Pressure Management

Excessive system pressure can contribute to increased leaks and distribution line failures. In fact, operating pressures not only have a major effect on the amount of water escaping from active leaks but also a surprisingly large influence on the rate of generation of new leaks (AWWA, 2009). In addition, excessive system pressures can impact the effective operation and longevity of some household appliances. Conversely, pressures that are too low can have a detrimental effect on system operations. Advanced pressure management has become a tool in the control of leakage loss, particularly in addressing background losses that are, by their nature, undetectable by traditional acoustic means. Pressure management has become a highly effective means to reduce what was previously viewed as unavoidable leakage (AWWA, 2009).

The overall pressure within a utilities distribution system will typically vary due to location, topography and distance from the treatment plant and storage facilities. System pressures in distribution systems should typically be maintaining in the range of 40 to 80 psi. System pressure in a household environment should be maintined within this same range[1]. Note that some utilities may supply water at higher pressures to customers given physical conditions and system demands. In these cases, customers will be advised to install pressure reducing valves on their service line to keep pressure within the recommended range within their home or business.

System pressure is typically managed through a series of storage tanks located strategically throughout the distribution system. Pressure reducing values (PRV) and pump controls both within the distribution system can also assist in the regulation of system pressure. PRVs are also utilized on individual customer connections in some locations. Water utilities with substantial changes in elevation can be challenged in maintaining consistent water line pressures through its distribution system; however, there are assessment and corrective measures that can be used to overcome these challenges.

Managing system pressure within a small to medium water distribution system can be achieved through the deliberate application of an assessment process for proactive pressure management, as presented in M-36 (AWWA, 2009). The process includes the following:

- Desktop study to identify areas of high pressure and potential remedies
- Review customer use records to evaluate potential for pressure management to impact customer consumption
- Conduct preliminary cost-benefit analysis to characterize economic feasibility
- Collect flow and pressure measurements in the field to support design
- Identify control methods and devices that may support pressure management and design system
- Conduct final cost-benefit analysis on proposed design

The various devices and methods that can be used to manage system pressures include pump controls (with slow starting and stopping values (reducing the creation of transients)), use of pressure zones (which requires isolating sections of distribution piping using valves), and pressure reducing values. Although many operators have utilized partially closed gate or butterfly valves to create head loss and reduce distribution system pressures, this method is not recommended since head loss across a partially open valve will vary dependant on system demand, and excessive wear can occur across the appurtenance (AWWA, 2009).

It is important to note that assessment and implementation of advanced pressure management systems can be straightforward or complex depending on the configuration, age and nature of the utility's distribution system. Therefore, it is good practice to utilize third-party resources in conducting these assessments and analyses, or to obtain some training related to data collection and manipulation.

[1] (Do It Yourself Plumbing Reference)

Resources

Colorado Water Utilities Council (to track training opportunities)

Colorado Rural Water Authority (for training)

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