CASE STUDY

DETERMINATION OF THE INJECTION BEHIND THE LINER BY THE **STREAM**™ SUITE IN HORIZONTAL WATER INJECTOR

Location: Middle East

Well type: horizontal water injector.

Average injection rate: 3000 bpd

Challenge:
High WI rate at 0 PSI wellhead pressure. Suspected fractured zones of injection.

Objectives:
Evaluate the injection profile across the open hole horizontal section of the well as well as behind the 7" liner for further well performance optimization.

Solution:
T-FLOW technology was performed to determine the injection profile through High Resolution Temperature (HRT) acquisition and subsequent temperature modeling.
Flow Identifying Noise Detector (FIND) logging was conducted to record the noise response during the injection stage for precise localization of the wellbore and reservoir flow intervals as well as possible formation fractures.

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 and T-FLOW technologies, working in perfect harmony to unlock unparalleled insights into the injection-production 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 using as an input a high-resolution temperature data acquired by the **High-Resolution Temperature (HRT)** tool. The method provides detailed injection-production profile related to formation flow.

FIND

FIND (Flow Identifying Noise Detector)
A cutting-edge spectral noise logging tool captures data through four channels, each channel is tailored to specific frequency range and signal amplification, facilitating detailed acoustic profiling without the need for artificial post-processing algorithms to be applied. This tool enables precise identification of intervals with wellbore and formation flow, flow behind casing and accurate detection of fractures.

HRT

CASE STUDY

DETERMINATION OF THE INJECTION BEHIND THE LINER BY THE **STREAM**™ SUITE IN HORIZONTAL WATER INJECTOR

Results

The T-FLOW profile highlights significant injection occurring primarily behind the 7-inch liner, with portion of injection into the open hole zone just below the shoe.

The FIND Channel 1 displays a low-frequency noise anomaly (0.1-0.9 kHz) associated with flow within the wellbore. Meanwhile, FIND Channels 2 & 4 reveal high-frequency noise anomalies (2-60 kHz) oriented horizontally, indicating flow through fractures in the formation (unconformity zone). GR readings from logging runs show higher values compared to open hole GR readings (depicted by the black curve in the chart) within the injection zone, attributed to continuous water injection. Furthermore, the interval of elevated GR readings aligns with the presence of an unconformity formation, where the injection is directed.

Major outcomes

- Confirmation of the flow behind the liner by FIND, T-FLOW and GR

- Quantitative spinnerless injection profiling behind the liner by T-FLOW

- Differentiation between wellbore and formation fractured flow intervals by split-channels FIND

northsidetools.com