

CASE STUDY

CLEARWELL CONTROLS SCALE WHERE PUMPED INHIBITORS CANNOT REACH.

LOCATION: Mississippi, USA.

APPLICATION: Jet Pump Artificial Lift Oil and Gas Well



BEFORE CLEARWELL™

A horizontal jet pump well, producing from the Tuscaloosa marine shale formation in Amite County, Mississippi, was brought online in 2018 with strong production. Over time the reservoir pressure declined, requiring higher drawdown to maintain production levels. This increased the scaling potential and calcite deposition had become an increasing problem, restricting the pump and resulting in inefficient production.

The jet pump was installed in the vertical section of the well, at 11,390 ftTVD (11,440 ftMD) and used a light oil power fluid with an API gravity of 40.6.

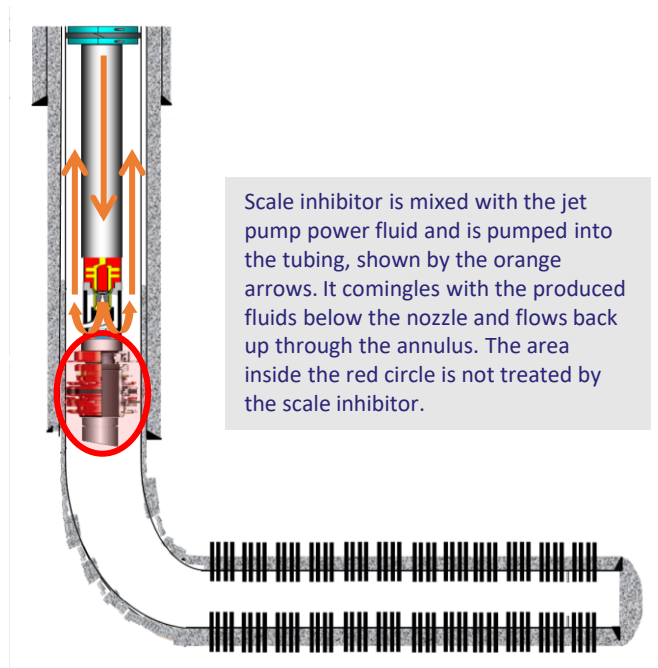
The operator began treating the scale with continuous injection of a chemical inhibitor at 75ppm, mixed with the power fluid. By April 2022, evidence of calcite deposits on the pump began to increase, leading to more frequent pump pulls, downtime, and repair costs. The images **opposite and overleaf** demonstrate the level of scaling present.

The scale problem was compounded as the inhibitor was unable to reach the well sections below the mixing zone underneath the nozzle of the jet pump, due to the opposing flow direction of the lifted reservoir fluids.

With in-well scaling continuing to inhibit performance, the operator decided to seek out an alternative solution to the challenge. Scales squeezes and acid clean-outs carry the possibility of reacting with the shale formation and swelling shales have the potential to plug the fracture channels, so this was not a viable option.

Looking at ClearWELL's track record of success, the operator decided to trial our well-proven electro-magnetic treatment technology in their well for the first time.

Well Schematic.



(Continued)



Images: Pump components in April 2022 before installing ClearWELL™.

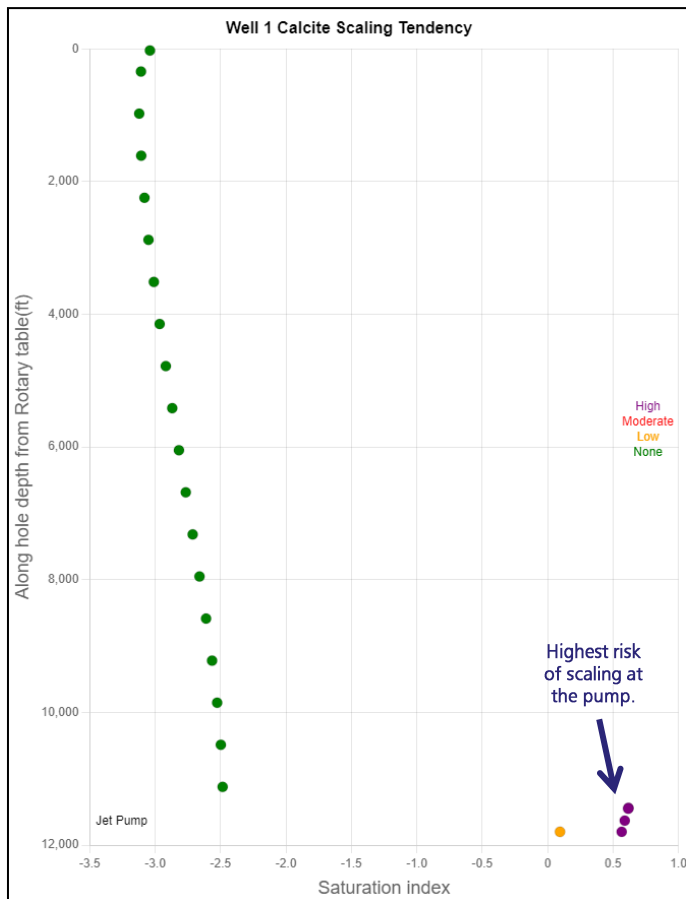
AFTER CLEARWELL™

Analysing the well schematics and downhole conditions, such as the pressure, temperature and flow rates, our scale prediction software confirmed that the location of the jet pump posed the highest risk of calcite formation.

With in-house simulations and site testing complete, we installed a ClearWELL™ unit to the wellhead in February 2023. A small volume of acid was pumped into the well prior to the installation, to clean the packer and remove any pre-existing scale deposits from the upper completion.

Since installation of a ClearWELL™ unit, the well has maintained an elevated and stable production rate. Three months later, to test the efficacy of ClearWELL™, the operator pulled the pump from the well for a full inspection and the images below and overleaf show that all equipment remained scale-free.

Saturation Index Plot Showing Risk And Severity Of Scaling Related To Well Depth.

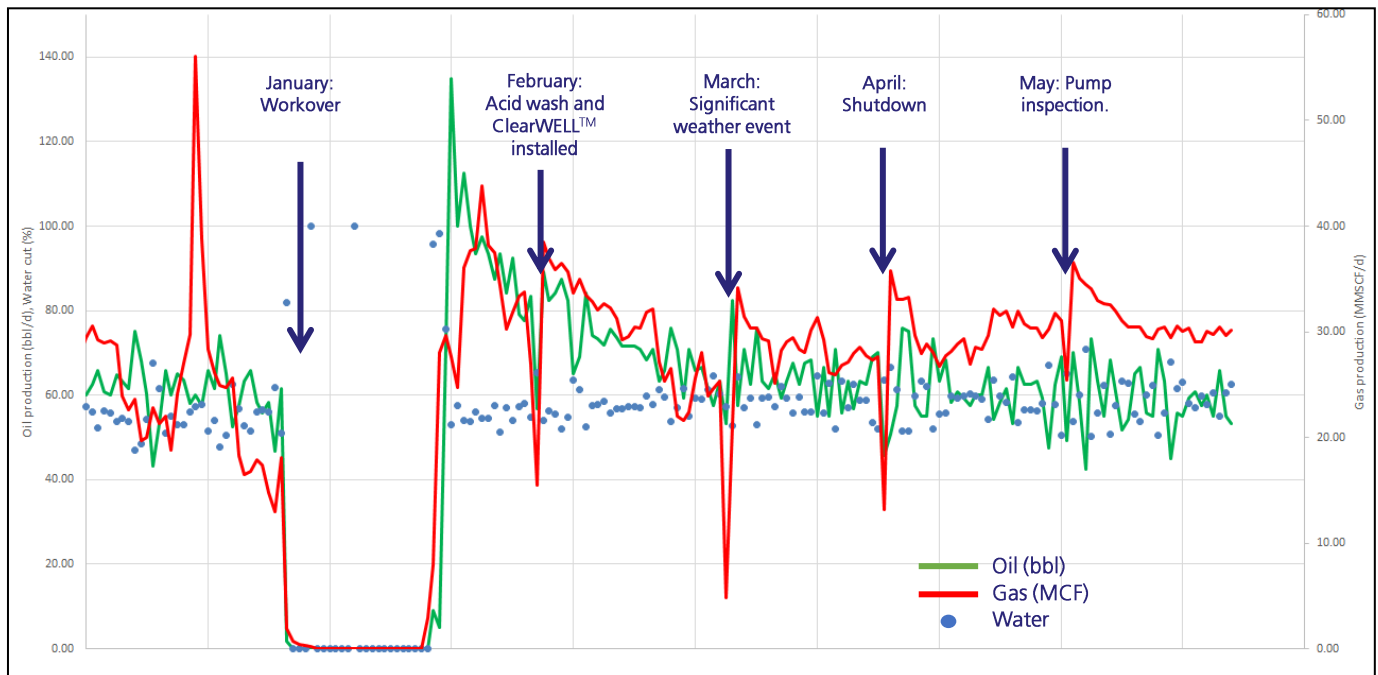




Images: Pump components in May 2023 three months after installing ClearWELL™.



Well Performance Chart Before and 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.