be commissioned while the well remains online. The device transmits pulsed radio frequency (RF) signals through the connected metallic infrastructure to propagate through the wellbore. This generates an electrical field that alters ionic crystallisation kinetics so that instead of bonding together as hard, adherent scale layers on internal pipe walls and moving equipment, scale-forming minerals precipitate as a microscopic suspension within the fluid. These harmless particles are carried out of the wellbore in the normal flow of produced fluids.



Feb 2021: Plunger stuck inside barrel due to scale

THE RESULTS: UNPRECEDENTED UPTIME AND COST REDUCTION

The ClearWELL system was continuously monitored via satellite for over 18 months, yielding outstanding operational improvements across every core metric:

1. Dramatic Run-Life Extension

Prior to deployment, the well's average pump run life was limited to 159 days due to rapid scale-related locking. Under ClearWELL™ protection, the pump operated flawlessly for 627 days without a single failure, achieving a 3.9x improvement over historical baselines.

2. Physical Elimination of Scale

During scheduled workover pull-out inspections, the contrast was stark. Historical pull-outs regularly revealed thick scale lining the entire 1,000-metre wellbore, seizing the plunger inside the barrel. But post-trial visual inspections confirmed the completion to be almost entirely scale-free, with zero scale buildup inside the pump, rods or tubing.

3. Stabilised Mechanical Performance

Dynacard trends and surface tracking data validated a major drop in mechanical resistance. Peak and minimum load values became highly consistent, stabilizing pump motion and confirming that the system was running smoothly without scale-induced friction or rod tension anomalies.

4. Clear HSE and OPEX Advantages

Because ClearWELL™ represents a physical rather than a chemical solution, Daleel Petroleum did not need to alter its fluid chemistry or introduce scale inhibitors, which delivered several operational benefits:

- **Lower Carbon Footprint:** Fewer logistics and intervention-heavy workovers minimised carbon intensity
- **Reduced Human Exposure:** Eliminating hazardous chemical handling lowered on-site HSE exposure risk for field operatives
- **Direct Financial Savings:** Drastically reducing intervention frequency and maximising well runtime provided a high reduction in total OPEX.

VISUAL LOG OF DOWNHOLE SCALE

Using a traditional scale mitigation approach during 2021-2023 scale is observed (X) at all depths, at every workover.						ClearWELL technology applied to producing well 4 months after workover	ClearWELL technology applied to clean well immediately after workover	
Inspection Date		Feb-21	Jun-22	Jan-23	Apr-23	Oct-23	Apr-25	Dec-25
Depth (m)	Section (")							
100	1	X	X	X	X	X	X	
200	1	X	X	X	X	X		ZERO SCALE AFTER 8 MONTHS RUNTIME
300	1	X	X	X	X	X		
400	1	X	X	X	X	X		
500	1	X	X	X	X	X		
600	0.875	X	X	X	X	X		
700	0.875	X	X	X	X	X		
800	0.875	X	X	X	X	X		
900	0.875	X	X	X	X	X		
1000	1.5	X	X	X	X	X	X	

CONCLUSION

This deployment marks a milestone for improved artificial lift reliability in scale-prone environments. By unlocking a chemical-free, long-term method to mitigate severe downhole scale, ClearWELL™ has proven that oil and gas operators can achieve maximum asset performance alongside long-term sustainability.