



## LNG PIPELINE LEAK DETECTION MONITORING OFFERS PEACE OF MIND TO THE COMMUNITY AND ENVIRONMENT

Sensornet was sub contracted to provide leak detection monitoring on an LNG pipeline on the fringes of a populated city suburb in Texas, USA. The facilities are operated by a major Oil & Gas company whose LNG Plant and vessel offloading facility is nested in the picturesque bay. The aim was to implement a fibre optic distributed temperature sensing (DTS) system that would alert the plant operators of indication of fluid leakage to the surrounding environment, providing an early warning system to the company at the slightest indication of a leak and offering the local residents and the company peace of mind that the environment would not be polluted.

### CLIENT REQUIREMENTS

Two Vacuum Insulated Pipe (VIP) LNG transportation pipelines and a Burn Off Gas (BOG) pipeline were to be monitored for leaks that might be caused by any breach in the pipe works during normal operations at the LNG plant and off-loading bay. This monitoring system will be crucial to prevent any leakage of fluid from the pipelines into the environment by alerting the plant control room personnel through a series of alarms relayed to the plant's SCADA / DCS system.

### THE MONITORING GAP

Flow meters at the vessel and the plant ends of the pipeline were not able to capture minor leaks or breaches along the length of the pipes unless there was a significant pressure drop between the two ends. Valve positions and pipe jointing also presented vulnerable areas coupled with possible ground movement activities that could escalate a breach. The slightest indication of these activities needed to be captured and contained before they escalate into a major leakage. The Sensornet Sentinel™ DTS is capable of measuring temperature changes of 0.01°C, serving as an early warning tool in the event of fluid leakages.

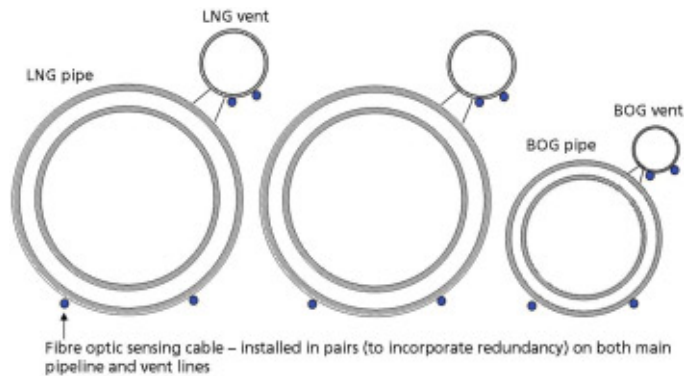
## THE SENSORNET SOLUTION

Sensornet have carried out studies on LNG pipeline monitoring using the cryogenic properties of LNG as the basis of monitoring temperature changes in the immediate environment of an LNG pipeline in the event of a leak. The United States Federal Energy Regulation Commission (FERC) has approved Sensornet's monitoring method for use in Vacuum Insulated Pipe (VIP) systems.

The LNG pipelines in this case were VIP pipes and Sensornet's solution offered a leak detection system that could detect leaks in the jacket and inner pipe by monitoring changes in the temperature of the vacuum space.

In this installation, micro-duct tubing was buried adjacent to each of the LNG pipelines and the BOG pipeline. Fibre was then blown into position using compressed air. The sensing fibre was configured in such a way as to detect any fluid ingress into the exhaust pipes from the main VIP pipes in the event of an inner pipe breach. The sensing cable was looped such that the return path was adjacent to the 2" exhaust pipe to detect fluid leakage in the event of a valve failure.

The installation of blown fibre system allowed for continued pipeline installation works to be completed before the fibre was blown through the ducts, jointed and terminated. The fibre loops were connected to the Sentinel™ DTS via an 8 channel Sensornet Multiplexer unit, providing further redundancy into the system in the event of a fibre break.



Sensornet's LNG Digital Leak Detection solution - providing full leak detection coverage of LNG pipelines and terminals

## SUBSTANTIAL BENEFITS

The Sensornet LNG Digital Leak Detection system provides non-intrusive protection over the entire length of the pipeline. In the event of leaks occurring, these can be detected in real time and the location pinpointed to within a few metres. This allows the response team to react instantly to minimise potential safety hazards and harm to the environment.

The highlight of this project was the ability of the system to measure, record and activate alarms at pre determined thresholds. Alarms were set to activate at  $-10^{\circ}\text{C}$  to indicate an LNG leak. LNG would normally be flowing through the pipeline at  $-196^{\circ}\text{C}$  and any breach would rapidly cool down the immediate surrounding of the fibre optic cable. Through the use of integration software, zones of interest along the pipeline were tagged and relayed directly via the client's SCADA / Honeywell system allowing events along the pipeline to be viewed in real time in the plant control room.

The visualisation of the temperature profile along the pipelines also gives the added benefit of preventing steel fatigue in the pipes by being able to control cool down operations. The extremely user friendly alarm software means that alarms can be relayed to management groups over their mobile phones or to remote desktops besides the control room display, giving an overall peace of mind.

## MEASURABLE PERFORMANCE

The Sentinel™ DTS offers the most advanced performance available today. Measurements were taken by the Sentinel™ DTS in real time and provided a resolution of  $0.01^{\circ}\text{C}$  along each 1250m length of pipe. For a 60km pipeline measurement points can be taken every 2m, thus providing over 100,000 points along the entire length of the pipe, providing the operator with total integrity over the entire length of the pipeline.

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

