

Leak Detection Standard Operating Procedure

- From routine data analysis (tank draw-downs, master meter readings, ect..), determine which pressure zone (tank zone) is losing the most water based off of customer connections and pre-determined demand factors. In most cases, a Demand Factor of 0.1 gallons per minute per customer will suffice in getting an approximate expected flow rate for a zone.
 - Demand factors can be determined by the following formula.
 - $A = \text{Total Water Sold in Zone}$
 - $B = \text{Number of Active Customers}$
 - $A/B = C$ (Monthly Customer Demand)
 - $\text{Demand Factor} = C / \# \text{ of days in billing period} / 1440$
 - For example, $A = 21,000,000$ gallons, $B = 5439$ customers. Monthly Customer Demand = $21,000,000 / 5439 = 3,861$ gallons per customer. Demand Factor = $3,861 / \# \text{ of days in billing period} (30) / 1440$ (minutes in a day) = $.089$ gallons per minute per customer. The Customer Demand Factors equal $.09 - .1$, in most cases. However, a Demand Factor of $.08$ or below may be indicative of an existing issue with meter validity. A Demand Factor of $.125$ or greater can usually be attributed to a large user in the area, e.g. hospitals, nursing homes, production plants, ect..
 - It will be advantageous to consider the source of the water. For example, let's say you are purchasing water for \$3.50/1k gallons to supply a zone that has been determined to have 40 gallons per minute excess flow. You are also producing water at \$1.75/1k to a zone that has been determined to have 60 gallons per minute excess flow. Initially, you may think the 60 gallons per minute loss should be assessed first. However, when analyzing the direct loss in monetary form, the 40 gallons per minute loss is costing \$201.60 per day while the zone with 60 gallons per minute loss is costing \$151.20 per day.
- At a point on the main line which supplies water to the zone (preferably close to the tank), use the portable ultrasonic flow-meter to verify data analysis of the zone.
 - All pumps feeding to or pulling from the tank are recommended to be shut down during this application if at all possible. Planning ahead to allow this situation to occur is preferred.
- Once data analysis is verified, station 1 employee at the meter while 1 (preferably 2) employee isolates sections of the zone with valve cuts.
 - To increase efficiency of time spent detecting, it is preferred to start at the end of the zone and work your way towards the flow meter with the valves remaining off until the zone has been completely assessed. This has been shown to reduce water fluctuations in the line, which in-turn reduces the fluctuations of flow on your portable flow meter.
 - It is crucial that the use of a leak detection device (listening device) be utilized in the valve cuts to determine with certainty that valves are truly off.
 - The number of customers between valves should determine the decrease in "gallons per minute" flow that will be shown on the portable flow meter. For example, at a

demand factor of 0.1 gpm for each customer, a valve cut that eliminates 100 customers from the search area should be equivalent to a 10 gpm (100 customers X 0.1 gallons per minute demand=10 gallons per minute) decrease in flow on the portable flow-meter. Any excess decrease in flow can be attributed to a leak within the area.

- Continue with valve cuts and data analysis until all excess flow has been isolated into smaller sections of the zone.
- Once the excess flow has been located to a smaller section of the zone, assess the area with your listening devices.
 - Results show that by listening to items that are part of the distribution system first (e.g. meters, hydrants, valves, ect.), you stand a greater chance of finding the leak.
 - Once you have located a leak noise, assess items in the immediate area for noise as well. ***If the leak is on a service line to a meter, you may be able to determine the location of the Corp Stop (connection to main) by using your ground mic while walking along the main line. This is because water going past the connection will cause a sound similar to a leak.
 - In most cases, wherever your highest leak index is found, your leak is in the immediate vicinity. If you are uncertain of exact location of the distribution system components that are beneath the ground, access the area using your ground mic in a grid to get an exact location of the leak.
- Once leak is located, mark with blue paint or flag. Create a work order for leak repair crews describing the leak and location.
 - *** Don't forget to call 811 and/or the appropriate organizations for line locates to prevent damage to any other underground utilities that may be in the area.



Prepared by: Danny Stinson-KRWA Circuit Rider