

Leak Detection and Repair

Leak detection has long been a vital part of system operations for all conscientious water providers; however the methods for detecting leaks vary widely. In that leaks will always be a part of a water distribution system, given the complexity and age of our water utility infrastructure, best management practices need to be employed to detect and facilitate leak repair, based on the requirements of the utility, the economics of the efforts, and the operational limitations of the organization (see the discussion of "recoverable real losses" in the introductory section of the [Water Distribution BMPs](#)).

Leak detection can be supported through various programs and practices; however the most effective practices are those that are performed with precise regularity. Leak detection programs can vary widely in terms of costs and efforts, depending on the size and complexity of the distribution system. Therefore, care should be taken when selecting programs and practices for consideration and ultimately implementation at a utility.

The specific methodology that a water utility selects for leak detection is based on available resources. Most effective leak detection programs utilize a number of programs and practices. Many water utility managers employ an analysis of leak records to predict areas of concern. However, leak surveys are the single most popular leak detection method whereby those appurtenances that are accessible such as valves, fire hydrants, service connection curb stops and other access points are accessed and sounded. It is not unusual for utilities to employ more than one leak detection method to search for and locate active system leaks. For example, transducers can be deployed and programmed to "awaken" at minimum noise hours (using leak noise loggers (LNL)), as one way to assist in manual leak detection efforts. However, all leak detection methods require that data is collected in an orderly manner, and that the data is cleansed, assessed and evaluated to support the utility's overall water loss control efforts.

For those water utilities that do not have the resources, the Colorado Rural Water Association has equipment that may be leased to perform acoustic leak detection testing. Otherwise, small and medium utilities should implement regular practices to detect and track leaks using the following methods described above in the water distribution system [data collection and management BMP](#):

- Track leaks and repair leak reports.
- Collect instantaneous water production measurements (at least daily) for comparison to previous days and past years of record.
- Install meters in various locations within the distribution system (creating district metered areas) and collect flow measurements instantaneously (or at least daily) from these locations for comparison to previous days and past years of record.
- Conduct regular field surveys to look for surface expression of leaks.
- Conduct acoustic leak testing whenever practical, especially in areas of high concern.

Once a leak has been detected, the leak should be repaired as soon as possible and practical. Typical leak repair techniques include (based on AWWA, 2009):

- For small leaks, simply tightening a few bolts on valve or pump packing may alleviate the problem.
- Service line leaks are very common for all water utilities. The repair team/contractor will have to determine if the service line can be repaired or replaced completely, depending on the nature of the leak and the age of the service line. Another consideration may be whether or not the utility is scheduled to replace or upgrade the water meter, yoke and/or backflow prevention device. Replacing any or all of these items may dictate whether or not the entire service line is replaced. Note that there are trenchless methods for service line replacement.
- For small to medium water lines, repair clamps are commonly used to quickly repair a ruptured or broken water line; however, clamps may not be applicable to some kinds of plastic pipe (e.g., ABS) that has a tendency to split.
- Pipe joints are often the site of smaller leaks caused by worn joint material, uneven settlement of pipe,

age, or other impacts. For split bell-ends of pipe, replacement may need to occur, whereas there are clamps that can be used to encapsulate the bell without its removal. Some joints can simply be re-caulked.

- Larger ruptures or splits in pipe, the faulty section may need to be removed and replaced. Care should be taken when replacing a pipe of one material with another. For example, ABS pipe is known for splitting. It is also known for not being commercially available. Therefore, ABS it is commonly replaced with other plastic pipe (e.g., PVC); however, special attention is needed when coupling PVC to ABS pipe, for proper joints must be maintained. Similarly, if one type of metallic pipe is replaced with another metallic pipe, consideration should be made for the potential of accelerated corrosion when different metals are coupled.

Regardless of the repair needed, often special tools and skills are needed to repair and/or replace pipe and related appurtenances. Therefore, leak repairs must be undertaken by only trained professionals that have experience with the pipe materials at hand.

Tracking of Water Production

Field Observations

Shocking the System

Acoustic Leak Detection

Non-Accoustic Leak Detection Methods

Resources

[Colorado Water Utilities Council](#) (to track training opportunities)

[Colorado Rural Water Authority](#) (for training)

[American Water Works Association, M-36](#) (for methods)

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