



## SENSORNET DIGITAL LEAK DETECTION PREVENTS PIPELINE FROM GETTING TOO HOT AND STEAMY

Sensornet's Digital Pipeline Leak Detection system detected high temperature steam leaks for a Canadian oil operator. This system operated utilised the Sentinel DTS (Distributed Temperature Sensor) and operated at temperatures in excess of 220°C.

### CLIENT REQUIREMENTS

The client produces oil through the SAGD (Steam Assisted Gravity Drainage) process, which involves heating an "envelope" of steam to temperatures in excess of 200°C. Two parallel horizontal pipes are used. The upper piping injects steam and the lower one collects the water that results from the condensation of the injected steam and the crude oil or bitumen. The injected steam heats the crude oil or bitumen and lowers its viscosity which allows it to flow down into the lower pipeline.

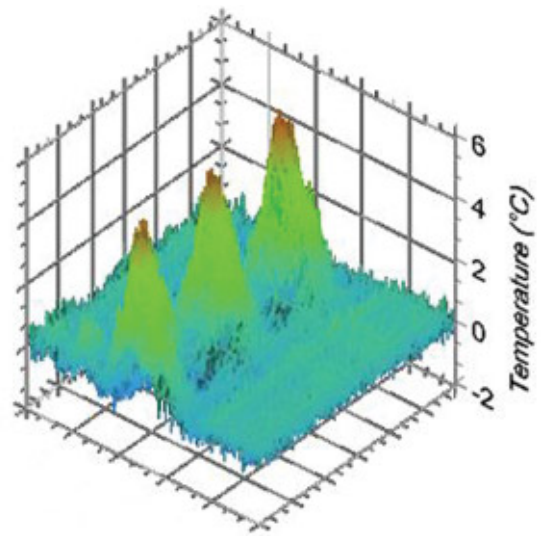
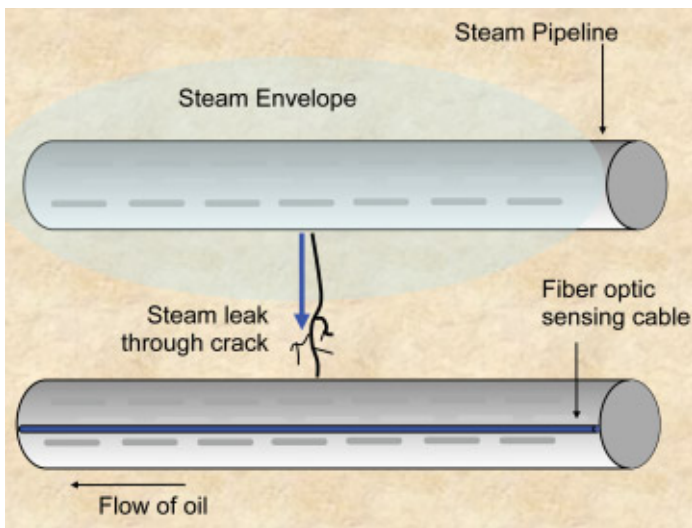
In certain cases pressure build up can cause cracks in the underground formation and steam moves rapidly through these cracks. This causes the steam to uneven steam distribution (as opposed to the desired "envelope") and the oil production rates drop rapidly. This is very expensive for the operator and so they need to locate these potential steam leakages so they can prevent them.

### THE MONITORING GAP

In this scenario the customer was utilizing two different technologies in an attempt to locate the steam leakages.

The first technology was point measurement sensors (thermocouples). However, because the point temperature sensors were not located in the precise location, it was not possible to detect the leak.

For the second technology, the customer was using a fibre optic Distributed Temperature Sensor (DTS) – NOT manufactured by Sensornet. There were two issues with this alternative DTS. Firstly, it did not have a measurement time fast enough to measure the leaks (which were intermittent in nature). Secondly, at these high temperatures and pressures, hydrogen in the pipeline had caused damage to the fibre and the existing fiber optic system could not provide useful data.



## THE SENSORNET SOLUTION

Sensornet used the Sentinel DTS-SR with a 10 second measurement time to monitor the sensing cable. The Sentinel DTS-SR discovered a leak at approximately 600m along the pipe. This was an intermittent leak with a 6 minute cycle time. In the thermal intensity graphs displayed to the right, you can see three occurrences of the leak. As can be seen from the 3D graph, in this case the leak caused a temperature change of approximately 5°C.

## SUBSTANTIAL BENEFITS

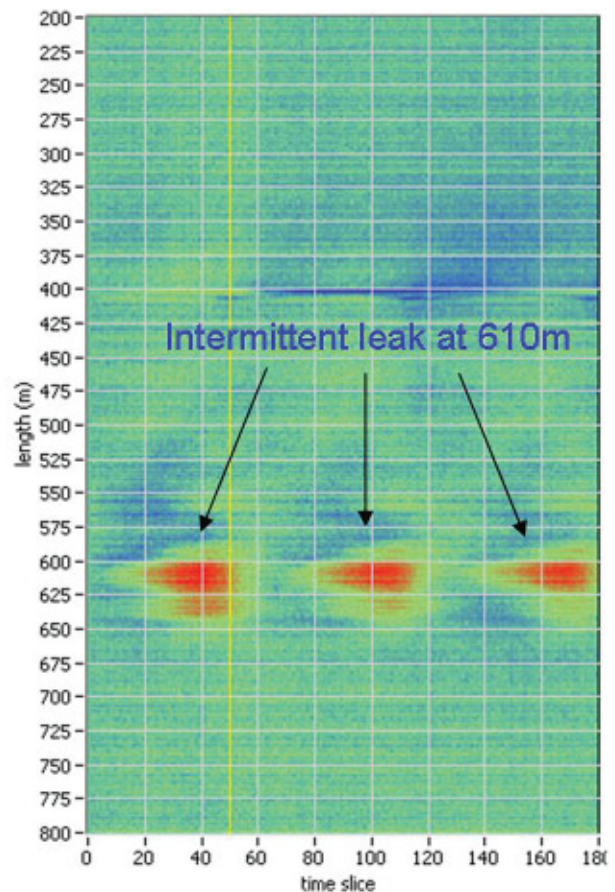
The operator was able to locate the leak using the Sentinel-DTS and take appropriate action to prevent this steam leakage and improve productivity. There were two options open to the operator, firstly to adjust the pressure of the steam to prevent the crack forming and monitor in real time. The second option is to repair the section where the crack has occurred through the use of a protective liner.

## THE SENSORNET ADVANTAGE

Of the three systems utilised (Sentinel DTS, thermocouple, and other DTS) only the Sentinel-DTS was able to detect and locate the leak.

The Sentinel-DTS is superior in two distinct ways to the other DTS. Firstly it is able to provide useful information even with fibre that has been damaged due to hydrogen ingress.

Secondly, the Sentinel-DTS is accurate even at very fast measurement times (in this case 10 seconds) and was able to measure the intermittent leaks. The Sentinel-DTS can be more than 1000 times faster than competing systems.



To close your monitoring gap, call +44 20 8236 2550 or visit [www.sensornet.co.uk](http://www.sensornet.co.uk)