# CASE STUDY

## LEAK DETECTION IN VERTICAL WATER INJECTOR BY **FIND** & HIGH-RESOLUTION TEMPERATURE TOOL

**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:** FIND Technology was proposed along with High-Resolution Temperature tool aiming to detect and localize a leak point precisely.

In addition, the client would receive a full spectrum of the noise data (4 independent channels) and high-resolution temperature curves across the whole logging interval, which could result in extra conclusions, such as localization of fluid movement inside the 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 into the A-annulus to capture the leak point.

### High-Resolution Temperature Tool

A fully autonomous High-Resolution Temperature (HRT) tool is designed for accurate measurement of downhole temperature standalone as well as part of Production Logging Tools of North Side.

### 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, which allows the acquisition of the entire noise spectrum data without distortion.

**Input data:** amplified spectral noise data recorded during the stationary measurements in high-resolution mode.

**Output data:** detailed reservoir acoustic profile, including wellbore/ formation flow intervals, fractures localization, leak detection, and flow behind the casing determination.

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### Results

The SNL injection pass data revealed the tubing leak point (refer to the chart below) by high amplitude noise 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 HPT curve of the injection pass.
There is an additional wave-shaped temperature anomaly observed on the HPT curve during both static and injection passes below the tubing leak point. The SNL 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 HPT and SNL anomalies were interpreted as an indication of channeling behind the casing with possible casing leak.

### Major outcomes

- tubing leak point was localized
- interval of flow behind the casing and possible casing leak were detected
- integrity evaluation of several barriers within one log