



## CASE STUDY

### LEAK DETECTION IN VERTICAL WATER INJECTION WELL BY FIND™

**Location:** West Africa

**Well type:** offshore vertical water injector

**Challenge:** a connection between the tubing and A-annulus was observed during the latest SIT, suspecting the tubing leak. The well was temporary closed for further investigation to locate the depth of the tubing leak.

**Objective:** precise tubing leak depth detection for further repair.

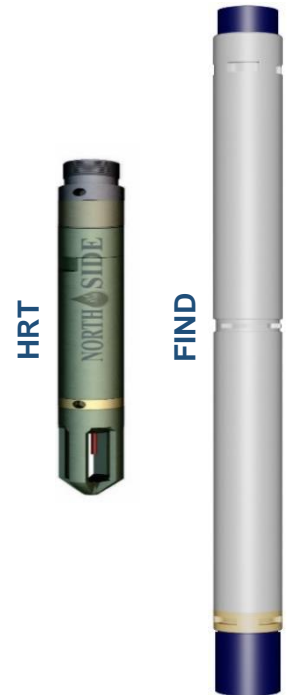
**Solution:** North Side's Flow Identifying Noise Detector along with High-Resolution Temperature Tool were suggested for this well aiming to detect and locate a leak point.

In addition, the client would receive a full spectrum of the noise signal (4 channels) without distortion and high precision temperature curves across the whole logging interval, which could result in extra conclusions, such as fluid movements in annulus and channeling behind the casing, if any.

The survey was proposed to be done in two runs: the first one during the static conditions to obtain the base line, and the second one while injecting water in A-annulus to capture the leak point.

#### HRT (High-Resolution Temperature Tool)

The High-Resolution Temperature Tool (HRT) is a portable and rigid solution for detailed analysis of the downhole temperature profile in vertical, deviated, and horizontal wells. The HRT could be used for numerical temperature modeling such as North Side T-FLOW Technology. The Tool is independently programmable for the duration of logging and fully compatible with other North Side PL tools and modules.



#### 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

The FIND injection pass data revealed the tubing leak point (refer to the chart below) by high amplitude & magnitude anomalies on a high-frequency domain (Channel 2) and low-frequency domain (Channel 3). The conclusion is also confirmed by a well-marked spiky anomaly on the HRT curve of the injection pass. However, there is no fluctuation in static conditions either on the HRT curve or FIND response.

There is an additional wave-shaped temperature anomaly observed on the HRT curve during both static and injection passes below the tubing leak point. The FIND readings showed explicit noise response on the high-frequency domain (Channel 2) across the same interval. The amplitude of the noise anomaly during the injection pass was higher, and the magnitude was more localized. Therefore, mentioned HRT and FIND anomalies were interpreted as an indication of processes behind the casing with possible casing leak.

### Major outcomes

- tubing leak point was localized
- interval of processes behind the casing and possible casing leak were detected
- recommendation to conduct the corrosion logging and evaluate the corrosion severity across the tubing leak point as well as the condition of the casing

