2.3 Leak Detection and Repair

EPA WaterSense

Overview

Identifying and repairing leaks and other water use anomalies within a facility's water distribution system or from particular processes or equipment can keep a facility from wasting significant quantities of water. As described in Table 2-2, water leaks can add up over time.[12,13]

Table 2-2. Potential Losses From Water Leaks

Malfunction	Leaking Flow Rate (gallons per minute)	Water Loss	Estimated Cost of Water Loss
Leaking Toilet	0.5 gpm	21,600 gallons per month	$2,100 per year
Drip Irrigation Malfunction	1.0 gpm	43,200 gallons per month	$4,300 per year
Unattended Water Hose at Night	10.0 gpm	5,400 gallons per day	$16,000 per year
Broken Distribution Line for: One Day One Week One Month	 15.0 gpm 15.0 gpm 15.0 gpm	 21,600 gallons 151,200 gallons 648,000 gallons	Up to $64,000 per year
Tempering Water Line on a Steam Sterilizer Stuck in the On Position	2.0 gpm	86,400 gallons per month	$8,600 per year
Stuck Float Valve in a Cooling Tower	5.0 gpm	216,000 gallons per month	$21,000 per year

An aggressive leak detection and repair program can help facility managers better understand building water use and save money by avoiding water waste.

Best Practices

Reading meters, installing failure abatement technologies, and conducting visual and auditory inspections are important best practices to detect leaks. To reduce unnecessary water loss, all detected leaks should be repaired quickly.

[12] City of Poway, California. How to Detect a Water Leak. www.poway.org/Index.aspx?page=472.

[13] Estimated cost of water loss based on an average rate of $8.25 per 1,000 gallons for water and wastewater determined from data in: American Water Works Association (Raftelis Financial Consulting). 2010. *Water and Wastewater Rate Survey*.

2.3 Leak Detection and Repair

Reading Meters and Installing Failure Abatement Technologies

To reduce water loss, consider the following metering and leak detection methods:

- Read the facility water meter during off-peak hours when all water-using equipment can be turned off, and building occupants, employees, and visitors are not using sanitary fixtures. After all water uses have been shut off, read the meter; and then read it again an hour later. If the water meter reading significantly changed, this indicates there may be a leak somewhere within the distribution system or within the facility.
- Read water meters and water bills monthly. Pay close attention to water meter readings to ensure that they make sense and are consistent with expected water use trends. Compare monthly water bills to the previous month and to the same month of the previous year, keeping in mind expected seasonal water use increases (e.g., more water in the summer months for building cooling and landscape irrigation). If water use is unexpectedly high, a significant leak might be present in the distribution lines or within the facility. Install submeters on major water-using equipment (e.g., cooling tower make-up water lines, reverse osmosis system supply lines, and irrigation systems). See *Section 2.2: Metering and Submetering* for more information. Monitor the submeter readings to identify unexpectedly high water uses, which may indicate that equipment is malfunctioning or that a leak is present.
- Install failure abatement devices, or leak detection systems, on major water-using equipment. Failure abatement devices sense if equipment is malfunctioning or potentially leaking by detecting abnormal increases in water flow. The devices can alert a user if an issue is detected via alarm, flashing light, phone call, or other method, or they can automatically turn off the water supply to the equipment.

Visual and Auditory Inspection

In addition to metering, conduct visual and auditory inspections described in these best practices:

- Perform a water assessment of the facility once every four years, as outlined in *Section 1.2: Water Management Planning*. During a water assessment, all major water uses will be identified and estimated. If more than 10 percent of water use cannot be accounted for by the water assessment, the facility may have leaks in the distribution lines or from equipment, and further investigation is warranted.
- Select an irrigation professional certified through a program that has earned the U.S. Environmental Protection Agency's (EPA's) WaterSense® label[14] to audit the landscape irrigation system for outdoor water use leaks. All audits should be conducted according to the Irrigation Association's recommended audit guidelines.[15]

[14] U.S. Environmental Protection Agency's WaterSense program. Professional Certification Program. www.epa.gov/WaterSense/outdoor/cert_programs.html.
[15] Irrigation Association. Technical Resources: Irrigation Audit Guidelines. www.irrigation.org/Resources/Audit_Guidelines.aspx.

- Perform daily tours of the building, including mechanical spaces. Pay close attention to all water-using equipment indoors and outdoors by listening and looking for unexpected water use, such as:
  - Sanitary fixtures continuously flushing, leaking, or left running.
  - Unanticipated discharge to floor drains in mechanical spaces.
  - Wet spots in parking lots and grassy areas surrounding the facility. If soggy ground is unexpected, contact the water utility to determine if there is a leak in the distribution line.
- Train building occupants, employees, and visitors to report to facility maintenance staff any leaks that they detect in restrooms, kitchen areas, or any part of the facility. Building maintenance staff could complete these repairs without much extra effort. Immediate leak detection is vital to avoid water and monetary losses from unnecessary water waste. To encourage this feedback and build a culture of reporting leaks, be sure to repair leaks in a timely manner.

Leak Repair

If a plumbing fixture or other piece of water-using equipment is leaking, repair it according to manufacturer specifications. If necessary, replace it with new, properly functioning equipment; look for WaterSense labeled models where available.

For specific information on operation and maintenance, retrofit options, or replacement options, see the relevant sections for specific technologies within this document.

Finding and Fixing Leaks

EPA's WaterSense program sponsors Fix a Leak Week annually in March to remind Americans to find and fix household leaks. This week is the perfect time to educate employees about finding and fixing leaks at home, as well as at the facility.

The Southern Nevada Water Authority has several leak detection and repair videos[16] available on its website. Consider using these videos to further educate facility staff about identifying leaks.

Additional Resources

American Society of Heating, Refrigerating, and Air Conditioning Engineers. *Standard 189.1, Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings*. www.ashrae.org/publications/page/927.

American Water Works Association. Water Loss Control Basics. www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=47847.

DOE, Energy Efficiency & Renewable Energy, Federal Energy Management Program. January 2009. *Distribution System Audits, Leak Detection, and Repair: Kirkland Air Force Base—Leak Detection and Repair Program*. www1.eere.energy.gov/femp/program/waterefficiency_csstudies.html.

[16] Southern Nevada Water Authority. How to Find a Leak. www.snwa.com/3party/find_leak/main.html.

EPA's WaterSense program. Fix a Leak Week.
www.epa.gov/watersense/our_water/fix_a_leak.html.

Irrigation Association. Technical Resources: Irrigation Audit Guidelines.
www.irrigation.org/Resources/Audit_Guidelines.aspx.

North Carolina Department of Environment and Natural Resources, et al. May 2009. *Water Efficiency Manual for Commercial, Industrial and Institutional Facilities*.
savewaternc.org/bushome.php.

Schultz Communications. July 1999. *A Water Conservation Guide for Commercial, Institutional and Industrial Users*. Prepared for the New Mexico Office of the State Engineer.
www.ose.state.nm.us/wucp_ici.html.

Southern Nevada Water Authority. How to Find a Leak.
www.snwa.com/3party/find_leak/main.html.