CASE HISTORY

Micro Emulsion Solution Integrated with Spectrum ESP Increases Oil Production by 400%

Achieved rigless through ESP stimulation with harmless non acidic fluid

Badr Petroleum Company (BAPETCO) put a new well on production in 2019. After a few months of production the well stabilized production at 400 bbld. A workover was performed on the well in 2020 to replace a failed Electrical Submersible Pump (ESP). The failed ESP was completely plugged with solids including proppant flow back. After the new ESP was installed, the workover caused further wellbore damage and the wells productivity index reduced further. This resulted in **BAPETCO** being forced to run the ESP on intermittent production, due to pump off condition, as the well could not sustain production. With intermittent production the well was effectively producing net 75 barrels oil per day, an 81% reduction in oil production. The intermittent production caused further complications with the ESP experiencing frequent stuck pump condition during the many pump restarts which was a concern for the system runlife.

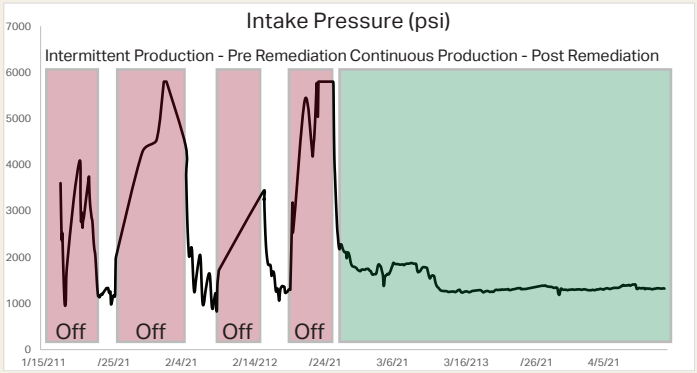
Approaching the Problem Through Collaboration

Alkhorayef Petroleum in collaboration with its production chemical partner, **SAS Production Services**, approached **BAPETCO** to analyze the problem and through close collaboration between the three groups of engineers concluded the wellbore damage was a result of several potential factors:

- Residual (unremoved) mud filtercake from the drilling operation
- Fines migration from the initial year of production
- In-situ downhole emulsion from the increased water cut blocking the near wellbore pores
- Previous workover operations utilizing KCL kill fluid caused further wellbore damage

Alkhorayef Petroleum in collaboration with **SAS** proposed a unique micro emulsion blend solution. This unique solution is non-acidic and environmentally safe and most importantly could be pumped through the existing ESP without causing any harm to the elastomers, avoiding the need to perform a workover to remediate the well. The micro-emulsion was able to remove the effects of the damage due to workover intervention and restoring the near wellbore to its original clean state, remove any in-situ emulsion block, water wet the formation sand grains and packed proppant to allow oil to flow easier through the pore spaces.

Evidence of the Reservoir Damage on the Pulled ESP



Results That Beat Expectations

The remediation job was completed successfully in early 2021, the well productivity index has been restored to its inital condition when the well was first drilled and net oil production restored to 300 bbld with a 50% water cut. This is a **400% improvement** from the pre remediation oil production. The well is now on continuous production again ensuring sustained production and eliminating the need for frequent starts and stops ensuring the runlife of the ESP.

RESULT

- Sucessfully remove severe wellbore damage using unique micro emulsion chemical solution
- Restored well productivity and increased net oil production by **400%** from **75bbld to 300bbld**
- Returned the well to continuous production after it was being run on intermittent production prior to remediation job reducing risk of ESP premature failure

BACKGROUND

- Well suffered severe wellbore damage from drilling and workover operations
- Oil Production dropped from 400bbld to 75 bbld
- Well run on intermittent production after workover due to low PI causing ESP pump off condition.
- Seeking a solution for remediation that could be performed without the need for a further workover to minimize cost of intervention

SOLUTION

- Collaborative approach between **BAPETCO, Alkhorayef and SAS Production Services** to identify potential causes
- Identified micro emulsion chemical solution to solve the problem
- Close follow up post remediation using realtime data to ensure sustainability of solution

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