CASE STUDY

EVALUATION OF AN INJECTION PROFILE AND LOCALIZATION OF THE FORMATION FRACTURE IN HORIZONTAL WATER INJECTOR BY STREAM™ ALLOWED THE OPERATOR TO OPTIMIZE THE CONFORMANCE

Location: Middle East

Well type: horizontal water injector

Injection rate: 1800 bpd

Challenge: understanding of the injection distribution (conformance) across the open section of the well in order to maintain continuous pressure support and sustain stable production. Regular water injection profiling helps the identification of preliminary water breakthroughs in oil producers, hence, optimize the WRM.

Objective: determine the detailed injection profile and localize possible formation fractures.

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 to assess the reservoir flow with a precise localization of main injection intervals as well as possible formation fractures.

STREAM™ (SPINNERLESS **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 Temperature Modeling, a detailed injection profile revealed a non-uniform distribution of injection and localized the fracture-type injection zone. There is an explicit visualization of such distribution in the "Warmback color map" column on the Chart below.

The FIND data confirms the T-FLOW profile highlighting the presence of the formation fracture and revealing an injection flow into the formation across the remaining part of the lateral.

Major outcomes

- detailed injection profile was constructed
- main injection zone was determined
- formation fracture was successfully localized
- the log conclusions allowed the operator to optimize the injection conformance

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