What Does the “Best of the Best” Drinking Water Taste Like?

Inside:
- Minnesota Section’s 100th Anniversary
- 99th Annual Conference Recap
- Babe Ruth drank from that pipe?
CASE STUDY

Winona's Wincrest Water Tank Continues to Perform Well

Installed: 2008
Tank Type: Composite Elevated Tank
Storage Capacity: 400,000 Gallons
Engineer: Short Elliott Hendrickson
Contractor: Engineering America

PROJECT OVERVIEW:
Engineering America crews completed the Wincrest water tower in August 2008 for the city of Winona, Minnesota. The 143-foot-tall structure has a capacity of 400,000 gallons and serves the far southwest quadrant of the city.

A life cycle maintenance analysis studied the cost of painting a welded steel water tower over a 50-year life cycle. City officials awarded the project based on a present worth analysis that showed a substantial savings by using Engineering America's Aquastore composite glass-fused-to-steel elevated tank.

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Disclaimer

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Message from the Chair

Gearing up for 2016

As we journey back in time to celebrate 100 years of AWWA in Minnesota, pause just a moment and think about how far we have come. From wooden water mains to PVC, DIP, HDPE water mains, and dip-needles to locate buried iron to GPSs and tracer wire. From paper trails to iPads, and the list continues. The most important part is our work force. Yes, we have changed. Bib-overhauls to jeans, caps to hard-hats, fill in the blank with what has changed at your utility.

A hearty “Thank You” to all that make our Section Conference a huge success. We can always use more help on councils and committees. If you are thinking about stepping-up, let us/me know. We will put you in contact with the right person. This is what makes our Section strong and mobile! Our greatest strength is our members. Don’t be afraid to step forward. We need your knowledge to share with our Section.

Our 2016 conference is gearing up to celebrate 100 years of the MN AWWA Section. Many events are in the works, such as social gatherings, guest programs, speakers, and a history museum. If you have any interesting parts, literature, or something you would like to share for the museum, contact Steve Schneider, St. Paul Regional Water Works.

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Honored to represent our Section and Association

Another great Fall Conference has past…

- The opening speakers, exhibition, technical sessions, boat ride social and member appreciation night, and regulatory updates were excellent.
- Congratulations to all the award winners! The George Warren Fuller award winner was Bert Tracy of Golden Valley, Leonard N Thompson award winner was Pete Moulton of St Peter, Operator Meritorious Service award went to Brian Dahl of Marshal, Benjamin G. Mason Award of Excellence to Chris Glassing from American Ductile Iron Pipe, and Volunteer of the Year to Stew Thornley from the Health Department.
- Congratulations to all the competition winners! City of Bloomington in Top of the Glass award, Brent Massmann in Meter Madness, City of Duluth in Pipe Tapping, and St Paul Regional Water Supply in Hydrant Hysteria. Look forward to seeing everyone compete in Chicago in 2016!
- Welcome to our newly elected board members – Section Chair-elect Tony Belden and Trustee-At-Large Stew Thornley.
- Thanks to all who contributed…The Minnesota Section raised over $15,000 for Water For People!
- And a special thank you to our Association Representative, Paula MacIwaine, for attending to our Section conference and Perry White from St Louis Park for giving Paula, Mona, and I shooting lessons at the WFP Sporting Clays event. Next year is the Minnesota Section’s 100th anniversary …make sure to invite friends, retirees, new members, and coworkers to the celebration.

At the Association level, the following policies are in the process of being updated:

- Asset Management, revised
- Fluoridation of Public Water Supplies, revised
- Qualifications-Based Selection of Professional Services, new policy

...An election for Treasurer (2016-2020) is underway, and a discussion of the philanthropic initiative and update to the 21st Century Membership Model continue. The policies and Treasurer will be voted on at the January Board meeting with a number of standards.

I want to Thank the Section for approving me as Director and Association Board for approving me as Vice-President. Although the VP experience is just beginning, I am honored to represent our Section and Association.

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Message from the Editor

100-year celebration

Not much to say. Great conference. Heading into our 100-year celebration. To give some perspective to how long we’ve been around (or how new we really are), the Chicago Cubs have never won a World Series during our existence. Here’s the latest Breeze. Enjoy it. Or else.

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Board highlights

Financial report
Section income for 2014 was $375,064; expenses were $384,943 for a net expenditure of $9,879. Investments since the beginning of 2014 were up by $20,311 for a total net income of $10,432.

As of June, section income for 2015 was $160,926; expenses were $138,283 for a net income of $22,643. Investments were up since the beginning of 2015 by $7,755 for a total net income of $30,398.

The reserve balance at the end of June was $222,650, which exceeds the section goal of 50 percent of the budgeted expenses. The section is well endowed as the fund balance of $244,582 at the end of June exceeds the goal of $180,000.

The annual section conference had reached 481 registrations and 93 vendor booths just prior to the conference.

The section’s Twitter account activity has been increasing and has become the social-media platform of choice for Minnesota AWWA.”

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Minnesota AWWA will be involved with the Smithsonian Water Ways Project, which will be coming to six Minnesota communities—New London/Spicer, St. Peter, Red Wing, Sandstone/Pine City, Lanesboro, and Detroit Lakes—starting in 2016. The exhibit will be in each location for six weeks. The purpose of the project is to promote the importance of water in Greater Minnesota.

At its September 15 meeting, the Board of Governors voted to donate $10,000 to help fund the exhibit and to match a similar donation made by the Minnesota Department of Health. An ad-hoc committee will be formed with input from the Training and Education Council, and it may be under the purview of the Public Affairs Committee.

The section’s Water Utility Council has become involved with Metropolitan Council Water Supply Planning. The involvement will have more to do with policy and procedures than on dictating what individual cities will have to do.

**Election results from the business meeting at the annual conference:**
Chair-elect: Tony Belden
Trustee at-large: Stew Thornley

**Recipients and Award Winners**
- George Warren Fuller Award: Bert Tracy, Golden Valley
- Life Members: Jerome Nelson, Roger Renner, Gary Warner
- Silver Drop (35 years): Richard Pawlicki, Steve Gleason, Jerome Nelson, Daniel Curley, Douglas Frederickson, Bassam Banat, Tony Belden, Shahin Rezania, Roger Renner
- Leonard N. Thompson Award: Pete Moulton, St. Peter
- Operator Meritorious Service Award: Brian Dahl, Marshall
- Volunteer of the Year: Stew Thornley, Minnesota Department of Health
- Top of the Glass Award: City of Bloomington
- Meter Madness Winner: Brent Massmann, Bloomington
- Pipe Tapping Winner: City of Duluth
- Hydrant Hysteria Winner: St. Paul Regional Water Services

“Minnesota AWWA will be involved with the Smithsonian Water Ways Project, the purpose of the project is to promote the importance of water in Greater Minnesota.”
The Minnesota Section’s 100th Anniversary

By Jon Eaton


They adopted a constitution that stated the purpose of the association as being “for the exchange of information pertaining to the management of waterworks, for the mutual advancement of consumers and water companies, and for the purpose of securing economy and uniformity in the operations of water-works.”

In the first 25 years, three AWWA members from the state of Minnesota were elected President of the Association:
• 1887...... J. T. Fanning
• 1897...... John Caulfield
• 1903...... L. N. Case

By 1900, the average life span was 47 years of age. The infant mortality rate was 140 deaths per 1,000 live births, the highest in world. Today, the average life span is 77 years of age, and the infant mortality rate is below 6 deaths per 1000 live births. This significant rate change is primarily related to improvements in the drinking water industry.

George Warren Fuller presented research in 1901 showing that water filtration and disinfection significantly reduces disease rates.

In 1902, the United States Public Health Service passed the first drinking water regulation; they banded the common drinking cup on trains, buses, and ships.

In 1908, the first AWWA Standard was adopted, for cast iron pipe and fittings. Today, there are more than 150 standards used world-wide.

In 1914, the United States Public Health Service began regulating organisms in water, which eventually became known as the “Coliform Rule.” The same year, in the interest to better disseminate information on a local level, the Association constitution was changed to allow the creation of Sections. At the same time, because so much information was being communicated, the Journal began quarterly publications versus the previous annual publication.

In November of 1916, the Minnesota Section was officially formed.

In 1919, Able Wolman was appointed the editor of the Journal. Within a few years there was so much information being communicated that the Journal became a monthly publication. It was relatively common for members from the Minnesota Section to contribute to the publication.

In 1920, the standards committee members collected works from some 320 separate authors and combined them to create the compendium known as the Water Works Technology manuals. The manuals were developed to educate members on all aspects of water quality and treatment. Today, the books are known as the “Water Quality and Treatment” manuals.

In 1937, AWWA opened an office in New York and hired an executive secretary, Harry Jordan, who became known as “Mr. Water.” Jordan held the position for over 22 years.

In 1939, North Dakota joined the Minnesota Section, and J. Arthur Jensen from Minneapolis became the fourth AWWA President from Minnesota.

In 1945, Leonard N. Thompson from St Paul became the fifth AWWA President from Minnesota.

In 1946, South Dakota joined the Minnesota Section.

In 1955, the Minnesota Section was renamed the North Central Section.

By 1959, typhoid fever, a waterborne disease, had been eliminated.

By 1928, AWWA water and wastewater professionals had generated so much information that they created the Sewage Works Federation to address the wastewater issues. This spin-off organization eventually became known as the Water Environment Foundation, or WEF.

In the 1930s and 1940s, the number of AWWA Sections grew quickly to address waterborne disease issues locally and at the war fronts.

In 1960, South Dakota left the North Central Section to form its own Section. In 1966, AWWA formed the Research Foundation to promote and fund associated research. In addition, the Water Utility Council was formed and a Washington, D.C., office opened to help members interact with federal elected officials and regulators.

In 1972, Clifford W. Hamblin from St. Paul became the sixth AWWA President from Minnesota.

In September of 1990, North Dakota and Minnesota split, forming their individual Sections.

In 1991, AWWA formed Water For People to help other countries address waterborne disease and bring safe drinking water to the public around the world.

The history of AWWA and the Minnesota Section is the history of the people who have committed themselves to achieving the purpose set forth more than a century ago, now simply stated as creating a better world through better water.

In the next 100th Anniversary article, the six AWWA Presidents from Minnesota will be highlighted.
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99th Annual
Minnesota Section Conference

Recap

David Rindal of the Minnesota Department of Health scanned the horizon to make sure the harbor tour was on course during the 99th annual Minnesota American Water Works Association (AWWA) conference in Duluth in September.

The big awards presented were to Pete Moulton (Leonard N. Thompson Award) and Bert Tracy (George Warren Fuller Award).

Paula McIlwaine, AWWA deputy chief executive officer, came in from Denver to greet the throng.
99th Annual Minnesota Section Conference

Recap

Incoming chair Jim “Bulldog” Sadler.

Smiling Bert Tracy with a cranky-looking Volunteer of the Year.

Serious Bert Tracy presents Brian Dahl with the Operator Meritorious Service Award.

Brent Massmann (right) gets the trophy from Kirk Peterson for Meter Madness.
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But what does truly superior drinking water taste like? How can other drinking water utilities improve their drinking water quality?

We asked Pat Planton, director of drinking water services at SEH and current Chair of the Wisconsin Section of the American Water Works Association (AWWA), who recently had the opportunity to serve as a taste tester and judge for the 11th Annual “Best of the Best” Drinking Water Taste Test Competition at the 2015 AWWA Annual Conference and Exposition (ACE15) held in Anaheim in June 2015.

You’ve tasted the best water in the country. How did it taste?
[Pat Planton] Like absolutely nothing! [laughs] Great tasting water appears to have the right chemical makeup to impart no taste, odor, or color to the water. Unlike other food or drink, great water is judged on its absence of taste, rather than a presence of taste.

Sounds like judging “no taste” would be difficult.
Yes, at this level, it’s difficult. All of the drinking water utilities present at ACE15 had already won their state or province competition and advanced from there. It was only the best of the best from around North America.

What was the taste testing process?
There were 30 different three-ounce samples, each in a small plastic cup. The water samples were required to be at room temperature, rather than chilled.

Why serve at room temperature?
They do this because with water at room temperature, or at temperatures higher than chilled water, dissolved gases, odors, and tastes are more discernable. That’s a takeaway to anyone reading this: cold water tastes better. There’s a scientific reason for it. But, honestly, the process is not unlike if you’ve ever done a wine tasting, except there’s no spitting. Instead, water samples are ingested. After each tasting, saltine crackers were provided so we could “cleanse our palates” between each of the samples.

Finally, the competition was a blind test. No, we weren’t blindfolded, but we didn’t know where the samples came from, or if they were taken from surface or groundwater sources prior to judging. We started with thirty samples, recording scores for each on a scale of one to ten, whittled them down to five finalists. Then selected the winner.

What were you judging, specifically?
Taste was the main criteria. Smell and mouthfeel were also considered. Water clarity, of course. There’s a graphic that shows the full spectrum of water taste and smell [see below]. It gives a good picture of the kinds of things you are looking for when tasting water. On that wheel you’ll find that there are proportionately more profiles for smell...
Drinking Water Taste and Odor Wheel is Continuously Updated.

Notes:
- Inner wheel indicates categories
- Middle wheel indicates descriptors
- Outer wheel indicates reference standards
- Distribution system has not been positively confirmed as the source of the compounds in gray
* Presence confirmed in water

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What Does the
than taste. What’s interesting is that the
majority of your sensory experience when
eating or drinking comes from smell,
rather than taste.

That said, just a few had discernable
musty or chlorine odors. Subpar tasting
water, compared to the superior tasting
samples, did have either a weak musty/
chlorine odor, or an unwater-like taste or
aftertaste. No differences in water clarity
were observed — all the samples were
very clear. You can’t say that about all
drinking water in North America.

Were there major discrepancies
among any of the samples?
I was easily able to eliminate 20 of the
30 samples as rating inferior to the ten
remaining samples. They had discernable
taste or aftertaste. However, ranking
the remaining ten water samples was
extremely difficult for me and the other
judges. Most of the samples we rated
similarly, giving a score between eight or
nine out of ten on the scoring sheet.

Who won? What utility
had the best tasting water?
Of the top five, all tasted similar, with
no easily discernable odor, taste or
aftertaste. I judged two of them better
than the other three, but it was a very
close vote.
The Big Sky Water Utility of the
AWWA-Montana Section was the ACE15
“Best of the Best” Taste Test Contest
winner. A big congratulations to them.
I scored two of the final five samples
as my top choice — one of them was
Big Sky Water, the 2015 Winner. So…
congratulations to me! [laughs]

What is the winner doing to get
such great tasting water?
Location can play a role. There are parts
of the country that have an abundance
of great tasting water — often times you
find old breweries in these communities,
and more currently you’ll find bottled
water plants. These locations and utilities
know that they have great water and
aren’t afraid to compete for the title of
Best Tasting Water in North America at
AWWA’s ACE events.

Though the winner (Big Sky) is
situated in an area that looks like it’d be
on the label of a bottle of water—with
picturesque mountains and pristine
lakes—don’t think that the best water
needs to come from places like these.
For example, the Village of Arcadia
in Wisconsin has won the AWWA-
Wisconsin Section’s Taste Test Contest
Arcadia should bottle their water — it’s
that good; and even better at 48 degrees
as it comes out of the ground, rather than
room temperature.

Treated water should taste as good
if not better than raw water — especially
when tastes, odors and color are removed
from the raw water. This is especially true
with surface water supplies.

Aside from the pride, what
types of benefits do communities
with great tasting water see?
Everyone — residents, businesses,
industries — loves great tasting water
provided by their local water utility. Great
tasting water, especially if it does not
need much treatment to make it potable,
generally results in lower rates for drinking
water, as expensive treatment costs can
be avoided.

Communities can also advertise and
promote their drinking water. For example,
Stevens Point WI (where I lived for 26 years
and designed many wells and treatment
plants) won the 2010 AWWA ACE-10 Best
of the Best Taste Test Contest, beating out
New York City’s water utility.
The City of Stevens Point has a tagline
“City of Wonderful Water”, and the local
Stevens Point Brewery also promotes that
its water source is the great tasting water
from the award-winning Stevens Point
Water Utility.

What are some steps other cities
or utilities can take to be more like
the winner in Big Sky?
Public utilities could include even more
water treatment polishing processes
This weak chlorine smell often times means there is not enough chlorine being added to the water, which is counterintuitive to most water treatment operators. Their first reaction is to reduce the chlorine dosage to remove the chlorine odor, but the reverse is true but difficult to explain and has to do with breakpoint chlorination principles.

Any final words?
The large majority of the samples provided at the ACE15 Contest were as good if not better than most bottled water — plus with much more rigorous testing to ensure safety than bottled water. My final words? Your local water utility staff works hard to deliver water to your faucet every day. Drink tap!

About the Expert
Patrick Planton, PE, is the current Chair of the Wisconsin Section of the American Water Works Association and SEH senior water project manager who has led many award-winning water projects. With over 32 years of experience, Pat is passionate about solving the world’s drinking water challenges. Pat has worked on drinking water projects throughout North America over his career.

Any final words?
The large majority of the samples provided at the ACE15 Contest were as good if not better than most bottled water — plus with much more rigorous testing to ensure safety than bottled water. My final words? Your local water utility staff works hard to deliver water to your faucet every day. Drink tap!

About the Expert
Patrick Planton, PE, is the current Chair of the Wisconsin Section of the American Water Works Association and SEH senior water project manager who has led many award-winning water projects. With over 32 years of experience, Pat is passionate about solving the world’s drinking water challenges. Pat has worked on drinking water projects throughout North America over his career.
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Babe Ruth Drank Water From That Pipe?

Upgrading a Century-Old Infrastructure in an Urban Environment

By S.S. Donnally, PE and N.T. Nicholson

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EXECUTIVE SUMMARY
Design of rehabilitation and replacement of 10 miles of water distribution mains in an urban environment can be challenging. The water mains replaced for this project are part of the city of Baltimore's holistic approach to proactively update their century-old water distribution system.

The city's critical distribution system includes over a thousand miles of pipe that have reached or surpassed their useful life, many of which have failed in recent years, resulting in major disruptions to the City's customers. Pipes slated to be replaced were installed in the late 1890s and early 1900s, with the majority installed prior to the 1930s. The mains are composed of varying materials, including both pit-cast and spun-cast ductile iron pipe. This paper focuses on unique challenges associated with the evaluation and design of water mains in an urban environment that have been in service for more than a century.

OVERVIEW OF THE CITY OF BALTIMORE AND ITS WATER SYSTEM
Baltimore, Maryland's largest city, is located in the central part of the city. It has approximately 625,000 residents within the city limits and is also the center of a metropolitan region that is comprised of over 2.5 million residents. The heart of the city is an urban center highlighted by a diverse economy, world-renowned universities and medical centers, and numerous historic and cultural resources. The city lies within two major watersheds, the Patapsco and Back River Basins. It is bordered almost entirely by Baltimore County, with the exception of a small southern portion that is bordered by Anne Arundel County.

The city of Baltimore's water distribution system is unique in that it provides water to most of the surrounding metropolitan area, including Baltimore County, Howard County, and a small portion of Anne Arundel County. The city currently operates two treatment plants (Ashburton and Montebello), which have a combined capacity of 360 million gallons per day (MGD) and convey potable water to surrounding counties through a series of large transmission mains that are jointly maintained by the city and the surrounding counties. Each connection to the surrounding counties includes large meter vaults that monitor the quantity of water being used by each of the municipalities. This paper focuses on the distribution system located within the city limits and the unique factors associated with upgrading these century-old water mains.

The Baltimore Central System, which functions as the common water system for the city of Baltimore and the Baltimore County Metropolitan District, delivers water to an estimated 1.6 million consumers annually and includes an area of approximately 291 square miles.

The development, operation, and maintenance of the major distribution facilities in the system are the responsibility of Baltimore City. The raw water supplies located on the Gunpowder, Patapsco, and Susquehanna Rivers, treatment facilities at Montebello and Ashburton, and all distribution facilities located within the boundaries of the city are owned and operated by the city. Facilities located in neighboring Baltimore County are generally built by the county, but are operated and maintained by the city.

Baltimore's water system consists of more than 1,500 miles of water main, ranging from 3-inch to 108-inch diameter, most of which was installed in the late 1890s and early 1900s. The mains are predominantly cast iron; however, some of the larger mains...
(greater than 16-inch diameter) are steel, reinforced concrete, and prestressed concrete cylinder pipe (PCCP). These water mains connect a series of pumping stations, reservoirs, and elevated storage tanks in five major zones of service.

**SYSTEMATIC REPLACEMENT**

Prioritizing the water mains to be replaced

In effort to be pro-active in replacement of the aging infrastructure, the city of Baltimore completed an evaluation of its existing system. This included development of a criticality model that used several of the following criteria (in addition to other critical information) to rank the mains and prepare the overall replacement schedule:

- Age of the pipe
- Dirty water complaints
- History of failure
- Structural condition of the pipe
- Corrosion analysis
- Hydraulic modeling
- Location of the pipe
- Size of the pipe
- Number of lateral and service connections
- Roadways under moratorium

This information was compiled into a database, and a city team was put in place to determine which of the mains should be replaced immediately and which could wait until a later time. For instance, take a 60-inch water main in Lombard Street, which is the main feed past Baltimore’s Inner Harbor and provides water to a large portion of the downtown area. This main was found to have been installed in 1902 and has recently been experiencing a growing number of failures. Replacement of this main was made a priority over a smaller main in the more suburban locations of the city that had very few service connections and had been installed in the 1930s.

Creating a program to replace the failing infrastructure

Replacing more than 1,500 miles of water main is undoubtedly a monumental task. In 2010, the city announced a bold program that included the replacement of 20 miles of pipe the first year and 40 additional miles annually over the following five years until all critical mains have been replaced. The city has

---

**Figure 1** – Map depicting the geographic location of the city of Baltimore.

**Figure 2** – Map depicting the five zones of water service for the city of Baltimore and related reservoirs.
estimated the cost to replace these mains at approximately $1.2 million per mile, with an anticipated total cost of over $300 million. In order to undertake such a large enterprise, the city created a program to be funded in part under their Capital Improvement Program (CIP), and made the replacement of the critical water mains a priority.

It can be noted that Baltimore’s user rate structure incorporates both anticipated capital project costs as well as operating and maintenance expenses necessary for proper water and wastewater system maintenance. The city has substantially increased both the capital and operating budget expenditures to address the aging infrastructure. In mid-2013, the city announced that in order to fund this critical program (as well as the Sewer Replacement Consent Order Driven Program), water and sewer rates would be increased by a total of 42 percent over three years. Following the first year, which included an 11 percent increase, the increases will be at a rate of 15 percent per year for the subsequent two years. By passing these rate increases, the city made it clear that replacement of the critical water infrastructure was a priority that could no longer wait.

In order to meet the goal of 40 miles of pipe replaced annually, this water main replacement program includes an aggressive schedule. To keep the program running as planned, the city hired a Program Management Team. This group is working with the city to implement a process that will undoubtedly help the city meet its target goals. Understanding that the design portion of the replacement program would require the city to hire multiple firms to complete the work, the city opted to streamline the process by updating their design standards and developing a set protocol for document preparation. This critical decision for standardization allows for an efficient program that facilitates the city so it can meet the aggressive schedule required to reach its original goals.

EVALUATION AND DESIGN
Evaluation of available data – building the platform
When developing design documents for an infrastructure that date back to the likes of Babe Ruth, Francis Scott Key, Frederick Douglass, and Edgar Allen Poe, it is imperative to collect as much information on the existing infrastructure as possible. Sources of information range from paper copies of original 100-plus year-old linen as-builts to electronic information such as GIS. Sifting through all of the available information was the most critical step in preparing an accurate picture of what actually exists beneath the cobblestone streets that once saw trolley cars and horse-drawn carriages as the major source of transportation.

Working with the city, a list of available data sources to be used in plan development was created. Some of these sources included:

- Water plat maps – The city maintains overall water key maps to reflect changes to the water system.
- As-builts – The city maintains a library of paper copies of as-built information from water mains, sewers, storm drains, and electrical conduits (conduits are owned by the city while electrical utility owns the conductor in the city conduit).
- Water meter data – The city provided the most up-to-date water meter information available.
- Privately owned utilities – Several privately maintained utilities, such as gas, electric, fiber optic, steam lines, and chilled water are present in city streets. Information was requested from known sources.
- Subsurface utility engineering – Test pitting and Level D utility designating were used in areas of congestion and at critical locations.
- GIS – The city maintains a database of GIS that includes information on water, sewer, storm drains, and conduits.
- Survey – Field survey was used to develop an accurate picture of surface features.

Creating an Accurate Picture
By creating an accurate picture of existing conditions, construction efficiency can be increased. Costly change orders are thereby reduced in number. This in turn increases the amount of pipeline installed on an annual basis, which is ultimately the goal of the city under its replacement program.

Unless you have x-ray vision, understanding what is really underground means relying on the best available information. The list above outlines some of the sources of information used to develop an accurate base plan... because once you know what is there, replacing it becomes the easy part!
The first step in preparing this picture is to conduct a field survey that identifies the existing surface features. Although typically a simple process, field survey in an urban environment, such as downtown Baltimore, does pose some challenges unto itself. With rush-hour traffic, constant construction activity, cars parked on the sides of the streets, and recently paved streets that covered up existing manholes and valve boxes, even picking up the existing features requires that precautions be taken as to not miss any critical features. Off-hour surveys, traffic control during survey work, and other creative options can be employed in the business district to improve efficiency and accuracy of the information collected. A rigorous comparison of as-built data and GIS information to the field survey is necessary to identify a missed valve cover or other surface feature, which can then be added to the design plans.

Following the field survey process, the base plan is then supplemented with additional information to further increase plan accuracy. Adding in the information gathered from privately owned utility companies, incorporating electronic GIS information, comparing the survey to as-built plans and using high-tech utility locating equipment, creates a relatively accurate picture of what is underground. This then becomes the basis for the replacement plans that are ultimately used by the contractor to install the new water mains. By using these multiple sources of data, accuracy is increased, as is the potential for efficiency during construction.

**Water service evaluation**

In addition to the need for creating an accurate base plan for design purposes, the city’s replacement program includes evaluation and replacement of water services. In a historic urban environment, it is likely that some existing services lead to abandoned buildings, parking lots, etc. It is also the city’s intent to replace galvanized services with new copper services as part of this program. While meter data provided by the city offered some basic information with regard to whether services were active, it was necessary to gain another level of accuracy. Reviewing available GIS information did provide some additional information about water house connections; however, the most accurate method of determining service condition was to simply open up the meter vaults and look at what was there. Taking the time to inspect each meter vault and connection allowed the design team to verify the connection materials, diameter, meter type, and general condition of the vault itself. This straightforward process, while time consuming, will provide for fewer changes to design during construction than meter data and GIS information alone. Outdated water meters and damaged vaults were identified through this process for later replacement and/or repair.

**DESIGNING FOR THE FUTURE**

Once an accurate picture of what exists has been created, the next step is to design for the next 100-plus years. One of the most important considerations during the design process is constructability. Can the new mains be installed while keeping the existing mains in service? Must they be replaced in the same trench as the existing main instead because there was simply no room in the street for a parallel main? Directly tied to this is another major consideration – how to minimize service outages to customers. This means that if the new main was going back in the same place as the old main, temporary water service will be required. Since temporary water service could easily become a significant percentage of the construction cost, considerable effort should be made to minimize same trench replacement.

There are multiple items considered when determining whether a pipe should be replaced in a parallel trench versus the same trench. Some of these include:

- What other existing utilities are present?
- How many water services are on the main?
- How many customers will be without service and for how long?
- Is there room in the road for another water main?
- Where are the nearest valves?
- Will temporary fire service be required?
• How large will the required temporary piping be?
• Where can the temporary piping be located?
In some locations, such as the more suburban, residential parts of the city, where the only other underground utilities are sewers, gas, and electrical lines, designing for a parallel water main installation made perfect sense. In areas like this, the major benefit of installing the main in a new trench is minimal disruption to residents’ water service because it is limited to the tie-ins to the existing mains. In addition, temporary fire protection during construction is unlikely to be required, as the existing hydrants will remain in service during the new pipeline installation.

Alternately, in an area such as downtown Baltimore, near the Inner Harbor or City Hall, there are multiple businesses, high-rises, hospitals, schools, and restaurants lining the streets. Steam lines, chilled water supply and return lines, and immense conduits are buried within the street along with the other water, sewer, storm drains, and gas lines. In a location like this, installing the main in the same trench is the more often the approach that makes sense. For these instances, a lot of time and consideration must be given to constructability to minimize disruption to customers.

Once the decision has been made whether the water main should be replaced in a parallel trench or if it should go back into the same trench, the remainder of the design is a matter of standard procedure (thrust restraint considerations, pipeline material selection, allowable joint deflections, tie-in details, permitting, etc.). However, there are several unique considerations inherent to a century-old urban environment. These include:
• The presence of redundant water mains
• Unique city features (trolley lines, cobblestone streets)
• Alternate methods of pipeline installation (CIPP, slip lining)

Redundant mains
During the data evaluation phase of the project, it was noted that there are several locations where there appeared to be redundant water mains within a city street (i.e., two 10-inch diameter water mains). Sometimes the redundant mains make sense, such as in a busy residential area where 30 row-homes line both sides of the street. Here water mains are located on either side of the street, and multiple other utilities are all located within the center of the road. In this instance, it makes more sense to keep both of the water mains. This will avoid having to bore multiple service connections to homes on the opposite side of the street. For these areas, the original design logic is typically held and two mains are replaced in-kind.

In other instances, it is not as clear as to why there are multiple similar-sized water mains located within the center of a street, particularly when there are minimal services coming off of the mains. In locations such as this, hydraulics are evaluated and it is determined whether there is a need for both of these mains or if one can be abandoned. If a main can be abandoned, the new main is evaluated as to whether it should be upsized to meet local demand. Within the city’s distribution system, there is ample hydraulic capacity and several of the mains are scheduled to be abandoned. By using this approach and evaluating the need for multiple mains, the city can save the cost of multiple installations, as well as, the operations and maintenance cost of excess storage volume.

Unique city features
In a city that has been around for more than a hundred years, there are some unique features that must be accounted for that are not usually present in a newer area. Numerous water main as-builts that were reviewed called out the location of trolley lines. Follow-up to these sites confirmed that there are still some buried trolley lines embedded under the pavement downtown. There are also locations where the streets are not paved with asphalt or concrete and cars traverse the 100-year-old cobblestones on a daily basis. The presence of these features adds to the historic flavor of the city and should be preserved if at all possible.

As part of the development of the design documents, the potential presence of these unique features has been noted and a cost for preservation or replacement has been included. In areas where a significant effort would be required to replace historic cobblestone streets, alternative methods of rehabilitation or replacement have also been considered.

Alternative methods of rehabilitation and replacement
Some of the things that set a city environment apart from a rural area are the same things that make maintaining its infrastructure a challenge. When trendy restaurants are nestled in a cobblestone-lined street and the sidewalks are constructed from brick, replacing the 100-year old 6-inch diameter water main that is located just steps away from the entrance can pose some challenges. However, in an age of trenchless technologies and methods of installation meant to minimize physical disruption, these challenges can be overcome with a little bit of innovation. Installation methods such as CIPP and slip lining can be employed to curtail disruption, while still bringing the aging infrastructure new life.

Public transportation is one of the great benefits to living in an urban location, and the Metro system in Baltimore is no exception. The additional power requirements of an underground subway system can create accelerated deterioration in metal pipes when not protected. Further study into cathodic protection systems was necessary to ensure that the new infrastructure being installed will last for years to come.

BUILD IT AND THEY WILL COME!
The purpose of creating a comprehensive and accurate set of design documents is to allow a contractor to install the water mains with minimal unknown conditions. Thus the city’s ability to install the required amount of water mains within budget is maximized and the allotted timeframe reduced. Paying attention to the details (clearly identifying water service connection materials, eliminating redundant water mains, identifying the potential for buried trolley rail lines, etc.), changes the installation process from a daunting process to a matter of course.

With water mains older than Babe Ruth and just blocks away from where he grew up, the city of Baltimore’s pro-active approach to replacement of their aging distribution system means that this historic city will continue to strive for another 100-plus years! •
Minnesota, North Dakota and South Dakota AWWA request abstracts for both verbal and poster presentations for the **2016 Surface Water Treatment Workshop**.

This regional conference presented by MNAWWA, NDAWWA and SDAWWA will provide current technical, process, and operational information to engineers, scientists, municipalities, and end users of surface water treatment facilities. The technical sessions at the **2016 Surface Water Treatment Workshop** will include all topics related to surface water in Minnesota, North Dakota and South Dakota.

### DATES TO REMEMBER

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<tr>
<td>Abstracts Due</td>
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### TOPICS MAY INCLUDE:

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The presentation selection committee will view quality of the abstract as an indication of the quality expected in the presentation and final manuscript. Review of the abstracts will be based on the following criteria:

- Relevance to the theme of the conference and the theme of the individual session(s)
- Significance of the work to a broad audience
- Technical content
- Originality of the work, including new concepts, innovations, or data

To submit an abstract for a presentation or poster, send an electronic copy to Jim Lennington by October 15.

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People in the news

John Youngblood has joined Progressive Consulting Engineers of Minneapolis. He will be working on the utility design for the Southwest Corridor Light Rail project. A 2004 graduate of the University of Minnesota, John worked has worked for PSI, Tonka Equipment Company, and Jacobs Engineering. John is married and has a one-year-old daughter.

Hector Geosciences Inc. of Brainerd/Baxter has hired project architects Ronald Speichman, Dixie Recht, and Gloria Winterquist as well as project engineer Randi Altenship.

Governor Mark Dayton selected Tonka Water of Plymouth, Minnesota, as one of the recipients of the Governor’s International Trade Awards in the manufacturing/services category. The award requires that a significant portion of business is international growth. Tonka Water was recognized for its activity and growth in Canada, where the company has more than 30 installations and has experience working on water treatment projects with municipalities, First Nation communities, and the industrial sector. •

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Bacteriological laboratory change for very small communities

Beginning January 1, 2016, community public water systems (PWSs) serving fewer than 1,000 people will be assigned the MDH Public Health Laboratory (PHL) in St. Paul for quarterly bacteriological analyses. PWS operators should prepare for logistical changes as well as likely increases in shipping costs and sample rejections.

The MDH PHL will continue to provide sample kits, mailers, and analysis of water samples at no cost. Instructions for sample collection and mailing will be provided. PWS operators will notice a change in sample bottle volume as the PHL transitions to using 150 milliliter (mL), double-fill-line bottles (shown below). However, as before, PWSs are free to choose to use (and pay for) a private, certified laboratory instead of the PHL. In those cases, the chosen labs must have the ability to report results electronically to the MDH.

Overnight shipping will be necessary to ensure samples arrive at the PHL within 24 hours of sample collection so they can be analyzed within the required 30-hour hold time. Shipping costs will continue to be the responsibilities of PWSs. The combination of larger distances from a designated laboratory and faster shipping requirements are expected to increase shipping expenses for these community PWSs.

In addition, sample rejection rates are expected to increase due to samples not meeting the 30-hour hold time. The affected PWSs are encouraged to take the following steps to prepare for this change:

- Determine a best shipping method that can deliver samples to the MDH PHL within 30 hours.
- Thoroughly read the MDH PHL chain of custody forms and instructions upon receipt in December 2015.
- Inspect and become familiar with bottles required for MDH PHL sample collection.
- Prepare for occasional replacement samples in schedules and budgets.

MDH lab reprocessing water sample data

In September the Minnesota Department of Health (MDH) Public Health Laboratory discovered that imperfect quality assurance procedures were used when processing some water testing data over the past couple of years. This might have affected the interpretation of a small portion of the data the lab generated on behalf of MDH and the Minnesota Pollution Control Agency for environmental health work.

While MDH determined that the possible lapse did not lead to an immediate increased risk to public health, it raises questions about the reliability of some water testing data. MDH is responding by ensuring the calibrations are correct and reprocessing potentially affected samples. The initial focus is on the 2,200 sample analyses in question, which were conducted between May 2013 and May 2015. Special priority is being given to reprocessing samples from public water systems.

MDH has arranged for an external contractor to review the reprocessed data to ensure accuracy. The results considered most sensitive for public health are being reanalyzed first, and the top-priority group includes five municipal water systems, Edina, St. Louis Park, Spring Park, Kasota, and Brooklyn Center. The timeline for the completion of the work will be posted on the MDH website when all steps for the reprocessing work are in place.
Industry News

Closing the gap on water system security
By Jon Groethe, Minnesota Department of Health

Next year, 2016, will kick off the “Close the Gap” campaign for water-system security. Over the last decade, Minnesota’s water sector has made notable progress toward physically securing much of its critical infrastructure across the state. With the challenges the future may bring, now would be an excellent time to assess the security measures we currently have in place and to explore additional security measures that would raise the bar on our existing physical security - measures that are targeted, effective, and practical.

The Minnesota Department of Health will be renewing its efforts during the upcoming year to encourage and assist Minnesota water systems to close the gap by identifying and improving physical barriers as well as by checking and upgrading security equipment and operational procedures aimed to deter, detect, and respond. We will also be providing updated training and review of response procedures for a variety of unintentional events (severe weather, plant malfunctions, etc.) at our district water schools. Finally, we want to pass along the most recent security and emergency response tools that are currently out there for you to use.

By Jon Groethe, Minnesota Department of Health

Nitrate source water monitoring beginning in 2016
By David Rindal, Minnesota Department of Health

Beginning January 1, 2016, the MDH Community Public Water Supply Unit will initiate a statewide investigation into nitrate trends for community public water systems (PWS) wells and aquifer sources. Community PWSs with one or more source wells known to have nitrate levels of at least 3.0 milligrams nitrogen per liter (mg-N/L) will be asked to collect investigative quarterly source samples. The information will assist PWSs and MDH with nitrate trend analyses and will also help MDH collaborate with the Minnesota Department of Agriculture in implementation of the state Nitrogen Fertilizer Management Plan.

Analysis of results from the MDH General Water Chemistry Project showed approximately six percent of sampled groundwater sources had nitrate results of at least 3.0 mg-N/L. That concentration was chosen as the primary criteria due to its association with anthropogenic sources as well as the practicality of monitoring 140 wells per quarter. Over time, the MDH expects that number to change as wells either encounter nitrate issues, are newly identified as having nitrate issues, are sealed and abandoned, or experience improvements in response to remediation or natural processes.

As with most monitoring, the MDH PHL will provide sample kits, mailers, and water sample analyses for free. The main difference from regular compliance monitoring will be the need to collect raw water samples from specific wells rather than finished water samples from designated entry points. Instructions for sample collection and mailing will be provided, although shipping costs will continue to be the responsibilities of PWSs. A row entitled “Source Nitrate” will appear in the 2016 Annual Monitoring Schedule of any community PWS asked to participate in this monitoring, as shown below.

<table>
<thead>
<tr>
<th>SOURCE NITRATE</th>
<th>Sample Date</th>
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The Metro District of the Minnesota Section of American Water Works Association (AWWA) and Minnesota Department of Health have been alternating the locations of the Metro District School between the Ramada Mall of America in Bloomington and the Ramada Plaza in northeast Minneapolis. However, the Ramada Plaza is limited in size; as a result, the 2016 school will be limited to the first 240 people to register. Please register early. The Metro District will no longer hold its annual training at the Ramada Plaza after 2016.

Important news about the 2016 Metro School - Registrants to be capped at 240

Every 10 years, all public water suppliers in Minnesota that serve more than 1,000 people must have a water supply plan approved by the Department of Natural Resources (DNR). This requirement, in place since the 1990s, is designed to encourage communities to deal proactively with providing sustainable drinking water for citizens, businesses, and industry. Having an approved water supply plan also creates eligibility for funding requests to the Minnesota Department of Health for the Drinking Water Revolving Fund.

The third generation of the plan updates will be due between 2016 and 2018. Starting last October, the DNR has been notifying the 360 water suppliers by email as to when their specific water plan is due. The new DNR Water Supply Plan web page (http://www.mndnr.gov/watersupplyplans) is also available. The DNR will be providing water suppliers with an easy-to-use template and guidelines for completion. Plans will now be submitted electronically through the Minnesota Permitting and Reporting System, where most water use reporting takes place.

The Local Water Supply Plan template has four sections: inventory, emergency planning, water conservation, and metropolitan area (when relevant). The plan includes stronger conservation measures to meet demand reduction requirements.

All communities in the seven-county metropolitan area, even those of fewer than 1,000 people, must also fill out an additional section relating to the Metropolitan Council’s Master Water Supply Plan.

The DNR and Metropolitan Council have been working together to update the template to make it quicker and easier for communities to complete. There are no major changes from the last template, but the format will include more standards for water conservation.

New this year are workshops with neighboring water suppliers to discuss local water supply issues and water conservation strategies. Fourteen workshops were completed in October and early November, and more will be held over the next two years. “Many areas of Minnesota are blessed with abundant water,” said Carmelita Nelson, DNR water conservation consultant. “However, groundwater resources are not limitless, and in some areas we are hitting the limits. We are seeing more instances where withdrawal is impacting sensitive natural areas, interfering with other wells, or affecting drinking water quality.”

Approximately 75 percent of Minnesotans depend on groundwater for their drinking water. The remaining 25 percent obtain their drinking water from surface sources. “In the last 10 years, groundwater specialists have learned a great deal about aquifers, and we are collectively going through an evolution in the way we look at appropriation and sustainability,” said Steve Thompson, DNR hydrogeologist. “In the past, we have made decisions on well permit requests individually. In the future, we will need to start looking at water appropriation requests cumulatively, using modeling to ensure that wells are sustainable.”

“In next ten years, conserving our drinking water sources will become more and more critical,” added Nelson. “We will all need to implement more water reuse and conservation.”

For more information on water supply plans: Carmelita Nelson at 651-259-5034, carmelita.nelson@state.mn.us.

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The National Park Service is taking a strong stand on discouraging the sale of bottle water at its parks despite pressure on Congress from the International Bottled Water Association (IBWA) to cut off federal money the Park Service is using to install bottle filling stations as an alternative to bottled water.

Four years ago Park Service director Jonathan Jarvis told parks they could eliminate the sale of disposable plastic water bottles if they replaced them with refilling stations and sales of reusable bottles. The impetus for this directive was the amount of garbage and recycling costs the parks were facing. In the spring of 2015, the IBWA began lobbying to halt the Park Service’s sustainability efforts.

Lisa Rein, in the Washington Post, quoted IBWA president and chief executive office Joe Doss: “My thought would be, you certainly don’t want to be doing things that Congress has indicated they don’t want you doing. It would seem prudent, if one were a Park Service official, to see that if there’s a clear sense of Congress, you’d have to take that into consideration and you don’t do what goes against that.”

Rein also reported that the Park Service will call on its network of friends groups and concessionaires to provide the funding for the filling stations, if necessary.

National Park Service Takes the High Road as Others Try to Stay Low

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Closer to Home, Minneapolis Promotes Tap Water to People with Fears of It

Blong Yang of the Minneapolis City Council is concerned about the amount of money Hmong families in his city are spending on water because they are leery of what comes out of their tap.

“It’s this transference of their knowledge from, let’s say, Thailand or Laos or some other country, maybe a Third World country,” Yang told Curtis Gilbert for a story in the August 17, 2015 Minneapolis Star Tribune. “Back in the home country, we didn’t trust it. We drank from the bottle. It’s just habit now.”

Promoting trust in Minneapolis water is one way Yang sees to reduce the income disparities between Hmong families and others in the city. He recently arranged a tour of the Minneapolis Water Works water treatment facility to show visitors the sophisticated treatment the water receives after it comes out of the Mississippi River. Plant superintendent Annika Bankston and water quality manager George Kraynick demonstrated to the visitors how water from an impure source is transformed into water that is safe to drink. Kraynick said, “We want people to see what we do, and have you know where your water comes from, and have confidence in that water coming out of your tap. That’s the safest thing in your house. Safer than the food, safer than anything else. That tap water, every drop has been tested.”

Yang said he thought the tour was successful in demonstrating to citizens, especially those from other parts of the world, that tap water is as safe as bottled water and definitely cheaper. He added, “If I can crusade in some ways to get immigrant groups, especially Hmong folks but other folks as well, to not buy their water from the store and to use their tap water, we will save people countless amounts of money, and that’s a good thing.”
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Industry News

Minneapolis Institute of Art decorates water towers

The Minneapolis Institute of Art extended its 100th birthday year celebration by bringing art experiences outside museum walls and into the communities. The effort included three water towers in the Twin Cities. New Hope had its tower at U. S. Hwy 169 and Medicine Lake Road adorned with Katsushika Hokusai’s Under the Wave off Kanagawa, the Minnetonka tower at Minn. Hwy. 7 and Williston Road had Frank Stella’s Tahkt-I-Sulayman Variation II, and the tower in the heart of Chisago City was decorated with Vincent van Gogh’s Olive Trees. The art was on the towers from the spring to fall of 2015.

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Photos and Events

Mobile Art Lab Focuses on Water
For the second summer in a row, Public Art St. Paul conducted its mobile art lab with a focus on water in Western Sculpture Park in St. Paul. Director of education Mary Johnson said the art lab and workshops “have demonstrated water quality concepts to participants and have had an added focus on eco-friendly art-making practices and environmentally friendly behaviors as a whole.” The 12 workshops in 2015 drew 597 kids and their families. “We will continue to shape a more beautiful, vital, and just city,” said Johnson. “We believe that art can transform our community and inspire our lives.”

St. Paul Wins State Fair Taste Test
St. Paul Regional Water Services general manager Steve Schneider (on the left, next to an unidentified gate crasher) accepts first prize in the Great Minnesota Tap Water Taste Test held at the State Fair. LeSueur, Maple Grove, Minneapolis, and St. Paul made the final four in the competition with the latter two reaching the finals. Schneider was gracious after edging out Minneapolis, saying, “They both have great water.”

Operator Training
In August the Southwest District of Minnesota AWWA held a two-day school in Mankato in conjunction with the Minnesota Wastewater Operators Association. Rick Myskewitz demonstrated hydrants, and operators also had the chance to attend a Minnesota Vikings practice in the evening.

Drinking Water Institute in Minneapolis
The annual Drinking Water Institute for Educators drew 25 teachers for a three-day workshop at the Minneapolis Water Works ultrafiltration plant in Columbia Heights. Water operators and superintendents Danyell Lundell of Woodbury, Lauren McClanahan of Columbia Heights, Roger Dingman of Apple Valley, Jay Hall of St. Louis Park, Eric Volk of Elk River, Mark Peine of Hastings, and Jim Bode of St. Paul attended on one of the days to meet with teachers from their cities.

Water Bar
Bellying up to the bar for a selection of tap water from across Minnesota is a project of the Works Progress Studio (www.worksprogress.org). Look for it around the state in the coming year.
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