CASE STUDY

EVALUATION OF AN INJECTION DISTRIBUTION BY **STREAM**™ IN HORIZONTAL WATER INJECTOR ENABLED THE OPERATOR TO ASSESS THE EFFICIENCY OF THE $CaCO_3$ TREATMENT

Location: Middle East

Well type: horizontal water injector

Average injection rate: 1500 bpd

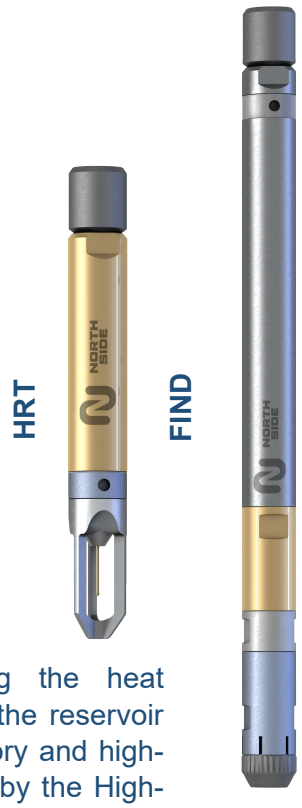
Challenge: to evaluate $CaCO_3$ treatment efficiency of the horizontal open hoe water injection well.

Objective: to assess changes in water injection distribution before and after the $CaCO_3$ treatment.

Solution: the injection profile evaluation was proposed to be done by the STREAM™ including T-FLOW and FIND technologies. Such a combination of technologies enables construction of detailed water injection profiles across the horizontal section of the well addressing expected redistribution of injection after $CaCO_3$ treatment.

STREAM™ (**S**PINNERLESS **T**ECHNOLOGIES for **R**ELIABLE **E**VALUATION, **A**NALYSIS, and **M**ODELING of well-reservoir flow)

A powerful suite of tools and technologies that provide high-resolution and accurate logging capabilities. STREAM is an integration of FIND, TFT, and T-FLOW technologies, working in perfect harmony to unlock unparalleled insights into the processes occurring inside and beyond the wellbore.



T-FLOW (Temperature Modeling)

The math solver allows predicting the heat exchange between the wellbore and the reservoir based on hydro/ thermo-dynamic theory and high-resolution temperature data acquired by the High-Resolution Temperature Tool (HRT). The method provides a detailed reservoir production/injection profile for open/cased hole wells with vertical, deviated, or horizontal trajectories.

FIND (Flow Identifying Noise Detector)

A new-generation spectral noise logging tool records data by four channels with different frequency ranges and amplification to signal. It allows to provide detailed full-spectrum acoustic profile without distortion, including wellbore/reservoir flow intervals detailing, fractures localization, leak detection, and flow behind the casing determination.

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Results

According to the T-FLOW profiling, which was done before the $CaCO_3$ treatment, a detailed injection profile revealed a non-uniform distribution of injection and localized the main injection zone across the first half of the open hole section. The FIND's Channel 4 data confirms the T-FLOW profile indicating the major high-frequency horizontal anomalies across the main injection zone related to reservoir fractured flow.

The T-FLOW profiling conducted after the $CaCO_3$ treatment shows explicit changes of profile and more uniform distribution of water injection (refer to the chart below). The FIND's Channel 4 data presents drastic changes in reservoir flow response by the spiky type of horizontal noise anomalies across the middle section of the logging interval confirming injection distribution changes.

Major outcomes

- detailed injection profiles before and after the treatment
- confirmed redistribution of the injection after the treatment
- STREAM™ as a reliable suite to evaluate the efficiency of the $CaCO_3$ treatment