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Water Works
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PRACTICAL IDEAS FOR WATER OPERATORS

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Drought Forecasting Aids
Supply Management

VOLUME 36, NO. 6 JUNE 2010





American Water Works
Association

Intake

A MONTHLY CHECKLIST

Opflow's editorial purpose is to present new and established technologies and ideas that readers can apply to drinking water treatment and distribution, alert readers to possible related problems and solutions, interpret regulatory and technical information in a clear format, and foster and promote innovative ideas that help readers provide safe water to all.

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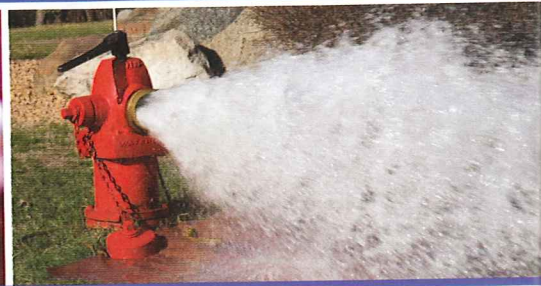
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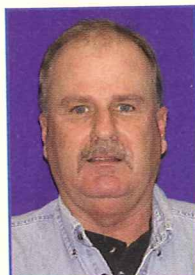
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June

Fire hydrants are so seldom used for fighting fires that it may be easy to forget the importance of keeping them well maintained for quick, reliable service. Fire hydrants should be flow-tested every year to ensure they're in good working order. Testing typically occurs April through October. Consider the following tips to ensure proper hydrant maintenance.

HYDRANT MAINTENANCE



Bob Brower, utility field operations manager,
Lawrence (Kan.) Department of Utilities

- ❑ Inspect hydrant locations and remove obstacles within 5 ft of hydrants.
- ❑ Verify that all hydrant numbers match their geographic information system map numbers, if available.
- ❑ Develop a fire hydrant inspection form and complete it as a hydrant is inspected.
- ❑ Observe a hydrant's general condition to ensure there are no defects or damage.
- ❑ Pressurize the hydrant to inspect for leaks from seals and gaskets.
- ❑ Inspect each hydrant's oil level.
- ❑ Operate the branch valve while a hydrant is running to make sure it shuts off completely. Flush each hydrant at least one minute to clear the line.
- ❑ Verify the hydrant is drained when the water is shut off.
- ❑ Grease hydrant nozzle threads and tighten caps.
- ❑ Make necessary repairs at the time of inspection.
- ❑ Enter completed inspection forms into an asset database system, if available.

Editor's Note: For additional guidelines on hydrant maintenance, see page 10.

AWWA TIP OF THE MONTH: FIRE-FLOW TESTING

Fire-flow requirements are the determining factor in many systems for sizing mains, storage facilities, and pumps. Flow requirements are specific to each community and depend on several factors.

One or more fire hydrants are used for these tests. The hydrants are operated from zero to full flow while pressure is measured at a nearby hydrant. A rapid change in velocity in the main feeding the hydrants can cause water quality problems. It's best to alert customers that this procedure will be conducted in their area and advise them that they may notice a temporary change in water quality. The notice should suggest how customers can help clear the water following the procedure.

System operators can also take advantage of these tests and coordinate other procedures at the same time. For example, routine flushing and hydrant valve inspection and maintenance can be conducted at the same time. It may also be a good time to inspect the function of air- and vacuum-relief valves and check backflow-prevention devices.

—AWWA, *Water Transmission and Distribution*, third edition (catalog No. 1957)

A comprehensive program is helping the city of Lawrence, Kan., streamline hydrant maintenance and better serve its customers. **BY KENT CULBERTSON**

LESSONS LEARNED MAINTAIN FIRE HYDRANTS TODAY TO PREVENT PROBLEMS TOMORROW

IN 1999, THE LAWRENCE (KAN.) Department of Utilities staff proposed creating and implementing the Lawrence Utility Management System (LUMS), a comprehensive management plan that applies to all utility divisions. Now, 10 years after implementation, the city is reaping the benefits of a proactive hydrant maintenance program. The 10 years have been spent setting and achieving goals to improve service for the city's 100,000 residents. Along the way, the department has become certified by numerous standards organizations (see Measuring Success One Certification at a Time, page 12).

In 2006, the city also established an engineering division whose inspectors ensure that city crews and contractors comply with the city's engineering design standards. By 2009, city utilities engineer

John Shutak was putting the final touches on specifications for fire hydrant design and installation.

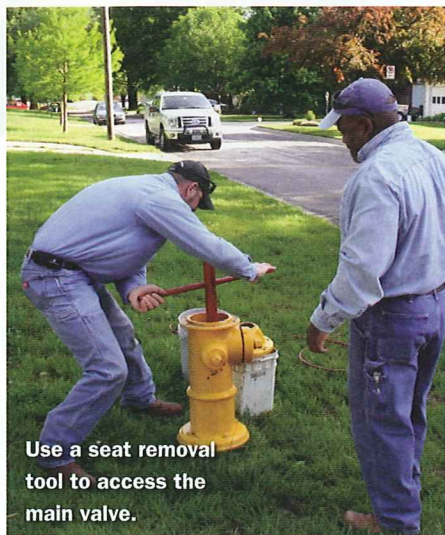
Today, more than 3,400 city-maintained fire hydrants are integrated into the city's geographic information system and identified with Global Positioning System (GPS) coordinates. The system allows Bob Brower, utility field operations manager, to review line segment maps; zoom in to specific fire hydrants; and review installation, inspection, and maintenance records.

The Field Operations Division, which combined water and sewer departments, consists of 24 employees divided into two pipe crews and a service group. From the comfort of a hydrant service truck, service group staff members can update maintenance records on a laptop in real time, which provides immediate, continuous data access to all divisions.

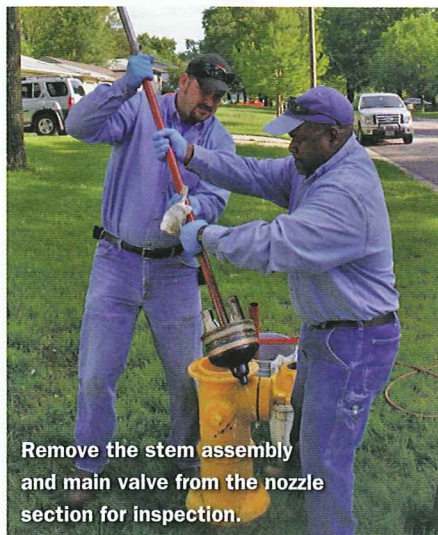


The Lawrence (Kan.) Department of Utilities inspects and pressure tests half of its 3,416 fire hydrants each year. Here Shawn Walters (left) and Larry Coleman (right) remove a fire hydrant's bonnet to allow access to the upper stem, break coupling, lower stem, seat ring, and main valve.

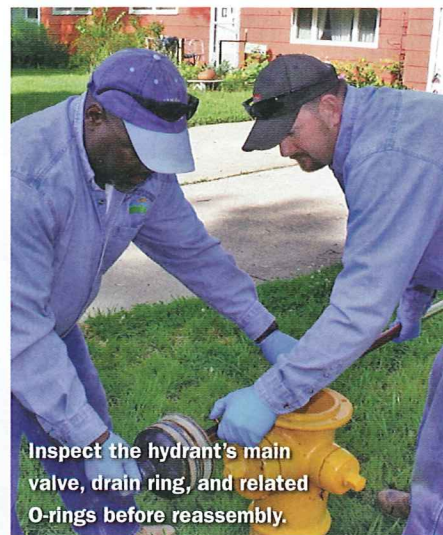
Distribution



Use a seat removal tool to access the main valve.



Remove the stem assembly and main valve from the nozzle section for inspection.



Inspect the hydrant's main valve, drain ring, and related O-rings before reassembly.

The city is divided into 36 sections, each of which is divided into quarter sections relative to township and range. All fire hydrants are identified by a numbering system that facilitates generation of hydrant inspection and maintenance work orders.

PROGRAM OVERVIEW

The fire hydrant inspection and maintenance program is extensive. The team ensures that at least half of the 3,416 hydrants are thoroughly inspected and pressure tested each year. One fourth of the hydrants are flow tested annually; the crew can flow test 1,000 hydrants in seven days. In addition, the crew flushes 400 hydrants per month to ensure the chlorine residual is consistent in all 36 sections of town.

New hydrants are set no more than 400 linear ft apart, and the pumper/steamer nozzle is always pointing toward the branch/lead gate valve that isolates the hydrant for maintenance. In addition to annual exercising, each isolation valve is operated with the accompanying fire hydrant semiannually. Two vacuum trucks are available to ensure hydrant isolation valve boxes are free of dirt and debris. Also, 10 percent of the city's hydrants (about 340) are repainted each year at a current cost of less than \$32.50 each. Crews work systematically from section to section.

STEP-BY-STEP PROCEDURES

The first step in implementing a comprehensive fire hydrant maintenance system

is to ensure that governing parties—mayor, city/town manager, council, etc.—understand and support the proposal. Next, select a team of employees or consultants from various city departments whose input provide a comprehensive scope consistent with existing and future policy and procedure manuals.

Begin with a simple concept and accept that the process will be slow. Keep goals realistic, achievable, and beneficial to gain the support of utility, engineering, fire, and finance managers.

In today's economy, bid lists for city contracts frequently reveal that bidders have a wide range of experience and expertise in installing underground utilities. Accordingly, a fire hydrant maintenance program should begin with a

UTILITY MANAGEMENT

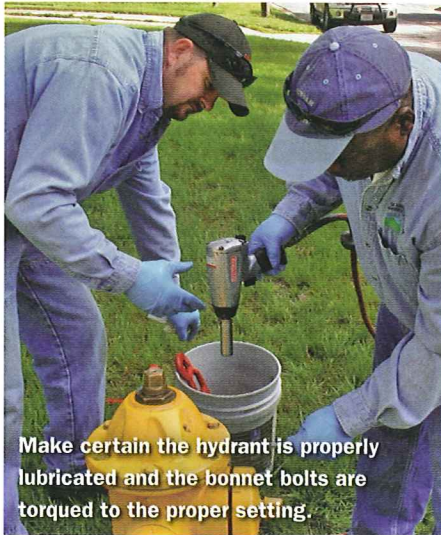
MEASURING SUCCESS ONE CERTIFICATION AT A TIME

The city of Lawrence, Kan., has an all-inclusive Lawrence Utility Management System (LUMS) that applies to all of the utility divisions within the city. For Utilities Operations Superintendent Mark Hegeman and Field Operations Manager Bob Brower, LUMS has meant 10 years of setting goals to improve service to the city's 100,000 residents, and then achieving those goals.

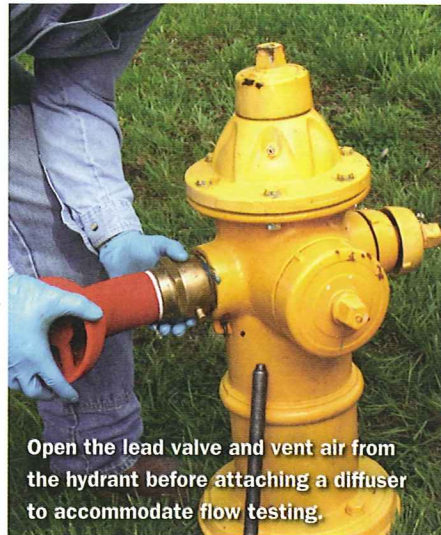
In 2000, the city's LUMS committee began the process of becoming certified for National Biosolids Partnership Code, and in 2005 they were just the 10th city in the United States to achieve such certification. In 2006, the LUMS committee achieved

ISO 14001 and OHSAS 18001 certifications for the city's Wastewater Division. The committee relentlessly pressed on in 2007, obtaining ISO 14001 and OHSAS in the Water Division. Not a team to slow down, the committee was given ISO 9001 certification in 2009. While all of these certification processes were being implemented, the city's staff also made sure all AWWA standards were accounted for as well. What are the results of all this hard work? Today, by several accounts, the city's Utility Department is the only one in the United States with a management system certified in all the aforementioned categories.

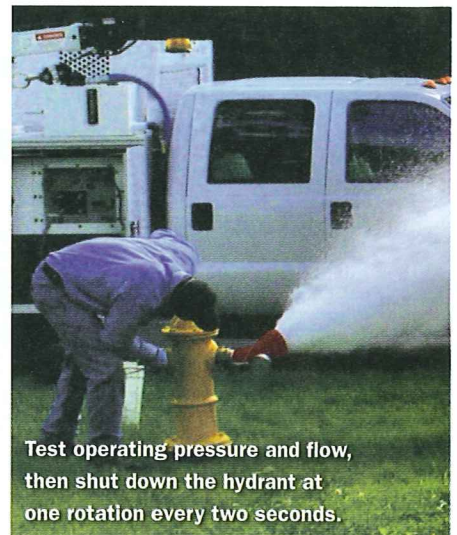
A fire hydrant maintenance program is only as good as those hired to manage it.



Make certain the hydrant is properly lubricated and the bonnet bolts are torqued to the proper setting.



Open the lead valve and vent air from the hydrant before attaching a diffuser to accommodate flow testing.



Test operating pressure and flow, then shut down the hydrant at one rotation every two seconds.

thorough review and update of installation standards and procedures. Establish clear, concise written responsibilities and general performance expectations, define the consequences of poor workmanship, and specify inspection provisions for new installations. To save time and money, make sure bidders understand they won't be paid until the installation has been inspected and approved.

New Hydrant Considerations. Before approving a new fire hydrant installation, get answers to these questions:

- Is the gate valve that isolates a fire hydrant in the open position? If it isn't, the fire hydrant will not operate.
- Are the gate valves that isolate the line segment the hydrant is on installed in the open position? If not, an entire subdivision could be without water, and the fire hydrant will not operate.
- Does the hydrant look like it just came off the factory floor? If there's evidence of wrench work on nuts and bolts, ask if the hydrant was taken apart during installation and why. Ask for a detailed description of modifications made.
- Is the hydrant set to the proper grade and facing the desired direction?
- Has the new fire hydrant had an extension kit installed to bring it to grade?

If so, are the bolts tight, are the couplings in the correct location, and was the hydrant relubricated?

- If an extension kit was installed, was it a factory or a generic kit? Understand how this affects the warranty.
- Is the hydrant the correct color? Is it factory or oversprayed paint?
- Does the new fire hydrant open and close in the direction specified?
- Does the operating nut that opens and closes the fire hydrant turn freely, or is it tight and stiff?
- Are the nozzle thread patterns correct for the system?
- Has an inspector flow tested the new hydrant to ensure it operates correctly and, in the case of a dry barrel hydrant, drains back properly?
- Did all tools and the manufacturer's maintenance manuals come with the fire hydrant(s)? If not, ask for them.

Existing Hydrant Maintenance. Categorize annual fire hydrant service into two categories. Type A fire hydrant service is for preventive maintenance, including the aforementioned post-install inspection items and recording residual pressure. In many communities, the fire department may conduct Type A service, tag inoperable hydrants, and refer the hydrants to the water distribution staff for Type B service.

In general, Type B service requires an operator to perform a complete hydrant teardown as follows:

- Remove and inspect all internal parts.
- Inspect main hydrant seating for irregularities.
- Inspect drain and applicable gaskets and O-rings.
- Inspect upper stem alignment and straightness.
- Inspect threads on upper stem.
- Replace worn parts while the internal components are exposed.
- Lubricate all moving parts.
- Install new O-rings and gaskets as required.
- Prepare a hydrant service record.
- Have the manufacturer's official maintenance manual on-site.

Don't be afraid to ask for assistance. In most cases, a fire hydrant manufacturer will gladly conduct a free short course for staff. Assistance in establishing applicable procedures is just as easily obtained. Remember, a fire hydrant maintenance program is only as good as those hired to manage it. 🛠️

RESOURCES

- AWWA Manual of Water Supply Practices M17: *Installation, Field Testing, and Maintenance of Fire Hydrants*, 2006 (catalog No. 30017).