



CASE STUDY

EVALUATION OF AN INJECTION DISTRIBUTION BY **STREAM™** IN HORIZONTAL WATER INJECTOR ENABLED THE OPERATOR TO ASSESS THE EFFICIENCY OF THE CaCO₃ TREATMENT

Location: Middle East

Well type: horizontal water injector

Average injection rate: 2200 bpd

Challenge: non-uniform injection distribution across the open section of the well before CaCO₃ planned treatment for leveling of the injection profile. The client requested to capture the CaCO₃ treatment effect on the reservoir injection and acoustic profiles.

Objective: evaluate the detailed injection profile before and after the CaCO₃ treatment.

Solution: the injection profile evaluation was proposed to be done by the **STREAM™** including T-FLOW and FIND technologies. Such a combination technologies enables to provide a detailed water injection distribution across the horizontal section of the well with precise localization of main injection intervals and captures a full spectrum of a noise signal.

STREAM™ (SPINNERLESS TECHNOLOGIES for RELIABLE EVALUATION, ANALYSIS, and MODELING of well-reservoir flow)

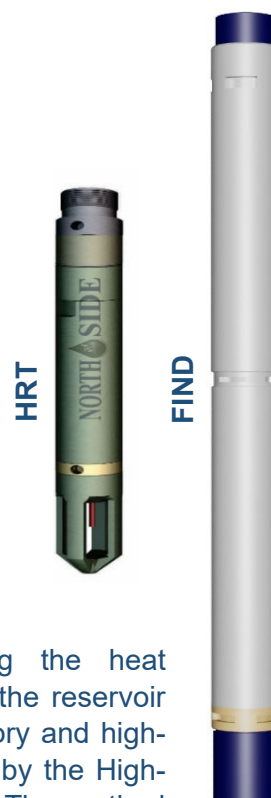
A powerful suite of tools and technologies that provide high-resolution and accurate logging capabilities. **STREAM** is an integration of FIND, TFT, and T-FLOW technologies, working in perfect harmony to unlock unparalleled insights into the processes occurring inside and beyond the wellbore.

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 CaCO₃ 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 from the 7" liner shoe. The FIND's Channel 3 data confirms the T-FLOW profile indicating the major high amplitude/frequency uniform formation noise signal across the main injection zone.

The T-FLOW profiling conducted after the CaCO₃ treatment showed almost the same distribution of the main injection zone with minor changes in profile. However, the FIND's Channel 4 data presented drastic changes in reservoir flow response with the spiky type of noise signal. This type of response most probably confirms the acoustic effect from CaCO₃ particles, which were squeezed into the formation across the main injection zone during the treatment.

Major outcomes

- detailed injection profiles before and after the CaCO₃ treatment
- use FIND as a reliable technology to evaluate the efficiency of the CaCO₃ treatment
- further optimization of the CaCO₃ treatment in terms of particles size and mixture volume

