WISE WATER WORDS

The Newsletter of the Nebraska Section

Volume 49, Issue 3 American Water Works Association Winter 2012

Maximize Hydrant Flow Testing

Conference Recaps 2012 Award Winners Wellhead Protection





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The Nebraska Section of American Water Works Association

American Water Works Association

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Ads from your friends and neighbors.

On the cover: Chimney Rock is a rock formation in Morrill County in western Nebraska. Rising nearly 300 feet above the surrounding North Platte River valley, the peak of Chimney Rock is 4,226 feet above sea level. During the middle 19th century it served as a landmark along the Oregon Trail, the California Trail, and the Mormon Trail, which ran along the north side of the rock.

Chair's Corner



2012 a Success by Rob Pierce, League of Nebraska Municipalities

t has been an honor to serve this past year as the AWWA Nebraska Section chair. Working with great executive board members and very productive committee chairs has made the year go smoothly. As one of the few AWWA sections that operate without full-time staff, I feel we are a very productive and active Section due to the dedication of the board, committee chairs and the members who participate throughout the year. The section gets great support from the companies, associations, municipalities, regulatory agencies and other employers that enable members to participate in a variety of ways to make the section a success.

We hit the ground running in 2012 as the new chairs and committee members settled into their positions. The Section continued to keep active as members participated in the World O' Water and Children's Groundwater Festival events, both of which are geared at educating children. The education committee held successful workshops throughout the year, providing operators with recertification credit hours toward their licenses. A disaster exercise in Norfolk, organized by the Nebraska WARN and Region 7 EPA, was well attended.

The Water For People committee sponsored three fundraisers: a golf outing, a sporting clay shoot and a raffle. Nebraska



water.

groundwater under the influence of surface

WATER hdrinc.com WATER

again.

ment of Natural Resources, is in the process of developing a voluntary integrated management plan, including an inventory of ground- and surface water supplies, a projection of future water needs, identification of potential sources and desired management of conservation programs.

Section members and supporters gener-

ally donate \$10,000 to \$12,000 each year

ning committee did an outstanding job

setting up this year's event. The Younes Convention Center was a larger and nicer

venue for the conference. Kudos also to

MAC committee chair Tony Bilek and his

committee as a record number of exhibi-

tors filled the exhibit hall. This year once

again featured the Top Ops and Ultimate

Backflow Challenge competitions, but

also featured a brand new Meter Mad-

ness competition. The water taste testing

competition saw Fremont prevail once

Jerry Obrist of the Lincoln Water System and I participated in a focus group

Eric Lee and the Fall Conference plan-

toward this worthy cause.

I would like to congratulate all the 2012 award winners and also thank Tony Bilek for his devotion and efforts as the Nebraska Section director. Tony has passed the baton to John Olsson.

I have only touched on a few of the many events and functions in which the Section participates throughout the year. I would like to challenge the membership to continue to raise their level of involvement in 2013. An association's strength is in the active participation of its members, and the Nebraska Section has been everstriving for a higher level since the association was organized in 1946.

Again, thank you for allowing me to serve as the chair of this outstanding association of water professionals!

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Director's Report



Looking Back on a Successful Conference by Tony Bilek, Mc², Inc.

G reetings, AWWA members and fellow water professionals.

At the time of this writing, our annual Fall Conference is still relatively fresh in my mind. My personal congratulations go out to all of the award recipients for jobs and service well done. It was good to see so many members and associates at the conference this year. I hope you were impressed with the Younes Convention Center. Virtually all feedback was positive about the new venue. As always, we will continue to work to improve the conference for our members. Your input is important, so please provide any suggestions on how we can make the conference as educational and enjoyable as possible.

New at the conference this year was the inaugural Meter Madness competition. The Section sponsors the winner with a \$1,000.00 stipend to attend and compete at the national AWWA Annual Conference and Exposition.

Congratulations again to Fremont Utilities for being voted as the best-tasting water in Nebraska for the second consecutive year. Fremont will be defending its national title at AWWA-ACE in Denver this June.

Thanks to the Young Professionals Committee for hosting another very successful Texas Hold-'Em poker tournament. The charity event, which benefits Water For People and Engineers Without Borders, was well attended, well executed, enjoyable and all for some very good causes.

It was a pleasure to host our visiting dignitary, AWWA National Vice-President, Reid Campbell. Reid delivered poignant messages in his opening session, luncheon and banquet addresses and complimented the Nebraska Section on our "all-volunteer" association. Reid was impressed with the Younes Center, the attendance, the content, and the delivery of the conference. Along with Reid, we were visited by Bob Montoya, who is our section services representative, and Dave Plank, who is with the AWWA publications office. Both Bob and Dave work from headquarters in Denver.

As mentioned before, the importance of your feedback and input is paramount to a successful organization. The impact of your input can be greatly enhanced by being involved in a committee. There are many committees that focus on specific issues. Certainly there is a committee that has an appeal to you or someone you know. You and the association will be the beneficiaries of being involved in





a committee.

The Winter Board of Directors meeting is being held in Nashville, TN, January 18-20. Incoming director John Olsson and I will be attending. The Special Session on Saturday will be followed by the election of officers, budget, consent agenda and other association business on Sunday.

AWWA-ACE is being held in Denver, June 9-13. This is a great event for any water professional to attend. Denver is also one of the easier venues for travel from Nebraska.

Best wishes for a safe and prosperous 2013!

If you'd like to share something in the next edition of *Wise Water Words*, send your comments to publications committee chair Brian Gongol at brian@gongol.net



Nebraska News and Events

Olsson Receives Fuller Award

B orn in the summer of 1965 in Lincoln, 2012 Fuller Award recipient John S. Olsson was part of a close family that includes a brother and two sisters. His family has lived in Lincoln ever since and John has become an integral part of the Lincoln community. He left Lincoln to attend the Colorado School of Mines, where he earned a Bachelor of Science degree in civil engineering.

In 1988, he married his high school sweetheart and started a family. Early in his career, John worked on civil municipal and land development teams where he completed water, waste water, recreational, municipal, residential and commercial projects involving both public and private entities. In 1993, he earned his Master of Science degree in civil engineering at UNL. He worked for a year or so at Williams Pipeline in Tulsa, Okla. With a strong desire to be back in Nebraska and The Good Life, he took a job at Olsson Associates in Lincoln in 1989.

Fremont Wins Three-peat in Water Tasting Contest

F or the third consecutive year, Fremont's water sample was rated the best-tasting in Nebraska at the annual tasting contest held at the fall conference. This was no surprise, given that the water sample that Fremont submitted to the "Best of the Best" national taste test competition at the AWWA Annual Conference and Exposition (ACE), held in Dallas in June, was rated the best there, also. Fremont will again be invited to submit a sample to the Best of the Best competition at ACE in Denver in June 2013. Other submissions this year came from the municipal water supplies in Lincoln, Omaha (MUD), and Seward. Congratulations to the City of Fremont!



In 2001, he was asked to lead the firm's civil municipal team. He soon took this team to new levels by winning significant water and waste water projects, including many with the City of Lincoln. He became the Lincoln office leader in 2007 and, soon after, added senior vice-president to his role. He currently leads all efforts on pursuing multi-discipline, multi-office projects for the



City of Lincoln and the University of Nebraska at Lincoln, and is responsible for office-level and firm-wide strategy, fostering local client relationships and assisting in building highly productive, efficient and collaborative technical teams.

John became a member of AWWA in 1992, served on numerous committees, and was Nebraska Section chair in 2009. As an avid runner, he has competed in several marathons. He is a bit of a gentleman farmer as he owns land near Palmyra, where he has planted more than 750 trees. He has four children: Matt, a freshman at his father's alma mater, the Colorado School of Mines; Jack, a senior in high school; Kate, a seventhgrader; and Nick, a fifth-grader. He and his wife, Jody, live happily in Lincoln.

Welcome to our New Members by Rich Robinson, Kirkham Michael

Welcome to our new section members who joined us in 2012:

- Richard Miner, Village of Palisade
- Larry Andreasen, Fremont Department of Utilities
- Brian Vencalek
- Steve Rohick, Diamond Plastics
- Randy Fehl, Schemmer Associates
- Owen Killham, Olsson Associates
- Allison Potter, student
- Lee Carter
- Glen Dolezal
- Richard Onnen, E&A Consulting Group
- Brandon Gardels, student
- Von Nielson, City of Stromsburg





Sporting Clay Shoot Raises \$1000 for WFP by Christian New (Terracon)

The Water For People Sporting Clay Event raised about \$1,000 on Sept. 9 at Oak Creek Sporting Club, near Brainard. A total of 22 shooters dined on brats and chips at noon before taking the field on a nicely cool summer day.



Craig Manson, Olsson Associates, won first place and a \$50 gift card to Cabela's. Tim Mundorf, Midwest Laboratories, and Andrew Ekstein, Lower Platte North NRD, tied for second, with \$20 and \$30 gift cards. The winning team was Lower Platte North NRD, led by John Miyoshi.

Special thanks to Tim Mundorf, who organized the event; our station sponsors, Electric Pump, HDR and Midwest Labs; HTM Sales and SGA Coating Consultants (TNEMEC) for donations; and, of course, our participants, who did a fine job pulverizing the clay targets! Shooters:

- CH2MHILL
- JCI
- Lower Platte North NRD
- Midwest Laboratories
- Olsson Associates
- TD2
- Terracon
- Tyson Foods
 Station sponsors:
- Electric Pump
- HDR
- Midwest Laboratories
 Donations:
- HTM Sales
- TNEMEC



Big Agenda at Annual Retreat by Mary Poe, Nebraska Department of Health and Human Services

The 2012 Nebraska Section annual retreat was held in Lincoln in August and was attended by members, board members and committee chairs. The day began with reviews of and updates to the Standard Operating Procedures of several committees. Although time constraints prevented all of them from being reviewed, it was decided that it is important that all of the SOPs be reviewed and modified, if necessary, on an annual basis.

Nick Lammers with Fontanelle Hybrids gave a presentation on the Aqua View soil-monitoring and control system. The system uses a ground probe to sense soil moisture; that information can tell how much an irrigation system needs to run and can control how much water is put on any portion of a crop. One sensor can control up to 130 acres. In demonstration fields, they have been able to demonstrate that farmers can get better yields using less water while lowering their operational costs (fewer pivot cycles) by using this system. The system runs about \$1,300 per field. It may be a helpful tool to promote water conservation in the agricultural community and potentially in city parks and cemeteries.

Jane Griffin talked about the Groundwater Foundation and their role in educating about water conservation and protection. One of their main focus points is to promote a "consequences" mindset regarding water conservation and protection. They are getting the word out through youth education and community-based action such as the Children's Groundwater Festival, Groundwater Guardians and other similar activities. Their emphasis is on quality over quantity. They have started the "Groundwater Green Site" designation program for activities undertaken by others to promote groundwater conservation and quality protection by reducing contamination (through behavior like the application of chemicals). Jane summarized their focus as "Education is the mission."

Paul Zillie with the Lower Platte South NRD gave a presentation about what the NRD is doing to protect water quality. One of their main focal issues is to work with the agricultural community to promote the scientific use of farming chemicals to prevent over-application and timely application to reduce the potential for introducing contaminants to local aquifers. They also are doing work to control and protect watershed areas.

The retreat was finished up by agreeing to review the Section's Strategic Plan at each yearly retreat as well as keeping the SOPs up to date. The participants also agreed to put more emphasis on increasing Section membership.

Silver Drop Award

C ongratulations to the following people for receiving AWWA's Silver Water Drop Award for 30 years of membership:

- John Miriovsky, Lincoln Water System
- Debra Leigh, Leigh Environmental Equipment
- *Ron Henn, Lakeland Estates Water Company
- *Jerry Obrist, Lincoln Water System
 *Also achieved Lifetime Member Status

Nebraska News and Events

Mentoring Q & A: Marty Stange

Marty Stange is the Environmental Supervisor for Hastings Utilities and serves as a Nebraska Section AWWA mentor. **Wise Water Words**: *Marty, as an AWWA mentor for Source Water Protection, what do you see as the biggest challenge for protecting source water here in Nebraska?*

Marty Stange: The biggest problem I see is getting both urban and rural to work together. In the past, community water systems have only sampled their wells for contamination and not the irrigators upstream of the community. We have left the rural (irrigation and domestic) well sampling to the NRDs. The problem we have found in the Hastings area was that the NRDs have not done enough sampling, and what sampling they did was voluntary. We suspect the volunteers had already known their nitrate levels (low levels) and thus were eager to participate. We have worked with the NRD and have collected in excess of 750 water samples between Hastings and the Platte River. We have found a significant nitrate contamination. We have to get past the blame issues and figure out what to do. Hastings is looking at \$75,000,000 worth of improvements, and we simply do not know how we are going to pay for it.

WWW: Those sound like some big challenges. I know that some communities are implementing a Wellbead Protection program to help control groundwater contamination. Has this been successful in your area? What is involved in a WHP Plan?

MS: I believe the efforts to develop a WHP Plan have been successful. It has caused a lot of discussion and increased public awareness. All the communities in Adams County have implemented wellhead protection plans. The Little Blue and Upper Big Blue NRDs have a majority of their communities with wellhead protection.

As for what is involved in a WHP program:

Delineate a Wellhead Protection Area (WHPA);

Inventory potential contaminant sources within the WHPA;



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- Describe plans to protect drinking water from contamination and to provide for emergency drinking water supplies;
- Propose controls necessary to provide protection from contamination;
- Submit the WHPA plan to Nebraska Department of Environmental Quality (NDEQ);
- Adopt plan by ordinance.

In addition, we assembled a WHP Citizen Committee to help us determine what we needed to do. This was very useful in helping us get cooperation between the urban and rural interests.

WWW: Thanks for the great information. If a community wants to explore development of a WHP Plan, who should they contact to start the process?

MS: Contact Ryan Chapman, the NDEQ Wellhead Protection Coordinator, at 402-471-3376. Then they need to contact their NRD and get them to help.

They also need to contact NDEQ about funding, as monies are available for public education activities. We have participated with the NRD in cost-share programs that promote better use of fertilizers and water conservation.

Also, the community needs to spend a couple of hours with a sister community



that has developed a WHP Plan. This is important to get the local "flavor."

WWW: Thanks for being an AWWA mentor. Is there any other information you'd like to share about source water protection?

MS: Groundwater modeling is very important and useful. We had a lot of misinformation we had to correct. So many people would not believe that our water comes from the Platte River. This included NRD staff, who should have known this fact.

I would also advise anyone who has a feedlot in their WHPA to do nitrate isotope sampling. They can work with UNL on the water testing. The farmers in our WHPA initially blamed the feed-lot for all the nitrates, but once we did nitrate isotope sampling, it showed the nitrates were from anhydrous ammonia use. Also, noting high levels of nitrates up gradient of the feedlot helped convince the farmers they are part of the problem.

I would be happy to talk to anyone with questions about wellhead protection.





For office locations and local contact information, please visit our Web site at www.oaconsulting.com.

Lincoln . Grand Island . Holdrege . Hastings . Scottsbluff . South Sioux City . Omaha . La Vista

Nebraska News and Events

Fall Conference Presentation Summary by Marc Rosso, JEO

These presentation summaries from our 2012 Fall Conference illustrate the range of topics and ideas shared in the interest of better service to the public water sector.

Alison Potter of UNL presented a session about the development, construction, and use of a tabletop model for educating the public and water system decision-makers to demonstrate four common backflow and backsiphonage situations. The model represents common cross-connections found in distribution systems and visually demonstrates the occurrence of backflow. These models are easily transportable and are available for use by contacting the Drinking Water Program of the Nebraska Department of Health and Human Services Department of Public Health. Feedback from nontechnical audiences has shown that seeing is believing.

Rich Koenig, Nebraska DHHS, conducted an interactive session on the characteristics of outstanding operators in the utility industry. The key characteristics found in operators who have received various awards were highlighted, and session attendees provided additional attributes of these operators. With lively participation from attendees, this session provided insight into the qualities of award-winning operators.

Sharon Skipton, UNL Extension, and Tom Christopherson, Nebraska DHHS, shared details of two physical models of wells that have been constructed based on the Nebraska Health and Human Services Grout study. One model demonstrates the benefits of the new well construction standard, and the second model demonstrates the benefits of proper decommissioning of abandoned wells. In both cases, the physical model demonstrates how contaminated groundwater from near the surface can be pulled through a well annulus past protective clay layers into nearby water wells.

Lucas Billesbach and John McCurdy of JEO provided the

audience with a structured overview of the process for developing a water or wastewater capital-improvement plan. This session provided attendees with information regarding identification of assets, asset maintenance, improvements and additional assets, resources, budgeting and utility rate decisions.

Howard Issacs, Nebraska DHHS, described the history of the Surface Water Treatment Rule and its modifications. Also pre-



sented during this session were CT calculations and data gathering used for those determinations, and the process developed by the Drinking Water Program of DHHS DPH to accomplish the reporting requirements.

Rick Melcher of the City of Aurora and Dennis Watts of the City of Norfolk gave a presentation on Nebraska WARN. Nebraska WARN is intended to assist water, wastewater, and storm water systems in the event of a natural disaster (such as an ice storm or flood) or a man-made system interruption (as when an operator may forget to order parts and needs additional parts and/ or manpower). To date, there are 162 communities signed up for Nebraska WARN. A brief tutorial was given on the NE-WARN website as to adding resources and navigation of the website.

> Administrator Jack Daniel (Nebraska DHHS) discussed issues associated with Nebraska's public water systems' goals of delivering safe drinking water on a continuous basis, including regulations, drought management, contaminants of concern, capacity development and water well research.

> Chris Rockwell, Mellen & Associates, presented on diagnostics for magnetic flow meters. Verifying the accuracy of a magnetic flow meter has been a point of concern for many municipalities, as there has been no good way to prove the accuracy of meters once installed. Meters are now available with internal diagnostics that can notify a user if the meter is out of a preselected accuracy range while pointing them to potential conditions that could be causing the discrepancy. Meter





diagnostic packages, such as those offered by Rosemount, provide the end user a performance comparison against the baseline performance standard established during flow testing at the factory. The software also affords the municipality hard data for proving accuracy to customers in an instance when billing may be questioned.

Doug Woodbeck, DHHS, reviewed issues that have been identified during the performance of routine surveys of public water supply systems. These include the need for effective screens on water storage facility overflows, keeping proper documentation of work performed on PWS facilities, and public education about the importance of cross-connection control.

Jeff Schovanec, Metropolitan Utilities District of Omaha, outlined MUD's billion-dollar infra-

structure replacement program by first providing the basis for launching a formal IR program in 2008 and then summarizing its full scope (which includes replacing more than 1,200 miles of cast-iron mains in the coming decades). The presentation then explained how MUD is financing and accounting for its IR program (including current and future expenditures) before contrasting how MUD currently selects and justifies individual IR projects with a comprehensive, GIS-based approach that MUD is developing to systematically and proactively identify future projects (and how both methods employ risk-of-failure determinations and asset-management principles).

Ben Day and Craig Reinsch of Olsson Associates described the process of resolving an administrative order issued to the Village of Denton (pop. 190) for repeated water sample results with concentrations over the radium MCL. A total of seven alternatives were presented to the Village, with a recommendation for WRT ion exchange media filtration and a service agreement to remove and properly dispose of the captured radium. The radium MCL violation is only the second leading to treatment within the State of Nebraska. The Village added iron and manganese removal, and a design memorandum compared two treatment options: WRT ion exchange media filtration and hydrous manganese oxide. The capital and life-cycle treatment cost comparison was nearly identical between the two options, and the Village selected the proprietary media filtration treatment due to the radium disposal requirements. Final design was completed in 2012, and completion is expected in early 2013. This topic was also presented at ACE12 in Dallas.

Brian Gongol, DJ Gongol & Associates, shared the results of a Public Information committee effort for outreach to schoolchildren. The project concluded that communities, utilities and others in the water industry should actively engage schoolchildren



through classroom presentations and tours, since those kids become our future customers, voters, rate-payers and water-sector workers. A guide to giving those presentations was distributed, with a special emphasis on helping kids see how their water use is connected to water issues around the world. The guide is available for download at awwaneb.org/committees/pi and will be revised as new ideas are gathered.

Mike Milius of Olsson Associates addressed the reason for a project at Bridgeport to treat for uranium, the steps that were completed by the city to come to the final project, a summary of the project and the construction of the project, along with the operational issues of the treatment system. The water production improvements included the construction of three new production wells and a new water treatment system. The city selected an ion-exchange process for the removal of uranium from the water. The system has been operational since March 2010, allowing for a review of the real-world treatment cost along with an operational history. The presentation covered the treatment system design information, treatment system performance, cost of treatment, and operational issues.

Elizabeth Esseks, Nebraska DHHS, discussed compliance requirements of the surface water treatment rules, including a brief history of the regulations, and an overview of compliance requirements, and the reports that must be submitted to the department each month. Proper data entry was also reviewed.

Nick Lammers of Fontanelle Hybrids reviewed the success they have had helping Nebraska corn growers manage irrigation to maximize profits and conserve natural resources using a Monsanto program called Aqua View. The presentation also included an explanation of all the components of the system and how it is helping reduce nitrate contamination of Nebraska drinking water.

Distribution

Best Practices: Maximize Fire Hydrant Flow Testing

Fire hydrant flushing is an important part of distribution system maintenance and useful in determining flow conditions in water mains. Advance planning and proper procedures make the job easier. **BY JOHN H. VAN ARSDEL**

TILITIES USE TWO DISTINCT types of flushing programs to accomplish their goals unidirectional water main flushing and fire hydrant flow testing, also called fire-flow testing and main capacity flow testing.

In fire hydrant flow testing, fire hydrants are opened and flushed, pressure and flow data are collected, and calculations are made to determine potential fire flow at a particular point in the water main. In unidirectional flushing, hydrants are opened, and flow in the water main is controlled in one direction so debris is flushed out of the main.

Many utilities flush hydrants without controlling the flow direction in the water main. Although this allows hydrants to be checked for function and flow coming out of the port, it doesn't effectively flush the water main clear of debris. It also doesn't allow residual pressure flow data to be collected so fire flow can be calculated. Fire flow is the amount of water a main can deliver when needed for fighting a fire. This article focuses on hydrant flow testing.

FIRE-FLOW TESTS

The primary function of fire-flow tests is to determine water pressure and flowproducing capabilities for fighting fires at any location within a distribution system. Additionally, fire-flow tests can help determine the general condition of a distribution system by detecting reduced flows from heavy pipe-wall deposits. Fire-flow tests can also help detect closed valves in a distribution system.

Fire-flow test results are used by insurance underwriters to set rates for insurance premiums and by fire sprinkler system designers and fire departments to determine the rate of flow available at various locations. Testing results help determine if a building needs a fire pump to get water to a fire inside a structure or if the distribution system pressure can do the job. It's a good practice to conduct fireflow tests on all parts of a system about every 5–10 years, or more often if needed.





If distribution system changes are made-such as a new water tower, ground storage tank, new transmission water main installation, distribution system looping, or new pumps at a booster station or water plant-the changes could affect fire flow at given points in the distribution system. An accurate record should be kept of each fire-flow test along with a hydrant inventory that includes a condition assessment of each hydrant. Utilities and fire departments often color-code hydrants according to National Fire Protection Association 291 standards to reflect fireflow conditions at each hydrant location. With such coding, fire department personnel will know what the flow conditions will be. It's important to note that fire-flow standards refer to potential flow at 20 psi at the hydrant where the residual pressure is measured, not actual flow at the flow hydrant.

Equipment. Personnel and equipment needed for each flow hydrant include

- one hand-held Pitot tube or diffuser with a Pitot tube and a pressure gauge capable of reading 0–60 psi. Higher pressure gauges may be needed, depending on the distribution system's operating pressure.
- one outlet-nozzle cap that fits the residual hydrant's outlet nozzle. The

outlet-nozzle cap is equipped with a pressure gauge capable of reading 0–60 psi—greater than the pressure expected in the residual hydrant.

- a short ruler to measure the inside diameter of the outlet nozzle of each flow hydrant. If a diffuser is being used, the diameter or coefficient of the diffuser will need to be used.
- one hydrant wrench to operate the residual hydrant and one to operate the hydrant(s) where the flow will be measured.
- one person to read the gauge on the residual hydrant and one person to read the gauge on the Pitot tube or diffuser for the flow hydrant(s).
- clipboards and paper for recording data at each hydrant.

For wet-barrel hydrants, it may be necessary to install a specifically designed nozzle to minimize turbulence caused by the hydrant's discharge valve.

Plan Before Testing. Review distribution system maps and determine which hydrants will be used to measure flow and which will be used to measure residual pressures. If all hydrants aren't approximately at the same elevation, test results may need to be corrected for elevation differences. Water tower levels or tank levels should be recorded as This feature is an excerpt from *Opflow*, published June 2012 by American Water Works Association (www.awwa.org). Reprinted by permission.

http://dx.doi.org/10.5991/0PF.2012.38.0031

John H. Van Arsdel is with M.E. Simpson (www.mesimpson.com), Valparaiso, Ind.

well. Review the previous flow tests to see which flows and pressures can be expected. It's usually a good idea to start out at water sources, such as the water plant, wells, towers, or ground storage tanks. This will help minimize, but not entirely eliminate, the amount of debris stirred up in the water main.

Because of the potential for stirring up debris and causing discoloration of water in the mains, customers should be notified before the flushing program begins. Use the local cable channel or publish an article in the local newspaper explaining the project's goals and process. Post signs in areas where flushing will be conducted. A few days before flushing, the utility may also choose to hang door tags in affected areas to warn residents and businesses of possible dirty water. Some utilities use a reverse 911 call system to inform water customers about the activity. Public notification will reduce the number of customer complaints. However, those who answer such calls should be able to address customers' questions about the flow-testing activities and where utility crews are flushing each day. Utilities should also notify the fire and police departments about the activity.

Select a day for testing when consumption will be normal and the weather is predicted to be reasonably good. Notify the water production staff of the time and area in which the flushing crew will be working so water production can be adjusted to accommodate extra demand.

Testing may affect traffic flow, so investigate traffic patterns. Night work may be required in some areas, but flushing programs can often be done during the day, which enables the public to see the utility taking a proactive stance on fire flows. In addition, day-time testing allows water quality to be readily observed during testing.

FIELD PROCEDURES

Field personnel should use the following flow-test guidelines:

Distribution

Flow diffusers keep the flow under control, slowing down the water without affecting the flow.



- Minimize traffic interruptions and arrange for adequate water drainage.
- Locate the residual hydrant and
 - Flush the residual hydrant to eliminate sediment that may damage the gauge.
 - Install an outlet-nozzle cap, which is equipped with a pressure gauge, on the hydrant nozzle.
 - Open the main valve slowly until air is vented; close the vent and fully open the main valve.
 - Read the gauge (the static pressure reading).
- Locate the flow hydrant(s) and take the following steps:
 - Measure and record the inside diameter of the outlet nozzle from which the flow is measured. Take the measurement to the nearest ¹/₁₆ in. (0.159 cm). If you're using a diffuser, use the diameter of the diffuser according to the manufacturer.
 - Determine the discharge. At hydrants used for flow during the tests, the discharges from the open butts are determined from measurements of the diameter of the outlets flowed, the velocity pressures of the streams as indicated by

the Pitot gauge readings, and the coefficient of the discharge outlet being flowed, as determined from the diffuser coefficient or the style of the hydrant outlet. There are three hydrant-outlet styles, known as an A, B, or C outlet. An A outlet has a rounded edge inside the outlet from the hydrant; a B outlet is squared off; and a C-style outlet partially protrudes inside the body of the hydrant. If flow tubes or stream strengtheners are used, a coefficient of 0.95 is suggested, unless the coefficient of the tube is known. Coefficients for the outlets are 0.9 for A, 0.8 for B, and 0.7 for C.

- Conduct a flow test as follows:
- Station one observer at the residual hydrant and one observer at each flow hydrant.
- Open each flow hydrant slowly until it's fully open. Open one hydrant at a time to avoid a pressure surge.
- When pressure at the residual hydrant is stabilized, the observer signals the observer stationed at the flow hydrants to take the readings. The readings for residual

pressure and the Pitot tube readings of each flow hydrant must be taken simultaneously. Air should be exhausted from the flowing hydrant before the reading is taken. For an accurate reading, hold the Pitot tube in the center of the nozzle with the axis of the Pitot tube opening parallel to the direction of flow. The Pitot tube should be held away from the end of the nozzle at a distance of about half the nozzle diameter.

Record the residual reading and the Pitot gauge reading at each flow hydrant. Then close the flow hydrants slowly, one at a time. Closing the hydrant rapidly causes a pressure surge, or water hammer, which could cause a weak main to fail.

For reasonably accurate test results, the pressure drop between the static and the residual pressures should be at least 10 psi. If the distribution system is strong (as it should be near a supply main) and the pressure drop is less than 10 psi, an additional flow hydrant should be tested. Flow should be calculated in the field, so the test can be immediately repeated if results appear to be in error.

Gauges used for testing are sensitive instruments and should be handled with care. They should be tested regularly against a standard gauge to ensure accuracy. If there is any doubt about a gauge's accuracy, the gauge should be tested or replaced. Remember that insurance ratings and distribution system performance are based on these tests, so extreme care should be used in performing the tests.

System operators can take advantage of fire-flow tests and coordinate other procedures at the same time. For example, hydrant valve inspection and maintenance can be conducted. It may also be a good time to inspect air-andvacuum relief valves and check backflowprevention devices.

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