

CASE STUDY

CLEARWELL RESOLVES HALITE AND ELIMINATES WATER FLUSHES IN MULTIPLE ARTIFICIAL LIFT GAS WELLS.

LOCATION: Pennsylvania, USA.

APPLICATION: Plunger Lift Gas Wells.



BEFORE CLEARWELL™

Four plunger lift gas wells across two well pads, located in Pennsylvania, USA, were experiencing salting issues in the upper production tubing, surface equipment, flowlines and plunger lubricator. The issue had been treated by continuous injection of freshwater to dissolve and lift the salt from the wells, however a compressor replacement and lowering of the injection line pressure, from around 180psi to 50psi, had resulted in much greater levels of deposition.

The issue had become so severe that three of the wells were salting off every 2-3 days and would not flow. Well 1 and 2 suffered from severe deposition in the production tubing and plunger lubricators and well 3 from severe issues in the production tubing, wellhead, surface flowlines and motor valve at the gas production unit (GPU). The operator explained: "Around 0.75 bbls of water was being pumped down the casing on both wells every day to no effect and the plungers were salting off in the lubricators or tubing nearly every single trip. Hot freshwater soaks on the tubing/casing almost every other day did help but the plungers were still unable to run for more than a few trips."

The salting issue in well 4 was not quite as severe, but similar to well 3, it was concentrated on the near surface production tubing and surface equipment. It required flushes once or twice per month to maintain flow and prevent the plungers getting stuck at surface. Overall, the average monthly production across the four wells was severely constrained by the severity of the salting and downtime.

THE SOLUTION

Downhole salt deposition poses significant challenges for many wells due to its speed of deposition and its impact on production and downtime. It's traditionally treated by continuously injecting or flushing freshwater but this poses issues in some locations in terms of obtaining the large quantities required plus treatment and disposal.

KEY FACTS

- ClearWELL™ controls salt buildup in downhole and surface equipment.
- ClearWELL™ can reinstate flow rates to levels commensurate with normal production and no salting.
- For the worst affected well in this study, the production rate increased by 50%.
- ClearWELL™ reduces the amount of pumped freshwater, resulting in reduced OPEX and a lower carbon footprint from personnel, services, transportation and processing.
- One unit can treat two co-located wells, doubling efficiency.
- In wells that have extremely high concentrations of salt, freshwater injection can be combined with ClearWELL™ to manage the issue, or one unit can be used per well.
- ClearWELL™ is an eco-friendly electrical solution.

Salt deposition in artificial lift wells leads to increased power demand on the drive motor and premature equipment failure. Water treatments can struggle to effectively target all areas of deposition making it crucial to find a more effective solution.

ClearWELL™'s electromagnetic field (EMF) prevents salt deposition in the well and on downhole and surface equipment. The EMF travels from the wellhead into the well, reaching equipment in deep sections that may not otherwise be treated effectively by water injection. ClearWELL™ also reduces the need for remedial intervention, downtime and deferred production. It is installed at surface while the well is online.

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

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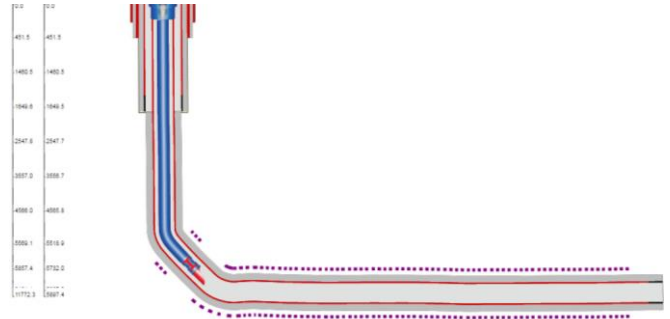
AFTER CLEARWELL™

One ClearWELL™ unit was used on each well pad to service two wells in tandem, so two units were installed for the four wells. A freshwater heavy flush allowed a clean start for each well and in consultation with the ClearWELL team, some modifications were made to the wells to improve signal propagation and more direct treatment of the halite. These modifications included switching water injection from the production casing to the production tubing with an increase in pressure to 96 psi and the application of insulator gaskets to the dump lines on well 3 to isolate ClearWELL™'s electromagnetic signal transmission.

Six months after the ClearWELL™ installations, the operator reported that they had successfully eliminated the requirement for water flushes across all four wells. Water injection on well 3 had been completely eliminated and on well 1 and 2 had been significantly reduced. Water injection had never been used on well 4 as it was the least problematic. This translated to an overall reduction in freshwater usage of 50% for well 1 and 2 and 25% for well 3 and 4, saving around \$54,000 per annum across the two well pads, including personnel costs.

The operator added: **“Not only did ClearWELL solve our salt issues and downtime across all wells, but on well 3, the worst affected, we were able to open up the MAF valve on our casing line and gain an additional 50% increase in production.”**

So far, seven units have been installed for this operator between November 2022 and February 2024, actively protecting 14 wells from scale and/or salt deposition. The two units featured in this four-well case study were installed in October 2023 and have continued to provide effective 24/7 preventative treatment for halite.



Simple Schematic (above) and photo (below) of Well 3.



THE PROCESS

- The ClearWELL™ unit is connected to production equipment at the surface wellhead – no intervention, 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.