

MECHANICAL LEAK DETECTION PRACTICES

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When a water leak occurs, the water generally comes to the ground surface allowing for our Operation Specialists to visually identify the problem area. As most of us have learned the hard way, that does not always mean the leak is directly below. Many an Operation Specialist have excavated where the water appears, only to find the leak is some distance away, and having to “chase” the leak with the excavation. In other situations, the water never appears at the surface due to soil conditions, frost, or some other means which allows the water a path to escape. In either case, most of us know that acoustic leak detection will allow us to narrow the search, and in most cases locate the position of the leak relatively accurately.

However, once in awhile, acoustic leak detection fails to identify the leak or leaks generally due to ever changing pipe materials, soil conditions, and in some cases installation techniques. In such cases, it may be necessary to find the leak using mechanical leak detection practices. Mechanical leak detection is the process of using a flow meter, either a permanent or portable device, and shutting off sections of the system using main valves until you identify the section of the system where the flow on the meter is reduced by the amount equal to your increased demand caused by the leak. Once a section is identified, then you can shut off the water street by street in that area to further narrow the search area.

While this sounds easy, there are a few factors to consider. First, the Operation Specialist must identify the increased daily demand, or the amount of water lost per day due to the leak. Once that number is confirmed, we recommend converting it to gallons per minute (gpm) in order to assist in determining what size and type of leak is occurring in your system. This can be done by dividing the total water lost (leak amount) per day (24 hour period) by 1440 minutes per day. Example: the leak is 100,000 gallons per day (gpd) divided by 1440 minutes per day = 69.4 gallons per minute. In this case it is likely a large service or a small main leak, depending on the size of the system. Now that you have identified the amount of water loss, we need to review system maps and locate main valves to develop a plan on how to shut sections of the system off. In most cases, you should be able to isolate half the system with one shutdown in order to determine which section requires further inspection. Once an area is identified, narrow the search by shutting smaller sections off in that area until the leak or leaks are confirmed in the smallest area possible, usually a street. As you can tell, this process requires more assistance since you will need someone to monitor and record the flow data at the meter, and at least one, but probably two people operating the valves in the system. It also

requires that your flow meter is installed in a place where it can be used for this activity. If your meter is at your treatment plant and flows directly to your storage tank, then to the system, it will not be possible to verify the flows. However, if you have a meter on the line flowing from the tank to the system, that would be ideal. Another option is to install a temporary meter connection for leak detection purposes. For instance, your main line exits the tank and flows to the system and has an isolation valve near the tank, but before the distribution system, then you could make a tap on each side of the main valve (usually a 2" tap) and install a temporary meter assembly that bypasses the main valve. Once the meter is installed, shut off the main valve forcing all flow through your meter, allowing you to isolate sections and identify your leak. We recommend you make such taps in the most permanent way possible so you can install the meter in the future for leak detection use without having to excavate. It is important to note that this practice is best done at night while flows are low, and you should also notify your fire department as fire flows during your testing would be inadequate. Last, if your system has access to or purchased a portable flow meter, you could simply install this equipment on the outside surface of your pipe, such as the effluent line at your storage tank if you had a pit to access the pipe, and conduct the flow testing while still allowing full water flow to the system. Regardless of which technique you use, you will be able to narrow the search area for the leak as long as you have properly located valves in your distribution and those valves are operational. We know, we know, that is not always the case, but that is a topic for another day and another article!

Some areas that may be of special interest or concern would include any creek, stream, or river crossings, areas of high elevation where pressures may be lower, and older low use areas such as former or abandoned industrial/commercial sites. In such cases most current design practices encourage the installation of a meter or a meter pit to allow for easily identifying any leaks or water loss.

As you can see, the mechanical leak detection practice can help you in identifying water leaks and unaccounted for loss. The practice is labor intensive, does require the proper equipment installed at the proper location, and also requires for pre-planning of valve locations and shut down procedure as well as documentation of the flow data to confirm the amount of water loss, and which area the loss is coming from. As always, the field staff here at the NYRWA will assist you in any way we can if such a situation occurs in your system. If acoustic leak detection fails, mechanical leak detection practices may be the only way for you to continue to provide,

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