

# Pipeline Advanced Leak-Location System (PALS)

## *Background*

Accurately locating leaks in buried bulk and hydrant fuel pipelines is a time-consuming and expensive problem. This problem has both operational readiness and environmental implications to the Department of Defense (DoD).

The Pipeline Advanced Leak-Location System (PALS) is a portable, computer-controlled system that allows small leaks to be accurately located within a few feet. PALS verifies the existence of the leak and then quickly and accurately locates it. The pipeline can then be uncovered at the leak site and repaired.

Vista Research and NAVFAC Engineering and Expeditionary Warfare Center developed PALS under the Department of Defense's Environmental Security Technology Certification Program (ESTCP). Successful demonstration/validation tests were performed at four separate Navy, Army, Air Force and EPA facilities.

## *Technology*

PALS consists of three small accelerometers and pre-amplifiers, an analog to digital (A/D) acquisition card, and a field-worthy notebook computer to operate the PALS software. The sensors are attached with epoxy directly to the pipe wall. Each sensor measures the pipe vibration resulting from the acoustic signal generated by the turbulent flow through a hole in the pipe. This acoustic signal propagates at different velocities through the fluid, the pipe shell, and the interface between the pipe and fluid. Although PALS can differentiate these signals, the strongest signal is usually due to acoustic propagation in the fluid.

A pair of sensors bracket the leak and determine the location of the leak relative to one of the two sensors, called the "Reference" sensor. A third sensor that does not bracket the leak is used to measure the speed of propagation of the acoustic wave in the pipe or fluid. A leak-location measurement can take as little as 2 to 5 minutes to complete. PALS is operated using a Graphical User Interface (GUI) software package. PALS is easy to set up and can be operated by a field technician with a minimal amount of training.

## Technology Benefits

**Accurate Within Several Feet** - PALS locates leaks quickly and accurately, to within 1.5% of the distance between sensors—usually a matter of a few feet.

**Almost No Down Time** - PALS measurement can be made in a matter of minutes.

**Minimal Need For Excavation** - Because PALS can identify a leak within several feet of its actual location, the scope of the necessary excavation work is vastly reduced.

**Easily Installed At Routine Access Points** - PALS can be used on any underground pipeline system that can accommodate the placement of sensors at intervals along its length. Points of access to the pipeline, such as valve pits or aboveground manifolds, can be as far apart as 500 linear feet.

## Costs

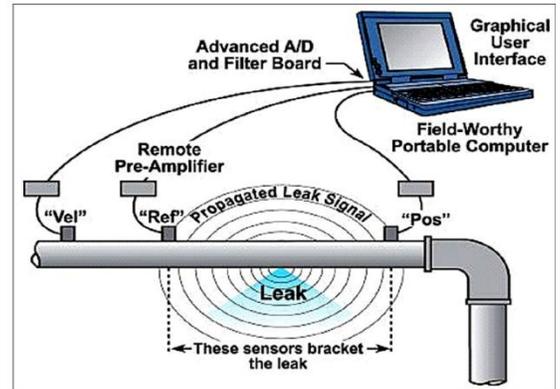
There is a 15 to 1 cost advantage of using PALS to locate a leak instead of excavation and a 4 to 1 cost advantage over using liquid-tracer methods. For example, for large pipelines, the cost for PALS service is as low as \$0.22 per linear foot compared to \$12.50 per linear foot for excavation and \$5.00 per linear foot for tracer methods. Furthermore, it is estimated that the cost of regulatory compliance using volumetric systems for leak detection and PALS for leak location is a factor of three smaller than liquid-tracer tests. It should be noted that actual costs are site specific and subject to change.

## Availability

Vista Leak Detection, Inc. can provide PALS equipment for purchase or provide PALS service. Since this technology and other competing technologies are not suitable for all potential applications, it is important for potential users to seek expert advice. NAVFAC Engineering and Expeditionary Warfare Center is available to provide assistance in evaluating potential leak detection technologies.

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