CASE STUDY

ClearWELL
Continuous Scale Control

CLEARWELL DOUBLES RUN-TIME AND INCREASES PRODUCTION RATES BY 42-50% IN TWO PCP WELLS IN OMAN.

LOCATION: Oman **APPLICATION:** Progressing Cavity Pump Oil Wells




BEFORE CLEARWELL™

Two progressing cavity pump (PCP) wells in Oman were suffering from calcite scale deposition, which was severely affecting the pumping equipment. Scale had been observed on both the rod strings and production tubing and the wells were experiencing multiple equipment failures with a run life of approximately eight months before intervention was necessary.

Unfortunately, neither well had an injection line, which made preventive chemical treatment unfeasible. Installation of an injection system was ruled out due to previous unsuccessful attempts in nearby wells. Consequently, the most viable course of action was to implement acid batch treatments despite the increased risk of corrosion to the tubing and pumping equipment, which subsequently led to more frequent replacements.

As an alternative solution, ClearWELL's non-invasive, electromagnetic technology was trialled by the operator with the primary objective of extending the lifespan of the pumps by at least a factor of two, thereby reducing production loss, chemical use and equipment replacement. This would also reduce the HSE risk of chemical handling.

KEY FACTS

- **An eco-friendly electrical solution.**
- **A reduced requirement for chemicals and interventions, contributing to a lower risk and carbon footprint.**
- **ClearWELL™ controls scale in deep sections of the well where traditional chemicals fall short.**
- **ClearWELL™ demonstrated effective prevention of calcite scaling in two wells and on PCP equipment.**
- **Equipment run-time more than doubled with no scale-related equipment failures.**
- **Average monthly oil production increased in well 1 by over 40% from 760 BBL to 1,081 BBL (over 12 months) and in well 2 by over 50% from 5,611 BBL to 8,454 BBL (over 4 months).**
- **ClearWELL™ eliminated the need for remedial acid washes, reducing cost, downtime and the HSE risk in handling and transportation.**
- **Production losses were minimised by eliminating scale-related intervention downtime.**

THE SOLUTION

Downhole scale deposition poses significant challenges for artificial lift wells, as it leads to increased power demand on the drive motor and premature equipment failure. Chemical treatments often struggle to effectively target all areas of scale deposition and acid treatments can be detrimental to equipment integrity, making it crucial to find a more effective solution.

ClearWELL™'s electromagnetic field (EMF) prevents scale deposition in the well and on downhole equipment. The EMF travels from the wellhead, down into the well, reaching equipment in deep sections not normally protected by chemical injection. ClearWELL™ also eliminates the need for intervention and can be installed at surface while the well is online.

Prior to installation, an analysis of the well architecture and its downhole conditions was conducted. EMF simulation modelling was undertaken, along with scaling predictions and onsite testing, to provide performance assurance.

The wellsite installation took around two days for both wells and specialist equipment was used to ensure an effective electromagnetic field (EMF) was propagating into the well, without any loss to nearby flowlines or metal pipework. One advantage of this device is that its output can be continuously monitored via a satellite connection, with any performance issues reported back to a secure online portal.

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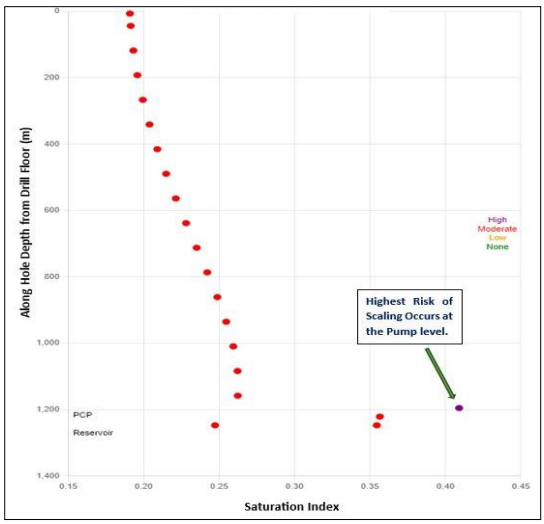
Saturation index plot showing risk and severity of scaling in well 1.



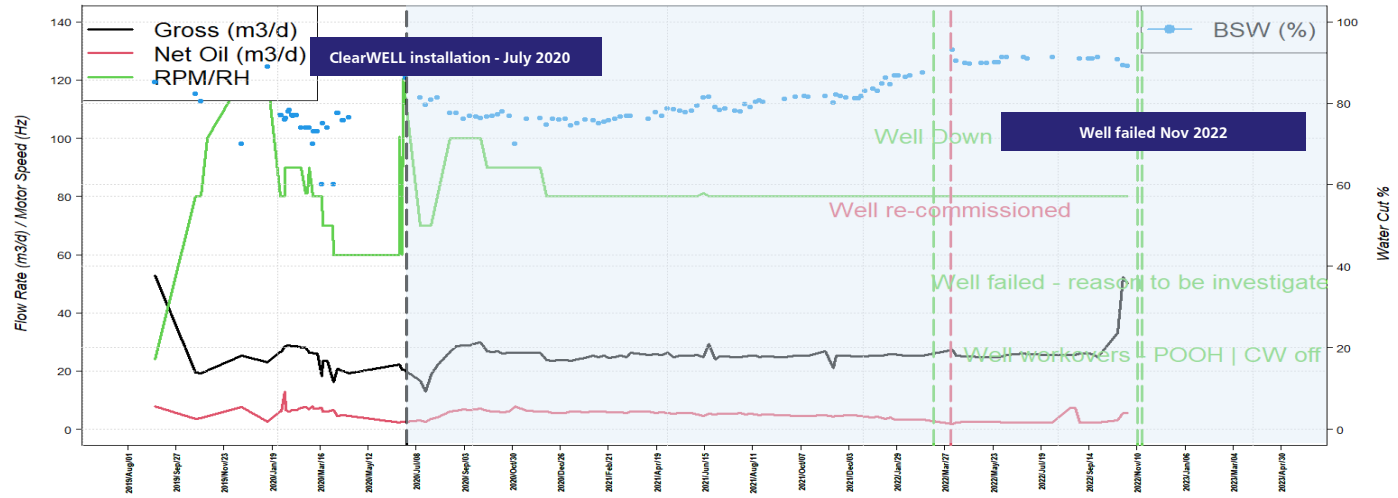
AFTER CLEARWELL™

After installing ClearWELL™ the gross produced volume, net oil, motor frequency and basic sediment and water rates were shown to stabilise and remain more constant. Prior to ClearWELL™ the rates varied dramatically, which can be seen in the charts below. In well one, run-time was increased from 8 months to 20 months at which point the trial was ended. In well two, run-time increased from 9 months to 15 months with the end of the trial brought about by a well failure from tubing corrosion. Visual inspections confirmed the prevention of scale, highlighting the effectiveness of ClearWELL™ as an alternative to remedial treatments.

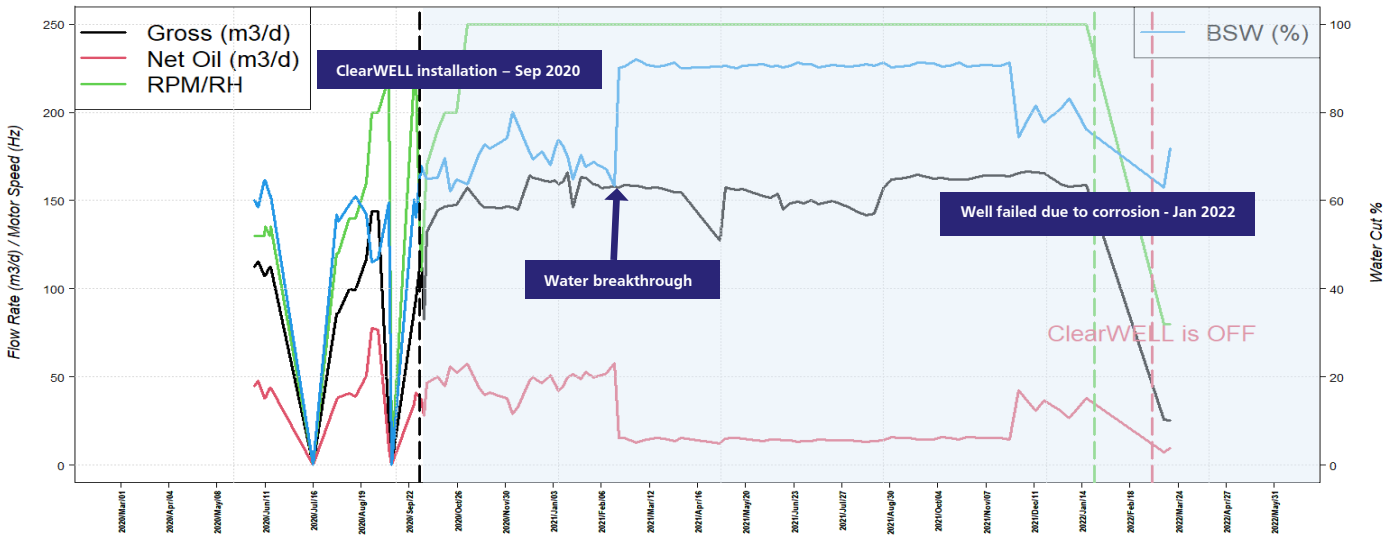
With improved run-time and production rates, plus visible absence of scale, both well trials were considered a success.

Well Performance Before and After Installing ClearWELL™.

Well One - After the installation, pump performance and flow rates were maintained.



Well Two - After the installation, pump performance and flow rates were maintained.



ClearWELL

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Visual inspection of the pump rods showed no scale in April 2022, over 18 months after installing ClearWELL™.

THE PROCESS

- The ClearWELL™ unit is connected to production equipment at the surface wellhead – no intervention required, no loss of production.
- The unit transmits a pulsed radio frequency signal down into the wellbore or along flowlines and equipment. The pulsed signal delivers energy to the scaling ions, controlling precipitation, keeping the liquid below saturation and minimising scale growth on production equipment.
- ClearWELL use satellite monitoring to ensure optimum unit performance. Where required personnel perform regular non-intrusive equipment checks.
- ClearWELL systems are low power consumption and supplied as a certified Class 1, Zone 1. The AC signal system is corrosion neutral, no reported gauge signal interference.

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