

# TRACER ELECTRONICS

## Water Leak Detection 101

An effective water leak detection strategy should always start with a basic water audit. A water leak detection program is essential to any utility owner and will quickly yield results, providing immediate reduction of water and revenue losses, and provides instant improvement in use of water resources.

A water audit should be designed to identify how much water is being lost, and how much the loss is costing the utility owner. To conduct an audit, one must verify/update system maps, test the master and source meters, update billing records, test residential meters, inspect water-measuring devices for proper sizing, installation and field check distribution controls and system operating procedures.

Identifying water loss is an integral part of this audit. “Unaccounted for water loss” is the difference between the water bought (produced) and the water sold (or otherwise accounted for). Regulation will soon dictate what percentage of loss is acceptable.

Basic water leak detection requires understanding of your system and its distribution. An audit will provide a survey of the distribution system. This knowledge will assist the leak detection efforts. The leak detection equipment will identify leak sounds and pinpoint exact locations of hidden underground leaks.

In order to maintain an allowable water loss percentage, a water audit plan must be put into place and an ongoing water leak detection maintenance strategy must be established with the understanding that the process is ongoing. Leaks do not improve over time, only worsen, and there will always be new leaks. On-going efforts to fix, improve, and maintain should be the underlying strategy for any successful program.

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### What does a Water Leak Detection Program Costs Operators?

- **Low Cost compared to loss revenue due to leaks:** \$150 - \$300 per mile if done in house
- **Costs include:** New Equipment, work crews, salaries, etc., are all variables.
- Repair costs of found leaks are not included in the cost above.

## **Benefits of Audit/Leak Detection Program**

- Reduced water losses
- Financial improvements
- Increased knowledge of your distribution system
- More efficient use of existing supplies (Can defer construction of new water facilities)
- Safeguard public health and property
- Improved public relations with communities
- Reduce legal liability

*Example: An 8" diameter steel main under 80 psi with a 1/2 hole leaks approx. 53 gallons per minute. The average leak duration is 2 years. This leak would cause \$43,000 in lost revenue. This may not include property damage.*

## **Types of Leak Sounds**

Three typical leak sounds:

1. **Orifice Pipe Vibrations:** Usually between 500 – 1500 hertz (Hz)  
These are sounds transmitted along the pipe wall, and can travel long distances from the actual leak. Contact points for listening include valves, hydrants, meters etc. using the probe or contact rod attachment of an acoustic leak detector.
2. **Impact of water on soil (cavitations) surrounding area of leak:** Usually between 20 – 250 Hz.
3. **Water circulating in a cavity near the leak:** Sounds like a water fountain. Also in the 20 – 250 Hz range. #'s 2 and 3 do not travel very far, and a good ground mic must be used. Listening with the ground microphone should be performed every 5 feet.

## **Factors Affecting Leak Sounds**

- **Pressure:** Minimum of 15 psi for acoustic leak detection.
- **Pipe Material:** Metallic pipe much better than non-metallic.
- **Pipe Size/Thickness:** Smaller diameter is easier to detect. Thinner walls are easier to detect.
- **Soil Type:** Sand is a better conductor of sound than clay.
- **Surface Type:** Sod insulates/muffles sound. Leaks under asphalt/pavement are easier to detect.

- **Depth of Pipe:** You will not be able to hear a leak on a pipe that is 15' and covered with rock and clay.
- **Deep pipe:** applications require the use of Leak Correlators. These devices do not have limitations on how deep the pipe may be.

## Types of Leaks

- **Main Leaks (1 - 1000 gpm)** Corrosion, splits from excessive pressure, improper installation, etc.
- **Service-line Leaks (0.5 - 15 gpm)** Same causes as Main Leaks.
- **Meter Leaks (1 - 10 gpm)** Loose fittings/connections, damaged couplings, etc.
- **Residential Leaks (1-15 gpm)** Holes in customer service lines on the residential side of the meter. Running toilets., etc.
- **Valve Leaks (1-500 gpm)** Loose packings, broken valves. Usually occur on pressure controlling valves