CASE HISTORY
CASED HOLE SERVICES - LEAK DETECTION

APPLICATION
Well Integrity, Cased Hole Services, Conventional Resources

TECHNOLOGY
Standard Flow Logging System (FLS) & Noise Tool

LOCATION
Continental Europe

CUSTOMER CHALLENGE
The customer's well was drilled within a heavy oil reservoir. Pressure tests had identified communication between the tubing and the annulus, so it was necessary to determine the location of the leak(s) to allow isolation so the well can return to production. The customer was confident that the tubing leak(s) were across the lower completion, so MPLT-Noise surveys were performed from the 4.5" x 3.5" cross-over at 1938m & the 7 5/8" Packer at 1987m MDBRT.

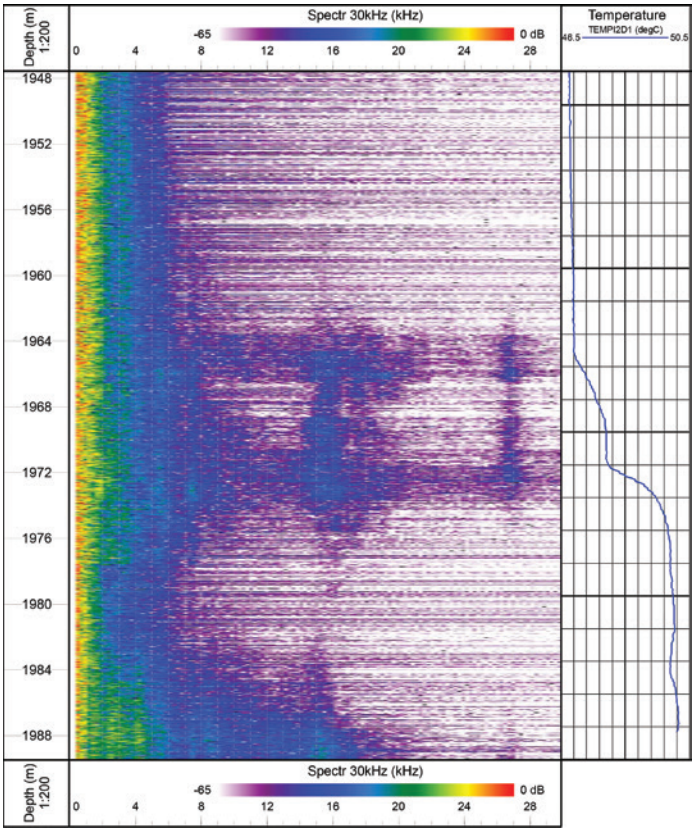
SDI was challenged to determine:
- The location of the 2 7/8" tubing leak(s) with Temperature, Spinner and Noise.
- Identify any other potential source of leak (Tubing Plug or 7 5/8" Packer).

SCIENTIFIC SOLUTION
A customized leak detection procedure was devised by Scientific Drilling to help resolve the customer's well integrity issues. A combined MPLT and Noise Tool solution was provided.

Two runs were performed with the following key discoveries by the Standard FLS & Noise Tool combination along with expert, in-house data analysis.

Run #1
The MPLT-Noise logs showed the main leak from SPM # 1 (1952.6m to 1955.1m MDBRT), with all of the injection water seen to exit the tubing (100% reduction in spinner). The whole well was cooled by the injection water flow from surface until 1955.1m MDBRT (bottom exit point) with no significant injection flow below (temperature geothermally increasing below 1955.1m MDBRT). The temperature below, however, did suggest a possible small leak from the plug/Packer (1°C difference suggesting warmer flow from below).

Run #2
The MPLT-Noise logs showed SPM # 1 was now sealed (0% fluid exit), with no communication between tubing and annulus now (i.e. no leak across SPM # 1: 1953.6m-1955.1m MDBRT). The main leak was now across SPM # 2 (1964.7m to 1967.6m MDBRT), with the majority of injection water seen to exit the tubing at this depth (73% reduction in spinner). The MPLT-Noise logs also shows a smaller leak in the tubing at 1971.9m MDBRT.



CUSTOMER VALUE
The data acquisition and interpretation provided enabled the customer to make informed decisions to remedy their well integrity issues.

Run #1
Based on the summary of results (with main leak from the SPM #1 and possible leak from below via the plug/Packer), the customer decided to set/replace the dummy valve in SPM # 1 (1953.6m to 1955.1m MDBRT). After setting/replacing the dummy valve in SPM # 1, communication still existed between tubing and annulus, so it was necessary to perform another MPLT-Noise tool run to check if SPM # 1 was still leaking or whether there was now another cause of the communication between tubing and annulus.

Run #2
Based on the summary of results (Run 2, with main leak from the SPM # 2, Tubing Leak at 1971.9m MDRT and a possible leak from below via the plug/Packer), the customer decided to set a pack-off to cover both communication with the annulus and exclude possible plug/Packer leak before returning the well to production.

Updated January 2018