

# A FUTUREPROOF APPROACH TO LEAK DETECTION

Atmos International's innovative, non-intrusive solutions for pipeline leak detection can be deployed anywhere they are needed

**▶ WITH** 3.5 million km of pipeline throughout the world and with this to increase by a further 12% by 2022, pipelines are still the safest form of transport for the supply of energy, as they are less exposed to environmental and socioeconomic risks. However, with the social movement to a clean and sustainable renewable energy economy, pipelines' future will depend on the technology that can be applied to their construction, operation and maintenance. The application and management of operational software and leak detection systems will play an important role.

This futureproofing approach is taken by the API 1175 pipeline leak detection programme management. API 1175 discusses the importance of leak detection technologies continuously improving and providing better security for pipelines. Its view is that there must be a focus by pipeline operators to select the right leak detection method and supporting components such as instrumentation and communication to make sure the system is working at the optimum performance. There also has to be a focus from leak detection vendors, such as Atmos International, to identify areas in their offering to provide improvements and new equipment to ensure the leak detection industry moves forward.

This article will discuss the new non-intrusive hardware technology that Atmos International (Atmos) has developed called the Atmos Eclipse unit. It will explain the functionality of the Atmos Eclipse unit, where it can be installed, the advantages the device offers to pipeline operators and where the technology has already been deployed.

## WHAT IS THE ATMOS ECLIPSE UNIT?

The Atmos Eclipse is a full, non-intrusive hardware solution that provides pressure, flow and temperature measurements to support all of Atmos leak detection systems such as Atmos Wave Flow and Atmos Pipe. It can measure bi-directional flow and speed of sound for density correction and also integrates cellular,

radio, standard RS485 and wired Ethernet to provide sensitive, real-time, pipeline leak detection anywhere it is needed.

The device samples the data at 60 Hz (60 samples a second) to allow for high levels of sensitivity, quick response time and accurate leak location and the unit has been designed to be easy to install, to be cost-effective and support rapid deployment. The installation of the device

can be completed with minimal to zero downtime of the pipeline.

The Atmos Eclipse unit has the following key benefits:

- Non-intrusive instrumentation such as pressure, flow and temperature
- Available inputs for two additional sensors such as external flow meters, pressure and temperature via 4–20 mA





- Cost-effective installation
- Rapid deployment across multiple pipelines
- Multiple communication options such as – wired Ethernet, line of sight radio, GSM (3/4G) and Modbus
- 60 Hz data acquisition rate
- Flash memory available in case of communication outages (up to 4.5 hours)
- Power 4.8 W at 110 V–240 V AC or 24 V DC, with solar/wind options
- Explosion-proof ATEX certified (ATEX/IECEx: Zone 1 Gas IIA, T6)
- -20 °C to +60 °C operating temperatures
- Non-intrusive pressure sensor down to 10–15 mbar (0.015 barg changes)
- Can be buried to a depth (max) of 2 m
- IP68 rated
- Pipe diameters 4" to 30"
- Cable entries - 4 x M20 x 1.56 g

**WHERE CAN IT BE INSTALLED?**

Atmos Eclipse has been designed to be installed on pipeline areas where previously it would have been a significant challenge not just from an engineering stance but also from a financial one. This was often due to lack of communication, power and intrusive tapping points for pressure sensors – a common issue seen on many pipelines around the world. A tapping point is seen as a risk point on the pipeline for both leaks and thefts. Pipeline operators generally limit the number of tapping points on the pipeline.

Short distance pipelines also benefit from Atmos Eclipse’s non-intrusive solution. Several units are now installed on tank farms, some using vertical fixings and within tight spaces.

As an enclosed unit, linked to powerful Atmos leak detection software such as Atmos Pipe and Atmos Wave Flow, Atmos Eclipse provides versatility and a solution to legacy pipelines.

**USING RELIABLE LEAK DETECTION SOFTWARE**

Since its inception as the first statistical volume balance system in 1995, Atmos Pipe has been at the forefront of leak detection technology. It is operational in many leading oil and gas companies worldwide.

Atmos Pipe is a statistical volume balance leak detection system. It uses the powerful Sequential Probability Ratio Test (SPRT) and pressure and flows analysis to optimise the leak detection.

Atmos understands that every pipeline has its own personality. The design of Atmos Pipe allows engineers to configure and tune each system to minimise the effect of:

- Instrument faults including telecommunication failures;
- Operational changes from shut-in to start-up and running;
- Fluid property changes;
- Seasonal changes or supply and demand variations; and
- Instrument drifts or calibrations.

Atmos Pipe identifies operational changes in the pipeline and continues to detect small leaks during transients. It provides leak detection and leak location when the line is in running and shut-in conditions.

**COMBINING RELIABILITY WITH ACCURACY**

Atmos Wave Flow is Atmos’ newest leak detection system that uses elements from both volume balance and negative pressure wave methods to optimise sensitivity, detection speed, reliability and accuracy. The detection system functions in all pipeline operations.

The mass, volume, or flow balance elements of Atmos Wave Flow is a proven industry method that has been

enhanced with additional algorithms to correct for instrumentation errors and uncertainties and automated learning capabilities to compensate for any measurement errors such as meter drift in the system. A real-time transient model (RTTM) corrects the actual flow difference instead of the inventory change.

Atmos Wave Flow also detects the wave caused by a leak. A negative pressure wave travels in both directions along a pipeline. Using fast response pressure meters, Atmos Wave filters the pressure signals to find those with the frequency and magnitude of a leak. The time at which the pressure signal reaches each pressure meter is used to determine the location of the leak extremely accurately.

Atmos Eclipse can work with an array of different pipeline products such as oil, water, diesel, petrol, jet fuel and butane.

**WHERE IS THIS TECHNOLOGY DEPLOYED?**

The Atmos Eclipse unit has already been installed on several pipelines around the world, from the UK to Europe, and is being deployed in Asia and Africa currently.

The hardware has allowed Atmos to provide a turnkey leak detection solution to many different pipelines such as; large pipeline networks covering thousands of kilometres delivering a range of different refined products, jetty pipelines, high consequence areas (HCA) pipelines such as river crossings, urban pipelines and remote pipelines; pipelines delivering products such as butane.

Long-distance pipelines have utilised Atmos Eclipse units in their valve pits instead of new tapping points to reduce the risk of leaks or theft activity.

Atmos Eclipse units have even been requested to provide protection on a river crossing pipeline that can be damaged by hippos fighting.

Since the introduction of the Atmos Eclipse unit at the end of 2018 over 100 of these units have been supplied for leak detection applications.

**For more information:**

This article was written by Harry Smith, sales and senior research engineer, Atmos International.

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