



WISE WATER WORDS

The Newsletter of
the Nebraska Section



American Water Works Association

VOLUME 48, ISSUE 2
SUMMER 2011

Meters: Accuracy Counts

Nebraska Workforce Survey

Legislative Updates

ACE11 Recap





MEMBERSHIP

 American Water Works Association

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American Water Works
Association

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WISE WATER WORDS

American Water Works Association

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Ads from your friends, neighbors, and Nebraska Section supporters.

On the cover: Plattsmouth residents spent the evening of June 22 watching record flooding on the Missouri River overtake Main Street. Photo by Brian Gongol.

Chair's Corner



Resilience in the Face of Flooding by Teresa Konda, HDR

As I write this column in early June, communities, families, farmers, industries and utilities up and down the Missouri River are seeing historic flooding—and bracing for even more water sure to come their way in the next weeks and months. The flooding in the Missouri can potentially produce a domino effect on the Platte River and other tributaries, causing them to back up and flood, as well. Electrical power facilities have been threatened by floodwaters, drain lines at critical infrastructure facilities have been rendered useless, and major roads and railroads have been closed off, including Interstates 29 and 680.

As the water levels continue to rise and remain above flood stage for weeks or months, water treatment plant intake structures and well fields may be flooded or see other damage. Levees may be overtopped or breached. High ground water and stormwater with no place to go may cause serious interior flooding.

Unfortunately, this is not the first time Nebraskans have faced disasters and serious challenges brought on by Mother Nature. Nebraska utilities have withstood other floods before,



The Missouri River overflows its banks near Nebraska City.

not to mention droughts, tornadoes, ice storms and blizzards. The trait that is demonstrated before, during and after each event is the enduring willingness to help those in need as much as possible. In preparations for this event, we've seen neighbors help neighbors evacuate family, pets and belongings to higher ground. Strangers have been helping strangers fill hundreds of thousands of sandbags. Utility systems have assisted other utilities in securing emergency pumps, generators and earth-moving equipment. Many people are performing extraordinary work in critical circumstances.

During times like these, AWWA offers even greater value to its members: Utility managers can tap an important local network of people to help them find emergency equipment. Nebraska WARN is a prime example of such a network. AWWA can offer resources to utilities on flood preparations and recovery, in addition to information to help educate and inform the public. AWWA advances great leadership in solving problems in the water industry, and, in turn, is sustained by those leaders.

At this point, we don't know how long the flooding will last or what will be the full extent of damage caused by the floods. We do know that Nebraskans and other Midwesterners are a hardworking, resilient bunch. We will continue to prepare for the worst and hope for the best.

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Shown: 3.0 Million Gallon Water Storage Tank for Grand Island, NE.
Engineering by Olsson Associates, Inc., Grand Island, NE.

Director's Report



Leadership in Washington and at Home by Tony Bilek, Mc², Inc.

Greetings, members and fellow water professionals. Hope everyone is enjoying a safe and happy summer.

At the time of this writing, I am finishing up activities and duties at the AWWA-ACE in Washington, D.C. The Board of Directors met for the special session on Saturday and board meeting on Sunday. The conference has been filled with interesting meetings and events.

SPECIAL SESSION

Updates on strategic partnering were discussed. In late April, a joint resolution was adopted by the executive boards of AWWA and WEF, further strengthening our commitment to working with WEF on issues and challenges that are important to each of our associations. A copy of the joint resolution is available at www.awwaneb.org/news.

One new activity in particular was the first AWWA-WEF Washington, D.C. Fly-in. Attendance from both associations was very impressive. The Water Infrastructure Finance and Innovation Authority (WIFIA) was introduced to key House and Senate members. WIFIA is modeled after the Transportation Infrastructure Finance and Innovation Act, which has proven to be a successful mechanism in providing low-interest loans for infrastructure projects. You can learn more about WIFIA on the AWWA website.



Larry Andreason received the Fuller Award in Washington, D.C.

Lee Roberts provided the updated treasurer's report. Finances are tracking in order since the budget was approved at the Winter board meeting. Discussion was held regarding membership and the pending restructure of membership fees for lifetime members.

BOARD OF DIRECTORS MEETING

Presidential candidate speeches were given from three very capable individuals: Dan Broussard of the Southwest Section, Jim Chaffee of the Wisconsin Section and John Donahue of the Illinois Section all gave impressive speeches. Any of the three candidates would serve well as AWWA president. We will elect the incoming president at the winter board meeting in January.

AWWA-ACE IN WASHINGTON, DC

The opening general session on Monday morning emphasized the theme of the conference: leadership. After introductions and a rousing general welcome from President Joe Mantua and Executive Director David LaFrance, representatives from Layne Christensen detailed the rescue procedures of the 33 Chilean miners trapped last year.

The Japan Water Works Association director, Yoshihiko Misono, provided details on the recovery efforts his organization was faced with in the aftermath of the historic earthquake and tsunamis of earlier this year. Closer to home, the story of Joplin, Mo., was detailed as the city was devastated by a massive tornado. After assessing the damage to his home and ensuring his family was safe, Matt Barnhart of the Missouri American Water Company immediately responded to the needs of restoring water service. Within 24 hours, water service was restored to the vast majority of the city. Leadership seems to truly blossom in times of adversity and turmoil.

On Tuesday, I joined Water Utility Council Chair Jerry Obrist and Nebraska

Chair Teresa Konda on visits to three House offices and both Senate offices. WIFIA and Chemical Facility Security literature was left promoting action on our behalf.

It was an honor to attend the Fuller Award breakfast on Wednesday and be a part of the presentation to this year's Nebraska recipient, Larry Andreassen from the Fremont Department of Utilities. Congratulations again, Larry.

The Iowa Section had reason to celebrate on Wednesday evening as the AWWA Presidential gavel was passed from Joe Mantua to Iowa's own Jerry Stevens. Jerry is the water superintendent at the West Des Moines Water Works. Jerry was welcomed to the presidency with an Iowa-themed celebration that followed the gavel-passing ceremony.

FALL CONFERENCE

Rob Pierce and the program committee are currently working on the details of the annual Fall Conference. We are looking forward to another impressive conference with hopes that all members can attend and benefit. Plan ahead and save the dates of Nov. 2-3, 2011.

MEMBERSHIP

With the economic times the way they have been for the last several years, it is not hard to understand why membership numbers are flat. Associations everywhere are facing the same dilemma. I am asking each member to reach out to individuals to become members of AWWA and get involved in the association. Most members can remember the friend or colleague who personally approached and encouraged them to become a member. Please consider being that friend and encourage someone to reap the benefits of being a member of our respected association. Thank you for being a part of AWWA, the world's authoritative leader in drinking water.

Water Reflections



You've Proven Yourself, Now Ask for More

by Brian Gongol, DJ Gongol & Associates

Traveling through Plattsmouth the other day—just as the water treatment plant there became an island thanks to rising river levels—I couldn't help but think that if you'd told me a few years ago (during the never-ending drought) that I'd soon see the Platte River so high that they'd have to sandbag Highway 75 just to keep it open...well, I'd have thought you were crazy.

It also occurred to me that the only force of nature that regularly threatens our public water supplies is water itself. It isn't often that we shut down water treatment plants because of wind emergencies

nor are we in Nebraska rattled by many earthquakes of any substance. But year after year, water itself (in the form of flooding) puts plants here and around the country at risk.

It's during these emergencies that the public pays just a little bit of attention to the silent service of the water industry — mainly because nobody can imagine modern American life without running taps. For the most part, that attention is too little, too late. Certainly, a few extra hands can help during a sandbagging operation, but what our industry needs generally is the support of a public that's willing to

back our efforts to prepare, even when there is no imminent threat.

You have undoubtedly noticed that many of the same people who will drop \$600 on a new LCD television without a second thought are the same ones who will scream bloody murder if water rates rise by \$5 a month. That is, perhaps, because Sony and Toshiba and Samsung spend millions of dollars on advertising, while we're content to let our work be taken for granted.

We should take greater ownership of the remarkable work this industry is doing 365 days a year. Consider some of the stories in this edition of *Wise Water Words*:

- Our Section's **Water for People** golf outing raised \$3,500 this year to help people in poor countries get access to safe drinking water. Did you participate? Have you told anyone about the great work we're doing and given them a chance to lend a hand?
- With some of the strong storms we had in June, the problem of **runoff leading to nitrate issues** is a matter of concern. How much does the average water customer know about fertilizer runoff — both on the farm and on deep-green household lawns — and how it affects drinking water? Do customers know how expensive it is for water systems to remove nitrates if they aren't kept out of the source water to begin with?
- Every time a story about jobs and unemployment reaches the headlines, one wonders if anyone else has seen the figures on the **retirement wave** coming to our industry. Is there someone you think might be interested in the results of our joint survey with NWEA and DHHS?

We have hundreds of members in the Nebraska Section (plus hundreds more associates who should be members, too—



Auburn's new water treatment plant will provide iron and manganese removal, expand capacity, and comply with regulations governing groundwater under the influence of surface water.

Advancing



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but that's another topic for another day). I'm certainly not the only one who has a cranky old friend who never ceases complaining to me about something related to our business. For me, it's the friend who is absolutely convinced that his backflow preventer is part of a Communist plot to steal his private property, or something like that. (His reasoning makes about as much sense as some of the excuses we've heard for football recruiting violations in the SEC.) Thanks to Steve Kelley's comments in our mentoring Q&A, I'm going to stop getting mad at my friend for being a blockhead, and instead I'm going to just hand him a copy of Steve's interview, so my friend can see that backflow devices are in his house to protect him more than anyone else.

I'd encourage you to take something from this newsletter and use it to educate someone from outside our field. Cut out a story and hand it to a friend over lunch — or better yet, take inspiration from something you read here and turn it into a letter to the editor for the local newspaper. Blog about something, or share a comment about a water issue on Facebook. If you're stuck for ideas, hit up a member of the Public Information Committee for help. People are talking about water right now, and you know better than anyone else what investments and improvements your public water system needs. This is the time to start the conversation, whether it's one-on-one, online or through the media.

So far, most of the affected communities along both the Platte and the Missouri have done a fantastic job of preparing for the worst and doing whatever it takes to keep their customers' taps flowing. Now that so many systems have shown such good stewardship in this emergency, it's an ideal time to start asking for the tools you'll need before the next emergency comes.

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Nebraska News

Changes Coming to the Nebraska Water Industry Workforce

by Marc Rosso/Tetra Tech, Inc. and Michael Wentink/Nebraska DHHS DPH

Based on information from recent national surveys, much of the institutional knowledge in the water industry could disappear as aging workers retire. The Nebraska Section of the American Water Works Association (NS-AWWA) took a proactive approach to the potential workforce retention issue by conducting a survey to determine what resources the Section should devote to attracting and maintaining membership.

In addition to identifying what the Nebraska Section could do to attract non-members, the research project also sought to obtain reliable demographic information to help forecast the impact of Baby Boomer retirements on public water systems in Nebraska. Developmental work on this project began in 2008 with the assignment of an ad hoc committee. The ad hoc committee members are:

- Lee Applebee, Lincoln Water System
- Brian Gongol, DJ Gongol & Associates, Inc.
- Mary Poe, Nebraska DHHS DPH

- Marc Rosso, HDR, Inc. (currently of Tetra Tech, Inc.)
- Richard Sklenar, Papio-Missouri NRD
- Michael Wentink, Nebraska DHHS DPH

The project was jointly sponsored by the Nebraska Section AWWA, the Nebraska Water Environment Association, and the Nebraska Department of Health and Human Services Division of Public Health. Wiese Research Associates, Inc., was selected as a consultant and worked under contract with the ad hoc committee to develop a survey that was designed to be mailed to existing members as well as to potential members who are Nebraska-licensed water operators and/or certified wastewater operators.

There were three target group mailing lists:

- 374 current members of the Nebraska Section AWWA
- 1,548 potential members who hold credentials as water operators (including some who hold both water and wastewater credentials)
- 590 potential members who hold only wastewater credentials

CREDENTIALS AND WORK SECTORS OF THOSE RESPONDING

	Total Survey (n=698)		AWWA Members Only (n=173)	
	Number	Percent	Number	Percent
Credential (License, Registration)				
Licensed Water Operator (Grade I-IV)	524	76%	92	54%
Licensed Backflow Prevention Assembly Tester (Grade VI)	113	16%	30	18%
Certified Wastewater Operator	238	34%	30	18%
Professional Engineer	65	9%	56	33%
Other	41	6%	26	15%
Do not hold a credential	24	3%	21	12%
Total¹		144%		150%

Primary Work in Water Industry

Public water systems operations	480	69%	83	48%
Consulting firm	42	6%	34	20%
Manufacturer rep/sales	13	2%	11	6%
Regulatory	33	5%	16	9%
Education (college, technical school, university)	9	1%	6	3%
Technical assistance organization	9	1%	2	1%
Fully retired	14	2%	8	5%
Wastewater	38	6%	2	1%
Other	56	8%	11	7%
Total		100%		100%

WHO RETURNED THE SURVEYS?

Target Group	Number Mailed	Number Returned	Rate Of Return
Group 1 (AWWA list)	374	173	46%
Group 2 (W & WW list)	1,548	417	27%
Group 3 (WW-only list)	590	108	18%
Total	2,512	698	28%

HOW OLD WERE THE RESPONDENTS?

Age	Total Survey (n=698)		AWWA Members Only (n=173)	
	Number	Percent	Number	Percent
Under 25	3	--	1	--
25 to 34	45	7%	14	9%
35 to 49	199	31%	45	30%
50 to 54	131	21%	26	17%
55 to 59	113	18%	18	12%
60 to 64	89	14%	28	19%
65/Over	58	9%	19	13%
Total		100%		100%
Average (Median) Age	51.9 years		52.2 years	

A total of 2,512 surveys were mailed in summer 2009, and the findings were compiled in late 2009. A total of 698 surveys were returned to the contractor for tabulation, for an overall response rate of 28 percent, within the expected range of typical mail surveys conducted with a single mailing. This overall return rate was considered acceptable for the Section's use.

In future issues, we will address other results of the survey. In this first installment, we wanted to share with you the overall sample characteristics and NS-AWWA membership demographics. The tables accompanying this report tell the story in full detail, but three highlights stand out:

- The largest numbers of total respondents work in water systems operations
- Almost 4 in 10 respondents could retire in the next 10 years
- Respondents overwhelmingly prefer one-day seminars to other training events

As you review the details in this and future installments, we invite you to share your comments with the members of the committee and your Section leadership, as we all seek to do the right things for our industry and the Nebraska communities we serve.

POPULATIONS SERVED BY RESPONDENTS

	Total Survey (n=698)		AWWA Members Only (n=173)	
	Number	Percent	Number	Percent
Public Water System Population				
Less than 1,000	235	35%	11	7%
1,000 to 3,299	77	12%	17	11%
3,300 to 9,999	78	12%	19	12%
10,000 to 50,000	77	12%	15	10%
Greater than 50,000	75	11%	33	21%
Not affiliated with public water system	120	18%	60	39%
Total²		100%		100%

WHICH NS-AWWA ACTIVITIES RESPONDENTS DESCRIBED AS "IMPORTANT"

	Total Sample (n=649)	AWWA Members (n=160)
One-day seminars	70%	55%
Annual joint fall conference	47%	68%
Email regulatory alerts/updates	33%	51%
AWWA association news	33%	42%
Information on NS-AWWA website	20%	29%

WHICH NS-AWWA ACTIVITIES RESPONDENTS WANT TO SEE PROVIDED MORE

	Total Sample (n=616)	AWWA Members (n=155)
One-day seminars	66%	56%
Support materials for public information	39%	40%
Email regulatory alerts/updates	19%	17%
Research information	19%	21%
AWWA association news	13%	8%
Information on NS-AWWA website	9%	10%

WHICH TOPICS RESPONDENTS WANT NS-AWWA TO EMPHASIZE MORE AT EDUCATIONAL EVENTS

	Licensed Water Or Certified Wastewater (n=565)	Total Sample (n=639)	AWWA Members (n=158)
Water system operation and maintenance	83%	77%	59%
Public water systems management	39%	38%	41%
Public water systems regulatory specifics	35%	34%	30%
Design and construction case studies	27%	31%	51%
Public water system security	24%	23%	18%
Research projects	21%	22%	25%

(Footnotes)

¹Includes multiple replies from some respondents

²Includes multiple replies from some respondents

WELCOME OUR NEW SECTION MEMBERS

Ronald Bishop, Diamond Plastics Corp.
 Chris Christenson, Johnson Controls
 Jake Fisher, Lincoln, NE
 Laura Hardesty, The Cadmus Group, Inc.
 Luke Kleen, Ruskin, NE
 Leah Kottwitz, Omaha, NE
 David Marszalec, Emerson
 Darren Marten, Broken Bow Municipal Utility
 Amin Mohebbi, Omaha, NE
 Mike Ruzicka, City of Ravenna
 Robert Thompson, Lexington Utilities System





Nebraska News

Solving Nitrate Problems at the Plant Level

by Ben Day/Olsson Associates and Bruce Dvorak/UNL

In our previous article (“The trouble with nitrates,” Spring 2011 *Wise Water Words*), we described the sources of nitrate contamination in drinking water sources. These generally include runoff from agricultural and household sources, wastewater (especially from septic systems), and natural sources like leaching from legumes and lightning. Unfortunately, nitrate mitigation at the source isn’t always possible, and some community water systems must react in order to protect public health. When a community is faced with nitrate issues, a few options are available:

- Drilling new wells or finding new sources of water
- Implementing wellhead protection programs
- Blending water from wells with lower nitrate levels
- Connecting with another public water system
- Building or modifying a treatment plant specifically to address nitrates

When feasible, finding new sources is usually the most economical long-term option. Unfortunately, nearby water sources are often contaminated with nitrates as well. In some cases, blending water from high-nitrate sources with water from lower-nitrate sources can result in a satisfactory dilution of nitrates. This may require connecting with another public water system — and in some cases, such connections are the only economical solution. Neighboring communities and rural water systems may be used to provide either a partial supply (for blending) or a complete replacement for a community that finds itself with no other options.

When other nearby sources are similarly high in nitrates, or when the cost of pumping from other public water systems is too high, several treatment options for nitrate removal are available, including ion exchange, reverse osmosis, and electrodialysis reversal.

An ion exchange (IX) process exchanges nitrate ions with anions (atoms or molecules with a net negative charge) from an ion-exchange resin. Sodium chloride can be used for this purpose, in which case the nitrates are replaced with chlorides. This ion-exchange process also softens the water by replacing calcium with sodium. The anion exchange process for nitrate removal is similar to the cation exchange routinely used in household water softeners to remove hardness.

In reverse osmosis (RO), pressure is applied to the water on one side of a permeable membrane, causing it to overcome osmotic pressure. The water crossing the membrane (called permeate) is nitrate-free and can be used as potable water, but typically requires pH adjustment, blending, disinfection, and other treatment prior to entering the distribution system. Nitrates and other contaminants remain on the other side of the membrane in a brine solution and are disposed of as waste.

In the process of electrodialysis reversal (EDR), water goes through a vertical stack of membranes with electrodes on the top and bottom of the stack. The membranes are coated with ion-exchange resins, and a direct current is applied across the stack. This causes cations to pass through the cation membranes into concentrate spacers, while anions pass through anion membranes into different concentrate spacers. The desalinated water stays in the feed spacer, and the salted water in the concentrate spacers is disposed of. To offset the potential for scaling on the membranes, the polarity is reversed several times per hour, causing the feed spacers to become concentrate spacers and vice versa.

Because each of these processes is costly, water that has been treated for nitrates is often blended with non-treated water to lower the overall concentration of nitrates to acceptable levels at a reasonable cost. A major add-on cost, though, is that any water treated for nitrates must also then be disinfected. This can not only raise the expense of water treatment, but also change the scent and taste of a community’s water.

The main technical challenge accompanying these treatment options is the disposal of the waste streams. Waste may be discharged to nearby stream, but that requires a NPDES permit. Discharging to the sanitary sewer may have less of a direct environmental impact, but it may cause problems for the wastewater treatment facility receiving the sewage. Evaporation basins may also be used, but those may require a lot of land.

Other issues may arise in connection with treatment, as well. Treatment for nitrates may not be optimal for other contaminants that may also be present, like arsenic and uranium. And any kind of treatment change could have unintended consequences, like changing the basic chemistry of the treated water—creating the need, for instance, to add corrosion inhibitors such as phosphates.

Dealing with nitrates in drinking water can be a complex issue, involving engineering, environmental and economic factors that may be in competition with one another. The appropriate treatment option must be evaluated and selected by not only considering the up-front capital costs, but also the long-term costs. Operation and maintenance costs such as labor, power and chemical usage, equipment replacement and waste-disposal expenses must be considered in addition to the capital expense and the financing costs of borrowed money.

An effective nitrate-mitigation solution for a public water system should consider all of the available alternatives (including both alternative sources and direct treatment), each compared against the others on at least a 20-year life cycle. These costs, adjusted for their net present worth, offer a reasonable picture of what the community will really have to pay over the life of the system in order to get a consistent and safe supply of usable drinking water.

Committee Reports

NOMINATIONS COMMITTEE

The current officers and trustees serving the Nebraska Section AWWA are:

■ Chair	Teresa Konda
■ Trustee and Past Chair	John S. Olsson
■ Director (through ACE 2013)	Tony Bilek
■ Trustee (term ends Nov. 2011)	Ben Day
■ Trustee (term ends Nov. 2011)	Milo Rust
■ Trustee (term ends Nov. 2012)	Chad Roberts
■ Trustee (term ends Nov. 2012)	Eric Melcher
■ Chair-Elect	Rob Pierce
■ Vice Chair	Eric Lee
■ Treasurer	David Lathrop
■ Secretary	Doug Woodbeck

The proposed officers and trustees recommended by the nominations committee to take office (or continue existing terms) at the meeting in November 2011 to serve through 2012 are:

■ Chair	Rob Pierce
■ Trustee and Past Chair	Teresa Konda
■ Director (through ACE 2013)	Tony Bilek
■ Trustee (term ends Nov. 2012)	Chad Roberts
■ Trustee (term ends Nov. 2012)	Eric Melcher
■ Trustee (term ends Nov. 2013)	Milo Rust (continuation)
■ Trustee (term ends Nov. 2013)	Mary Poe (new)
■ Chair-Elect	Eric Lee (from Vice Chair)
■ Vice Chair	David Lathrop (from Treasurer)
■ Treasurer	Ben Day (from Trustee, first-year term)
■ Secretary	Doug Woodbeck (second year)

The positions of Chair and Trustee & Past Chair are filled automatically by the outgoing Chair-Elect and outgoing Chair, respectively.

PUBLIC INFORMATION COMMITTEE by Mary Poe, Nebraska Department of Health and Human Services

Invitations were sent to the mayors of First Class cities to declare May 1-7 as Drinking Water Week in their communities. We have been told that these mayoral proclamations were issued in Grand Island, Scottsbluff, Seward and York. It's never too late to encourage your own mayor to issue a proclamation for this year

or to plan ahead for next year's national Drinking Water Week.

Committee members took turns issuing daily posts on the Nebraska Section AWWA Facebook page during Drinking Water Week. This generated some interest and new fans of the page, so we are continuing to add posts every couple of weeks. We have also developed a LinkedIn group for AWWA members in Nebraska. To become a fan of our Facebook page or to join our LinkedIn group, please visit awwaneb.org/socialmedia.

We issued postcards to radio stations statewide to invite them to visit the Section website to download original water-related public service announcements. Please let us know if you hear them on one of your local stations.

And for your own public outreach, we are developing a public resource page for the Section website. To let us know what you would like to find on that page, contact Mary Poe at mary.poe@nebraska.gov.

SAFETY COMMITTEE

by Rob Pierce, League of Nebraska Municipalities

If you have any questions about the safety survey or if you didn't receive your facility survey, please contact Rob Pierce. Completed surveys should be sent to: Rob Pierce, League of Nebraska Municipalities, 1335 L Street, Lincoln, NE 68508, or emailed to rbp@lonm.org.

STUDENT ACTIVITIES COMMITTEE

by Xu Li, University of Nebraska-Lincoln

Several members of the UNL student chapter helped with the fundraiser at the Water for People golf outing, and a couple of AWWA student members attended a tour of the Missouri River Wastewater Treatment Plant in Omaha. The UNL AWWA/NWEA student chapter organized a water-tasting contest at the UNL E-Week fair. Several AWWA student members attended and presented at the Great Plains Waste Management Conference in La Vista this spring, and the student chapter organized a poster contest during the fall conference in Kearney.

Gov. Dave Heineman (center) signed a Drinking Water Week proclamation, as have mayors of several Nebraska cities.



Nebraska News

7th Annual Water For People Golf Benefit by Craig Reinsch, Olsson Associates

The 2011 Water for People golf benefit raised approximately \$3,500. This year's event was held on Friday, May 6, at the Miracle Hill Golf Course in Omaha, with the support of 74 golfers and 13 hole sponsors. To date, the Section has raised more than \$21,000 for Water for People through the golf benefit, which was initiated in 2005.

The first-place team, with a score of 60, included Andrew Hansen of Black and Veatch, John Miriovsky and Nick McElvain of Lincoln Water System, and Jeff Selby of Fairbanks Morse.

Second place, with a score of 63, went to David Dunning of HD Supply Waterworks, and Brad Wagner, Troy Compston, and Shane Wagner of Johnson Services. The third place team, with a score of 64, included Bruce Dreessen of Griffin Pipe, Joe McLaughlin of HD Supply Waterworks, Kelly Thompson of Thompson Construction, and Adam Rutjens of Rutjens Construction.

The following individuals won hole/flag prizes:

- Chip Haas (closest to pin, Hole 2)
- Peggy Wilsey (longest drive in fairway, Hole 4)
- Noah Dryden (closest to pin on first shot, Hole 6)
- Mike Mostek (longest putt made, Hole 13)

- Jeff Selby (closest to pin on first shot, Hole 15)
- Bruce Breesen (shortest drive, Hole 16)
- Brian Bensen (longest drive in fairway, Hole 17)
- Troy Lagasse (closest to the pin on first shot, Hole 18)

Raffle prizes included two camp chairs from CH2M HILL, two coolers from Mission Clay Pipe, and two grill sets from MUD. Special thanks to Mike Florek, Dorian Roffe-Hammond, and Alison Cole from UNL, who assisted at the event. Thank you to all the participants, sponsors, flag prize donors, and committee members for helping the Nebraska Section AWWA support Water For People.

Top team (l to r): Nick McElvain, Andrew Hansen, John Miriovsky, Jeff Selby



Facility Spotlight Shines on Norfolk

Norfolk has two water treatment plants: The East Plant is a 1.4 MGD facility, constructed in 1933. The West Plant was constructed in 1975 with a much larger 14.6 MGD capacity.

We asked plant supervisor Chad Roberts to answer a few questions about Norfolk's water system.

Wise Water Words: What is your most significant day-to-day challenge?

Roberts: It's not day-to-day challenges, but normal challenges would be reacting to always-changing regulations and MCLs from the EPA.

WWW: What worries you most about serving your community for the next 10 to 20 years?

Roberts: Challenges from the EPA, and the possible classification of the aquifer for groundwater withdrawal.

WWW: When did you last make any major changes to your distribution system?

Roberts: We are presently constructing a booster station to supply a hospital and provide service to an industrial area.

WWW: What is your favorite community event of the year? Does the water utility take part?

Roberts: I take part in the home and garden show in Norfolk, along with the children's water festival. It's a great opportunity to educate the customers.

WWW: What is the most important lesson you've learned as a utility in the last 12 months?

Roberts: Always be flexible.

Editor's note: See the feature article in our Spring 2011 issue ("Norfolk endures the floods of 2010") about Norfolk's response to 2010 flooding. Back issues of Wise Water Words can be found at awwaneb.org/archives.

WATER OPERATOR TRAINING CALENDAR

For more details on any event, visit awwaneb.org or contact our training partners at the League of Nebraska Municipalities at 402-476-2829.

September

- 6: Ogallala (backflow)
- 20: Grand Island (backflow)
- 21: Wayne (backflow)
- 22: Beatrice (backflow)

October

- 4: St. Paul
- 5: David City
- 6: Norfolk

November

- 2-3: Kearney (Nebraska Section annual fall conference)
- 29: Bridgeport

December

- 1: Fairbury
- 13: South Sioux City
- 14: Fremont
- 15: Lincoln

January

- 4, 2012: Crete
- 5, 2012: Plattsmouth
- 24, 2012: Kearney



Industry Interview

Mentoring Q&A with Steve Kelley

Steve Kelley is the water superintendent at Beatrice. **Wise Water Words:** You're one of the Nebraska Section mentors for water distribution. What are your highest priorities to prepare a distribution system for the high demands of summer water use?

Steve Kelley: This work should actually be ongoing, but the first step is to start well before the start of the high demand times on your system. Have annual pump tests done on wells and high-service pumps to help you determine if there are any known weaknesses in the pumps, screens, formations and electric motors. By doing this early, you can get the repairs made before the summer months come and the usual peak in water usage.

It is also critical that you have some added capacity just in case you lose a well or high-service pump due to an unexpected cause. Another area I look at is backup power to operate the system without power. I believe you should have ample means to supply normal service for a minimum of four days during loss of power.

Another thing that gets overlooked is that if you have a water tower, I believe that you should overflow these a minimum of late spring and early fall. I believe that the water in these water towers can actually turn over, much like an pond or lake. When this occurs, if you have any dust or particles on the surface of the water, they are mixed to the bottom and may be the reason there are more coliform bacteria positives during these times.

WWW: That brings to mind the issue of sampling throughout the distribution system. Do you have any tips for making that process easier or more effective?

Kelley: A coliform bacteria sampling plan is required annually by the Nebraska Department of Health and Human Services. You must list five sampling sites in each zone and make sure that you rotate these sites on a monthly basis so that you cover the entire sampling plan in a five-month period.

I have installed sampling stations throughout the system for coliform bacteria sampling and have had excellent results with this. The main purpose for this is that the sites are always available and you are assured that you are actually getting a better sample of the actual water you are serving your customers.

Most of the time, if coliform bacteria does show up in a water sample, either the sample location is contaminated, there is a sampling error by the sampler or lab, or it could actually be from a water main break a few days earlier. If and when you have a water main break, if at all possible, try and keep positive pressure in the water main during the repair.

I usually try and keep this area isolated if possible, by feeding water from only one direction so that it doesn't leave the affected area. I then collect special coliform bacteria samples and tell the customers in the affected area to boil the water. Once the sample results are confirmed as negative for bacteria, then I notify

the customers and open the valves to the system.

WWW: What tips do you have for maintaining the valves in your system so that they open and close when you need them to—such as when you need to isolate a service area?

Kelley: We try to exercise each valve in the system annually. That includes even the fire hydrant valves. In our valve records we have each valve's location, type, date of installation, year of manufacture, depths to top of nut, direction of turn to close and number of turns to close.

During normal exercising, we count the number of turns to close and try to exercise the valve until this is very close to being accomplished. The number of turns and date exercised are recorded.

Some people recommend actually isolating an area and flushing out a fire hydrant to see if the area can be shut off, but I do not like to do this during normal valve exercising due to the fact that you bring the system pressure below the required 20 psi and then you have potential backflow situations.

WWW: Lawn and garden work probably creates one of the largest seasonal risks for backflow events. Do you have any advice for systems where customers complain about backflow-prevention devices—or maybe even actively resist them?

Kelley: First, the garden hose is the worst case for a bad backflow situation. It can be used for who-knows-what and put almost anywhere. If a hose bib vacuum-breaker is installed, this would eliminate 90 percent of the potential for residential backflow events. When I go out and tell a customer that a backflow device is necessary to protect the drinking water, I always inform them that the first person they are protecting is themselves—and second is their own family. Usually I don't get much resistance. However, backflow is not understood by most customers and once you explain how it might occur, it is much easier to get the devices installed and tested.

We require that industrial and most commercial customers have a backflow device installed before the first branch of the main service line or a containment device. This device must be a reduced-pressure for all industrial customers and depends on hazard for commercial customers. To get this done, you need the support of your board or council and have an ordinance in place to enforce it. Good luck: This is a tough area to deal with, and my rear end is a little smaller because of it.

To learn more about the Nebraska AWWA mentoring program, visit awwaneb.org/mentors.



Nebraska Legislative Report

Water Utility Council Report on Legislative Action

by Mari Matulka/MUD and Jerry Obrist/Lincoln Water System

The Nebraska 102nd Legislature adjourned May 26. The Nebraska Section AWWA followed the proposals listed below. To see the entire bill proposal, go to the Unicameral's website: www.nebraskalegislature.gov. Bills held in committee will be considered again in the 102nd Legislature, Second Session, which begins Jan. 4, 2012.

LB 189 (Sen. Brenda Council): Prohibits public employers from asking about a **criminal record in a job application**. The bill allows the employer to consider a criminal record when an applicant is a finalist for a position. A public employer may refuse to hire an applicant (1) if the applicant's record involves a misdemeanor involving moral turpitude or a felony if either conviction "directly relates to the particular employment"; or (2) if the applicant's criminal record involves a misdemeanor involving moral turpitude or a felony not directly related to the particular employment, and the employer determines after investigation that the applicant has not been sufficiently rehabilitated to warrant public trust. Completion of all aspects of a sentence would be regarded as a presumption that the applicant is rehabilitated.

Status: Business & Labor, hearing held Jan. 24. Will be carried over to the 2012 session.

LB 230 (Sen. Kate Sullivan): Exempts certain utility maps, records and drawings from the **Freedom of Information Act**.

Status: Approved by the Governor, April 14.

LB 266 (Sen. Kate Sullivan): Amends the **Open Meetings Act** to allow a closed session to evaluate the job performance of a non-elected official or employee. The amendment removes the requirement that the purpose of the closed session is to "prevent needless injury to the reputation" of the person.

Status: Government, Military & Veterans Affairs, hearing held Jan. 26. Will be carried over to the 2012 session.

LB 484 (Sen. Galen Hadley): Excludes certain **soil sampling** from the One-Call Notification Act.

Status: Transportation & Telecommunications Committee, hearing held Feb. 7. Will be carried over to the 2012 session.

LB 564 (Sen. Tony Fulton): Amends the Industrial Relations Act to provide that a public entity and labor organization can establish a procedure for the **settlement of industrial disputes**. If a procedure is not established, the amendment establishes a procedure that requires a mediator. An attempt to reach an agreement on a procedure is required to establish a finding of a duty to bargain in good faith, which is a prerequisite to proceeding to the Commission of Industrial Relations (CIR).

Status: Killed May 4.

LB 674 (Sen. Burke Harr): Regulates the use of **electronic monitoring of employees** by employers. In the bill, "electronic



monitoring" refers to the monitoring of employees' activities or communications by any means other than direct observation. An employer engaged in electronic monitoring must provide prior written and signed notice to employees.

Status: Business & Labor Committee, hearing held March 7. Will be carried over to the 2012 session.

LB 682 (Sen. Heath Mello): Creates the Major Gas, Water and Sewer Infrastructure Improvement and Replacement Assistance Act. Under the Act, beginning July 1, 2012, the sales tax levied upon all increases in the amounts that a gas or water utility operated by a political subdivision charges for water or gas infrastructure programs will be placed in a separate state fund that will be available to such gas and water utilities for the **funding of infrastructure replacement programs**. The bill provides a similar benefit relating to sewer use fees for the City of Omaha.

Status: Bracketed on Select File until Jan. 4, 2012.

LB 683 (Sen. Heath Mello): Creates the **Storm Water Management Commission**. The Commission is required to study various aspects of storm water regulation including adequacy, financing of storm water management and options for user-charge revenue mechanisms.

Status: Natural Resources Committee, hearing held March 10. Will be carried over to the 2012 session.

Washington, D.C., Fly-In

The 10th annual DC Fly-In resulted in more than 400 meetings on Capitol Hill. More than 170 water professionals attended, representing 49 states plus Puerto Rico.

Jerry Obrist (Lincoln Water System), **Milo Rust** (City of Chadron), and **Jim Shields** (Metropolitan Utilities District), represented the Nebraska Section AWWA. They visited all of the Nebraska congressional offices to discuss the water infrastructure finance and innovation authority, chemical facility security, standards legislation and clean water requirements.

Washington Report

Budget, Chem Security News from D.C.

A House appropriations subcommittee has approved a draft fiscal year 2012 budget for the US Environmental Protection Agency that contains cuts in state revolving loan funds for drinking water and wastewater.

This draft of a bill would reduce appropriations for the drinking water SRF program to \$829 million for fiscal year 2012 from \$965 million in 2011 and for the wastewater SRF program to \$689 million from \$1.52 billion. For drinking water, that new level would bring SRF funding to the same level it was in the last year of the Bush Administration.

The full House Committee on Appropriations is scheduled to take up the bill on July 12. No amendments were offered at the subcommittee hearing, but amendments are expected from both members who want USEPA to get more funding and from those who want the agency to receive less.

In explaining the SRF cuts, subcommittee chair Rep. Mike Simpson, R-Idaho, pointed out that water had received \$6 billion from the Stimulus Bill in 2009.

Grants that help states and tribal organizations administer environmental programs were cut to \$1 billion from 2011's \$1.1 billion.

When the bill arrives in the Democratically controlled Senate, funding levels should go back up.

Whenever the House and Senate pass different versions of a bill, it must go to a conference committee to reconcile differences. In appropriations bills, that usually means funding is set at the midpoint between the two different numbers the House and Senate initially approved.

This bill also contains a number of policy riders on issues such as endangered species determinations, regulations of greenhouse gases and determining a definition of "navigable waters" under the Clean Water Act. These, too, will likely be changed or thrown out in the Senate, further complicating the conference committee's work.

One of two similar bills are headed toward the floor of the US House of Representatives that would reauthorize the nation's chemical facility security laws. Although neither would cover water utilities, amendments to do so could be offered in the House or made in the Senate. House staff told AWWA that the Committee on Rules, in consultation with Speaker John Boehner, would have to decide which bill would advance to the House floor.

At the spring AWWA-WEF Fly-In and during AWWA's annual conference in Washington in June, members of the water community asked their elected representatives to support chemical security legislation for the water community only if it excluded water utilities from "inherently safer technology" requirements, applied to utilities based on threshold supplies of chemicals and provided adequate safeguards for sensitive information.

The House Committee on Homeland Security approved HR901, the Chemical Facility Anti-Terrorism Security Authorization Act, on June 22. It would reauthorize the current chemical security program for the chemical industry through fiscal year 2018. Rep. Dan Lundgren, R-Calif., chair of the Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies, authored the bill. Two amendments were offered during committee markup that would have included drinking water and wastewater utilities in the bill, but they were defeated.

In late May, the House Committee on Energy and Commerce approved HR908, the Full Implementation of the Chemical Facility Anti-Terrorism Standards Act, which would reauthorize the CFATS program through fiscal 2017. Rep. Tim Murphy, R-Pa., introduced that bill.

AWWA, the Association of Metropolitan Water Agencies, the Association of California Water Agencies, the National Association of Water Companies and the National Rural Water Association sent a joint letter to the committee before that markup asking that water utilities be considered separately from HR908. No amendments were offered to include water utilities during the markup.

However, if the full House approves one of these bills, it will go to the Senate, where there is already one bill introduced to create a chemical security program for water utilities, containing provisions the water community has objected to in previous sessions of Congress, including the "inherently safer technology" provision.

That bill is S711, the Secure Water Facilities Act by Sen. Frank Lautenberg, D-N.J., chair of the Subcommittee on Superfund, Toxics and Environmental Health. S711 has not moved since introduction.

The Senate Committee on Homeland Security approved S473, the Continuing Chemical Facilities Antiterrorism Security Act, on June 29. That bill would reauthorize the existing program, again excluding water utilities, through October 2014.

During debate, Sen. Daniel Akaka, D-Hawaii, said the bill did not go far enough and should include water utilities and "inherently safer technology" requirements. Sen. Susan Collins, R-Maine, ranking Republican on the Senate Committee on Homeland Security and Governmental Affairs, introduced the bill.



2010 Conference Presentations

Review of Presentations Given at the 2010 NSAWWA Annual Conference

The 2011 Fall Conference will give our Section members another opportunity to get together and learn about the state of the art in the water industry. Here's a summary of some of the sessions from last year's Fall Conference:

Doug Woodbeck (Nebraska DHHS) summarized the most prevalent public water system deficiencies found during sanitary surveys by the field staff of the Division of Public Health of the Nebraska Department of Health and Human Services. The most common deficiencies among community public water systems include:

- Failure to measure and record well water levels
- Failure to require cross-connection surveys
- Failure to provide required cross-connection public education
- Failure to have an emergency response plan
- Failure to prevent rust and corrosion on exposed metal water system components
- Failure to require the testing of backflow preventers
- Failure to have an updated water distribution system map

Among transient non-community systems, the most common failures include:

- Failure to keep maintenance records
- Failure to have an approved sample site plan
- Failure to have an O&M manual
- Failure to have an updated emergency contact list
- Failure to possess an operating permit available for inspection
- Failure to keep records of customer complaints
- Failure to maintain equipment as recommended

Non-transient, non-community systems exhibit these failures most often:

- Failure to retain records

- Failure to have a cross-connection control program
- Failure to have an O&M manual
- Failure to have a cross-connection public education program
- Failure to have the ability to apply emergency disinfection within 24 hours

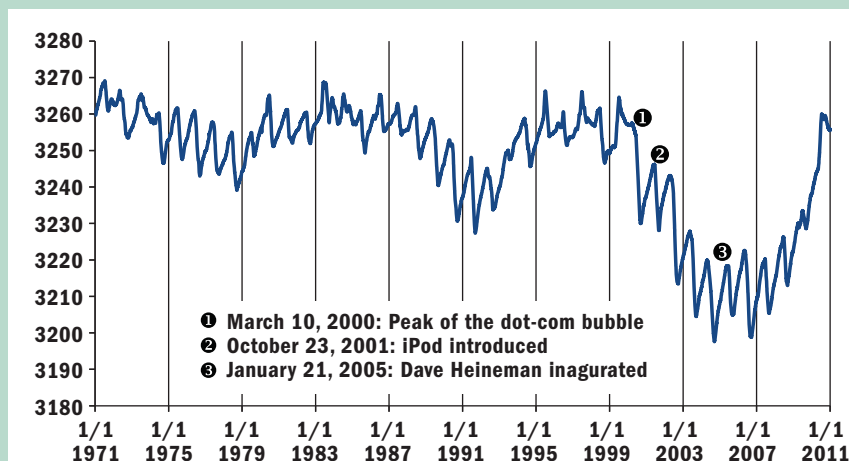
Woodbeck noted that water systems need to pay close attention to the submission of required annual reports for coliform sample site plans and emergency contact lists. In addition, **Scott Sprague** shared information about budgeting to help systems track their financial health and plan for future costs.


Brian Gongol (DJ Gongol & Associates) offered an approach to community marketing for utilities that addresses three target audiences: Schoolchildren, the mass media and ratepayers themselves. Gongol shared suggested classroom talks like "Five diseases Americans don't get anymore" and internship opportunities as ways to reach students both as future ratepayers and potential employees. He recommended approaching the news media with story ideas such as "The water tower is an insurance policy" and going directly to consumers with branding, online interaction and luncheon sessions with service clubs to create positive rapport with the community when times are good in order to build advance support for necessary rate increases and bond issues.

Susan Lynch (Diggers Hotline of Nebraska) offered an overview of the Nebraska One-Call Notification Act, and reviewed the responsibilities of stakeholders, including excavators, utilities, locators and the One-Call organization itself. She emphasized that all stakeholders need to communicate openly with one another and understand the best practices available for their geographic area to ensure that location services can be conducted efficiently, safely and correctly.

Craig Reinsch (Olsson Associates) reported on Olsson's use of pumping water records, water use and other system information to help determine the cause of the 2008 *Salmonella* outbreak at Alamosa, Colo. The outbreak appeared to have been generated by the community's public water system, and a response through the state's Water Advisory Response Network (WARN) helped rid the system of the outbreak. Olsson's research, part of a larger and continuing overall study of the outbreak, helped to rule out a number of possibilities and support other hypotheses generated by the Colorado Department of Public Health and Environment.

Infographic: Elevation of Lake McConaughy





Rich Koenig (Nebraska DHHS) hosted the “Ultimate Backflow Challenge,” testing contestants’ knowledge of cross-connection control.

Luca DeAngelis (HDR) presented two case histories where groundwater flow models are being used, at Hastings Utilities and at the Omaha MUD’s Platte West well field. The Hastings project was primarily concerned with maintaining water quantity while managing nitrate concentrations in the wells, while the MUD project was mainly concerned with managing water quantity while minimizing the impact to neighboring residents. The Hastings well field typically produces 8 MGD but can produce more than 20, while the MUD well field typically produces around 40 MGD but has operated in excess of 75.

Blake Birkel (Kirkham Michael) discussed problems with the Lakin, Kan., public water supply, where the system has repeatedly violated limits on both uranium and gross alpha particle contamination. Birkel reported on the design of a new reverse-osmosis water treatment plant, currently at 65 percent completion.

Steve Drda (Nebraska DHHS) explained the requirements of the new Ground Water Rule, with an emphasis on triggered source well monitoring, which is the feature of the regulation likely to have the greatest impact on many public water systems.

Billy Czapla (Modern Dynamics) presented an overview of pump sealing options, including packing, component seals, cartridge seals and split seals.

Angela Buzard (Wichita State University) discussed water-rate setting, describing the characteristics of “good” rates, ten steps to take towards setting a good rate and how to use available resources to assist in setting those rates.

Dennis Kahl (University of Nebraska Extension), discussing irrigation management in wellhead protection areas, reviewed Nebraska’s history with high nitrates and how demonstration projects and management of irrigation practices helped to alleviate nitrate problems for Seward.

David Lathrop (City of Seward) presented on the use of GIS data to improve both day-to-day asset management and long-term planning. GIS (Geographic Information Systems) models can be used to improve historic problem areas and prioritize future needs, and can be linked to work-management software to track preventative maintenance as well.

Dennis Watts and **Chad Roberts** (City of Norfolk) described how they responded to changes in the permit at Norfolk’s East WTP, which prohibited the discharge of chlorinated water into the Elkhorn River. Rather than dechlorinate the water at the plant, they decided to convey their backwash water to the sanitary sewer, which in turn required improvements to their holding basins. They further described how they were able to use city staff to cost-effectively improve their filter media (which had been troubled by mud balls) and program the PLC.

FALL CONFERENCE: MAKE PLANS FOR NOV. 3-4!

The 2011 Fall Conference—Nov. 3-4 in Kearney—is set to include lots of valuable information for Nebraska’s water professionals. **Presentation topics** at this year’s conference will include:

- | | |
|-----------------------------------|--|
| ■ Well grouting | ■ GIS and hydraulic modeling |
| ■ Benefits of well pump testing | ■ Valve exercising |
| ■ SCADA control systems | ■ Czech water treatment systems |
| ■ Reducing surge and water hammer | ■ Metering |
| ■ GIS water pilot study | ■ WARN program (national and local) |
| ■ Radium removal | ■ Improving revenue collection for utilities |
| ■ Arsenic removal | ■ Regulatory updates |
| ■ Condemnation law overview | ■ Safety |
| ■ Nebraska water rates | |

Operators attending this year’s conference will once again receive **contact hours** toward license re-certification. Credit hours will also be awarded for those competing in the **Top Ops** and **Ultimate Backflow Challenge** competitions, so come prepared to challenge other operators in these friendly contests. The winning Top Ops team will have the opportunity to represent the Nebraska Section at the National AWWA Conference (ACE) in Dallas next June.

Companies, associations or individuals needing to reserve **display tables** need to contact Tony Bilek at 402-333-9660 or tony@mc2h2o.com.

Hotel reservations must be made by Oct. 3 to get the conference rate (\$84.95 for single or double, plus tax). Contact the Holiday Inn at 308-237-5971.

See you in Kearney!

VENDOR INFORMATION

Invitations and contracts for exhibiting at the Annual Fall Conference have been mailed and are posted at awwaneb.org. The conference dates are Nov. 2-4, 2011, and will be at the Holiday Inn Convention Center in Kearney. Stay tuned for details regarding tours and information on the new venue for the 2012 conference. We are excited to be moving the conference activities to the Younes Convention Center, which is immediately west of the Holiday Inn.

Rick Melcher (City of Aurora) and **Dennis Watts** (City of Norfolk) shared an overview of the NEWARN system for requesting and providing mutual assistance during water, wastewater and stormwater emergencies. Participants were reminded of the importance of communicating NEWARN activations to the board of directors so that the program can document their successful activations.

Sharon Skipton (University of Nebraska Extension) reviewed the reasons why some water customers choose to perform additional treatment to the water they receive from their public supplies. Some people want to manage nuisances like hardness and iron content, while others need additional protection for vulnerable consumers in the home, particularly those with health conditions who may need exceptional protection. Skipton reviewed the options for in-home treatment, both at the point of entry (POE) and at the point of use (POU), and noted the importance of knowing the real reasons for extra treatment so that the right methods can be applied.

Improve Accuracy With Proper Water Meter Installation

Installation manuals are often ignored or discarded. When it comes to water meters, however, ignoring manufacturer recommendations and AWWA standards may adversely affect meter accuracy and useful life.

BY LONNIE BURKE AND CRAIG HANNAH, PE

METER INACCURACY decreases water and sewer revenues and increases apparent water losses. A meter's useful life may be significantly shortened if measuring components are exposed to stresses for which they weren't designed. Installing a non-fire-rated meter in an application that requires a fire-rated meter may contribute to loss of property and life in the event of a fire.

Although there are only minimal standards for meter settings, certain principles should be observed. Specific problems and

questions related to meter installation can best be addressed by consulting meter manufacturers and the AWWA Manual of Water Supply Practices M6: *Water Meters—Selection, Installation, Testing, and Maintenance*. As shown in the accompanying photographs, a lack of knowledge by those tasked with selecting and installing water meters can cause many unanticipated problems.

POSITIVE-DISPLACEMENT AND VOLUMETRIC METERS

For positive-displacement meters, orientation has only a marginal effect on accuracy

because of the measuring chamber's mechanics. Independent research confirms that error curves for positive-displacement meters remain virtually constant regardless of meter orientation. However, depending on set orientation and the type of positive-displacement meter used, a meter's life span may be reduced. Oscillating piston meters are probably least affected by meter orientation, but the plastic thrust roller on a nutating disk-type meter mounted in a nonhorizontal position may be loaded eccentrically, causing uneven wear and premature aging.



Access problems can make it difficult to manually read meter registers.



An encoder register for a 2-in. meter was installed on a 1/2-in. meter, resulting in high water bills.



Photograph 1 illustrates how improperly setting a positive-displacement water meter can cause premature wear and eventually affect meter accuracy, especially at low-flow rates. In this example, the meter consists of a 2-in. oscillating-piston positive-displacement meter installed in the vertical plane. The water meter served a small motel, an application in which low-flow accuracy is important. The registered usage at the time the meter was removed from service and tested in August 2009 was 268,450 ft³ (2,008,145.5 gal). According to the serial number, the meter was manufactured in 1984. After the meter

was removed from service, testing in the horizontal and vertical planes revealed a 5 percent degradation in meter accuracy at low-flow rates. This meter setting was completely replumbed, and a new 2-in. positive-displacement meter was installed in the horizontal plane.

Register accessibility is another concern in meter installation. Photograph 2 shows two 1-in. nutating-disk positive-displacement meters. As installed, it's difficult or impossible to manually read these meter registers. Each meter should have been installed using an appropriate setter, yoke, or horn. A meter box or tile that

This feature is an excerpt from *Opflow*, published September 2010 by American Water Works Association (www.awwa.org). Reprinted by permission.

Lonnie Burke is with Water Management (www.watermgt.com), Albuquerque, N.M. Craig Hannah, PE, is with Johnson Controls (www.johnsoncontrols.com), Lubbock, Texas.

would accommodate two meters, two setters, two curb stops, and automated meter reading (AMR) radio transmitters should also have been installed.

Similarly, in the installation shown in Photograph 3, no one noticed that an encoder register for a 2-in. meter was installed on a 5/8-in. meter. When the customer complained about exceptionally high water bills, the utility merely read the meter via a mobile AMR system on three occasions—instead of physically inspecting the meter—and reported the meter was functioning properly. In reality, the customer was being billed for 10 gal of water for every gal actually used.

INFERENTIAL OR VELOCITY-TYPE METERS

Proper installation is also critical to accuracy and life span for inferential or velocity meters, including multijet and singlejet water meters. To accurately measure usage at low-flow rates, the bottom end of the impeller shaft for most multijet meter models and some singlejet models rests on a jeweled bearing. As flow rate increases, a slight twist in the impeller vanes generates a lifting force, causing the impeller to achieve neutral buoyancy (float) in the center of the measuring chamber. This lifting force eliminates wear on measuring chamber components.

If such a meter is installed in a non-level, nonhorizontal position, the impeller



System Operations



The isolation valves for this bypass meter are closed, preventing the meter from registering usage at low-flow rates.



The strainer installed on the downstream side of this meter doesn't protect the measuring chambers from being damaged by debris.

shaft no longer rests on the jeweled bearing surface and rubs against the walls of the impeller shaft guide. This increases the amount of friction the impeller must overcome to register flow, which in turn greatly affects accuracy at low-flow rates. Friction forces also accelerate wear inside the impeller shaft guide, further decreasing meter accuracy throughout all flow ranges and shortening meter life.

Independent research for single-jet meters shows that a new, horizontally installed meter may not achieve an error rate of less than 5 percent until it reaches a minimum flow rate of 0.14 gpm. If the same new singlejet meter is installed at a 45° angle, an error rate of less than 5 percent isn't realized until the flow rate reaches 0.19 gpm. If installed at a 90° angle, the error rate of less than 5 percent isn't realized until the flow rate reaches 0.22 gpm.

Photograph 4 shows a 2-in. multijet meter installed at a 12° angle in the vertical plane that serves an apartment complex located on a hilltop; the service line followed the terrain. The installer should have purchased a meter setter or plumbed this set so the meter could be installed in the horizontal plane.

WOLTMANN OR TURBINE-TYPE METERS

Woltmann or turbine-type water meters are among the most reliable, robust, and accurate measuring devices available, but installation will affect their accuracy. The

measuring chamber of a Woltmann water meter consists of an impeller that faces in an axial direction. To provide accurate measurements, all turbine meters need an ideal, turbulent velocity profile at the impeller, which provides a near-uniform vector representation of the axial speed of a fluid, except for those areas near the pipe wall.

If flow is disturbed immediately before reaching the measuring chamber, however, the velocity profile may be altered, and the water may pass through the impeller in an unbalanced manner, commonly referred to as jetting. These disturbances are usually categorized as low, medium, or high.

For low disturbances, the velocity profile is skewed toward one side of the pipe, but there's little or no radial velocity or swirl present. Low-disturbance profiles are usually caused by installing fittings such as elbows, tees, and eccentric reducers without sufficient lengths of straight pipe; flow conditioners; or strainers to settle the flow. Misaligned flanges or gaskets may also be a source of low-disturbance profiles. Research indicates that a low-disturbance profile will affect meter accuracy by ± 1.5 percent. In addition, measuring chamber components will suffer increased wear, shortening meter life.

It's important to note that a meter will overregister or underregister usage. Overregistration often leads to angry customers; underregistration causes apparent

losses and lost revenue. An inaccuracy of 1.5 percent doesn't seem excessive when compared with the additional cost of providing and installing straight pipe or flow conditioners and enlarging the vault, but it may prove costly during the life of the meter and the set.

For example, assume the following typical conditions for a 3- or 4-in. meter service are met:

- The annual billable usage is 40,000 kgal/year, and the usage pattern remains constant over time.
- The combined volume rate for water and sewer is \$7.75/kgal, and these rates will remain constant for the life of the set.
- The meter will last 20 years, and the meter set will last 50 years.

For this illustration, assume the meter's accuracy won't degrade over time. A 1.5 percent underregistration caused by a low-disturbance profile means the meter won't register 600 kgal of water/year, and the utility won't receive \$4,650 in revenue. During the meter's 20-year life, 12,000 kgal of water will pass through the measuring chamber without being registered, and the utility won't bill \$93,000 in revenue. Over the set's 50-year life, 30,000 kgal of water won't be registered, and the utility won't receive \$232,500 in revenue.

Photograph 5 shows a 3-in. horizontal turbine meter set that probably has low disturbances in the flow profile caused

Although there are only minimal standards for meter settings, certain principles should be observed.

by a reducing elbow located immediately upstream of the meter inlet. The vault is undersized for this setting; there's insufficient room to install a 3-in. plate strainer with its 6-in. lay length at the meter inlet; and the vault can't accommodate five equivalent diameters (15 in.) of straight pipe upstream of the meter inlet.

For medium disturbances, the velocity profile is skewed, and there's a noticeable, measurable radial component of more than 2 percent of the swirl. Most medium disturbance profiles occur when several items that individually cause low disturbances are placed close together so the effects are combined and multiplied, such as when two elbows are bolted together in different planes. Research indicates that a medium disturbance profile will affect meter accuracy by ± 2.5 percent, and the measuring chamber components will suffer increased wear, shortening meter life.

When high disturbances occur, there's some combination of a skewed velocity profile, a measurable radial component somewhat above 3 percent of the swirl, and possible cavitation of entrained air. Common causes of high disturbance profiles include partially opened valves and certain types of pumps installed close to the meter. Valves, backflow prevention devices, and pumps placed immediately upstream or downstream of the meter can also cause high disturbance profiles. Research indicates that a high disturbance profile will affect meter accuracy by ± 3 –5 percent, and the measuring chamber components will suffer increased wear, shortening meter life.

Floating-ball technology meters aren't as sensitive to flow disturbances and can be installed in a wide range of orientations without affecting meter accuracy. Regardless of type, however, all water meters should be installed level, horizontal, and according to manufacturer recommendations.

COMPOUND METERS

Although the design of compound meters makes them less susceptible to flow



disturbances than large turbine or single-jet meters, it's still important to follow manufacturer installation guidelines. In addition, every large meter should have a strainer to protect the meter from damage by debris in the water.

Dual-body compound meters should be inspected periodically, and billed usage for an account should be reviewed regularly to ensure isolation valves for the bypass meter haven't been engaged. As shown in Photograph 6, the isolation valves for the bypass meter are closed. Water can't flow through the bypass meter, which means the meter can't register usage at low-flow rates and is functioning as a large turbine meter.

Likewise, all large-meter sets with a bypass should be inspected regularly, and the billed usage for the account should be reviewed each billing cycle to ensure the bypass valves haven't been opened. Wherever possible, a utility should install a locking mechanism to prevent bypass valves from being opened.

In Photograph 7, the strainer was installed on the downstream side of the meter, which doesn't protect the measuring chambers from being damaged by debris. The pressure-reducing valve (PRV) serving each of these meter sets has been installed downstream of the meter, but a minimum of five equivalent pipe diameters between the meter and PRV are recommended by AWWA and the

manufacturer when the PRV is installed downstream of the meter.

Photograph 8 illustrates how a large compound meter shouldn't be installed. A PRV is mounted to the inlet side of the meter, and a butterfly valve is mounted to the meter inlet flange. The manufacturer recommends against installing check valves or pressure-reducing devices upstream of the meter. In addition, valves immediately upstream of the meter should be fully open gate valves only. Butterfly valves are acceptable if they're five pipe diameters or more upstream from the meter. Downstream, fully open gate or butterfly valves can be used.

It's also important to note that a 2-in. compound meter was installed downstream of the 6-in. compound meter. Because the 2-in. service supplies an irrigation system, there will be no usage at low- or intermediate-flow rates; therefore, a compound meter isn't recommended for this application. A 2-in. horizontal turbine meter with a plate strainer, a 2-in. vertical turbine meter with a plate strainer, or a 2-in. floating-ball technology meter are better suited for this situation. Unless the 2-in. compound meter serves as a sewer deduct meter, this customer is paying twice for irrigation water—once through the 6-in. compound meter and again through the 2-in. compound meter.

Certification Corner

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WATER

1. Hard water scale is usually caused by
 - a. calcium bicarbonate.
 - b. calcium carbonate.
 - c. magnesium bicarbonate.
 - d. magnesium carbonate.
2. Which of the following is an example of a weighting agent?
 - a. Polyelectrolytes
 - b. Bentonite clay
 - c. Calcium carbonate
 - d. Sodium bicarbonate
3. The minimum detention time in a conventional detention basin is
 - a. 2 hr.
 - b. 4 hr.
 - c. 6 hr.
 - d. 8 hr.

WASTEWATER

1. Which type of organisms are most likely associated with poor treatment or young biomass?
 - a. Amoebas
 - b. Free-swimming ciliates
 - c. Rotifers
 - d. Stalked ciliates
2. The most common flow-measuring device for wastewater is a
 - a. Parshall flume.
 - b. magnetic flowmeter.
 - c. weir.
 - d. Venturi meter.
3. Which of the following would most likely control foaming?
 - a. Increase the detention time
 - b. Water sprays
 - c. Increase the dissolved oxygen
 - d. Increase solids wasting

ANSWERS Water: 1. b, 2. b, 3. b Wastewater: 1. a, 2. a, 3. b



OLSSON ASSOCIATES

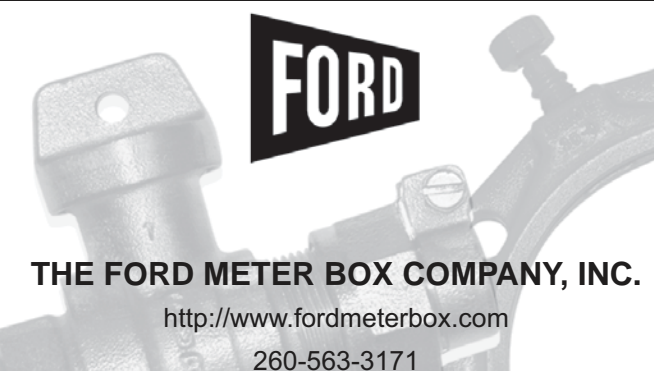
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