



Chardon Removes Arsenic from its Drinking Water

By: *Said Abou Abdallah, ARCADIS*
Daniel Sellitto – Water Superintendent

The Safe Drinking Water Act (SDWA) is considered the main federal law that ensures the quality of drinking water in the United States of America. Under SDWA, the Environmental Protection Agency (EPA) sets standards for water quality and oversees state agencies that implement these standards. On October 31, 2001, the EPA indicated that the new standard for arsenic level in drink-

Chardon obtains its drinking water from ground water wells. The levels of arsenic in all the wells levels varied between 11 mg/l and 17 mg/l and were below the old limit of 50 mg/l but above the new 10 mg/l limit. Starting early in 2002 the City initiated efforts to identify the available alternatives for compliance with the new arsenic rule. Several options were pursued with focus on three main alternatives; alternate raw water sources with lower arsenic levels; alternate potable water sources; and the treatment of water for arsenic removal.

The City of Chardon utilizes six wells for its water production. The discharge from each well is connected to a common header where chlorination and sequestering chemicals are added before water is released into the water distribution system. Alternate well field sites were evaluated with input from historical data of test wells that were advanced in the City. It was quickly determined that availability of raw water with low or no arsenic levels was not practical. The second alternative was pursued with three water purveyors. The purveyors, both public and private, serviced a wide range of communities and had facilities within reasonable distances from the City's facilities. Unfortunately the associated costs to receive and redistribute treated water were prohibitive.

In late 2003, the City of Chardon decided to move forward and develop plans for the construction of a new water treatment plant (WTP). The first step involved the preparation of a Water Treatment Plant General Plan to identify; available treatment processes that are approved for arsenic removal; general design concepts of the WTP; and costs of capital improvement and operations. It is during this phase, that a local water technology company producing a man-made filtration media approached the City and requested to be considered in the study.

Ohio's red barn theme used for building design.

ing water to be 10 milligrams per liter (mg/L), reduced from the existing limit of 50 mg/l. Public water supply systems had until January 2006 to meet this new regulation. The new regulation affected all water systems but mostly smaller ground water supply systems. The main concerns are the affordability of capital costs on small water systems. The City of Chardon serving a population of approximately 5,200 was directly affected.



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Straight From The Chair

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**Danella Pettenski,
Ohio Section Chair**

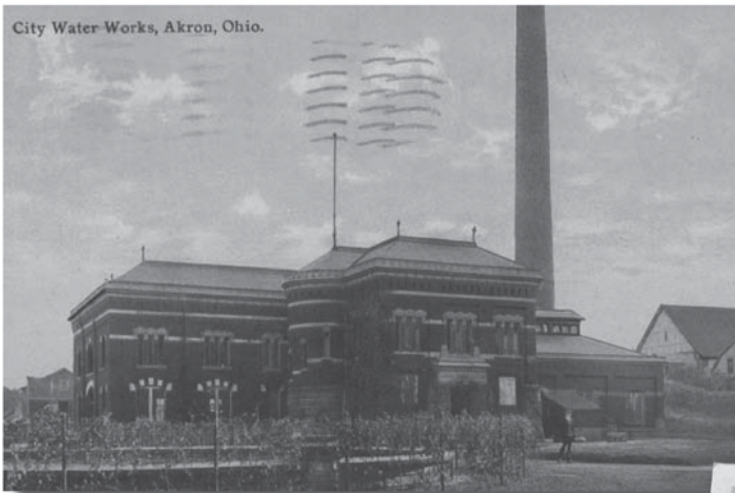
Well I am about a month into my term as Chair and I am off and running. I have set some lofty goals for this year and there is much to do to achieve them. However, I know that I have strong support from my fellow Governing Board members and we have great volunteers in our Section and without them the Ohio Section would not be what it is today. Nevertheless, we must continue to build off this foundation, otherwise we will become complacent.

As I mentioned at the September's Annual Banquet, my main objective this next year is to focus on retaining our current members and recruiting new members. Unfortunately we have been seeing a downward trend in membership at both the Association and Section level. Of course in today's economy, slowing down this trend or turning it around will even be more difficult. That is why I have challenged myself and my fellow Governing Board members to start thinking outside the box and find new ways we can serve our members more effectively and efficiently. We also need to find ways to get potential new members involved and show them how AWWA can benefit them both professionally and personally.

To assist in this effort, I will be working closely with two Committees this year; the Young Professionals (YP) and the Membership Committees. Cliff Shrive, past Section Chair and the current Chair of the Membership Committee has continually looked for ways to grow our membership and his involvement at the Association level hopefully give us some insight how other Sections throughout the organization is tackling this issue. I have already met with Robin Liss, the Chair of YP Committee, to discuss new goals for the upcoming year. Robin stepped up and volunteered to return to chair this committee after seeing this once active committee become dormant. I am happy to report that Robin is already working on ideas get our young members more involved and also how to tap into young professionals that are not members yet.

Hand in hand with growing our membership, we also need to come up with new or expanded training opportunities for our current members. With operational budgets being cut and travel cost and time away from work being severely cut or eliminated we have to explore possible smaller regional/geographical training opportunities and the use of Webinar training. We also need to look at emerging technology and determine if there are other types of training or areas of interest that we should be focusing on that can benefit our members. I may be leaning on a few other committees to help out in this area. For example, the Information Technology Committee will be putting on a workshop this coming December which will provide GIS training. GIS is ever growing technology in the water industry and I can see this as one area that we can continue to expand our training opportunities.

In closing, I would like to extend an offer to our membership that if you have any ideas on how we can improve as a Section, please call and talk with either me or one of the Governing Board members. With that said, I would like to wish you and your family safe and happy holiday season and I look forward to an exciting 2010!



Postmarked July, 1911

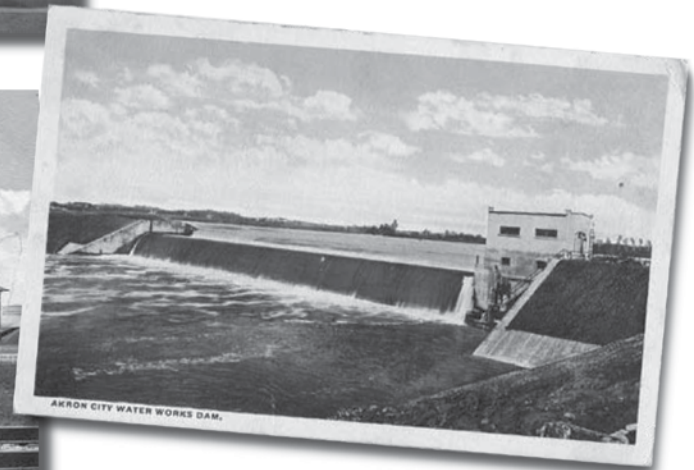


AKRON



The City of Akron experienced rapid "mushrooming" growth at the time of World War I partly due to the rubber industry expansion. As a result the City water system received expansions in 1919, 1922, 1925 and finally in 1954.

From the Akron experience, the Ohio Department of Health required all design engineers to lay out the works at least double the size to accommodate expansion.



HISTORY OF OHIO'S WATER SYSTEMS

The Ohio Section AWWA is producing a book entitled History of Ohio's Water Systems. The book contains 240 pages and is a history of the development of water systems covering the period of time from 1821, when Cincinnati started the first water system in Ohio, up until the 1950's.

The cornerstone of the book is some 180 postcards of waterworks that were produced in the early 1900's. There are also many black & white photos of original water plants and storage tanks. And there is more than just photos and postcards in the text. Ohio's Water Landmarks are featured along with listings of Ohio members who have been involved in AWWA on a national level.

This story of water in Ohio includes articles about operator certification, awards presented on national and state levels to Ohio members and even includes a story on WillingWater.

Some eighteen Ohio and national water dignitaries are featured in the book including such names as Fuller, Hoover, Holly, and LaDue.

Steam and its place in waterworks history is described in a number of pages as well as railroads use of water which was considerable in the days of the locomotive. Wood water main and early fireplugs are also covered in the book.

Several pages have been dedicated to explaining the progression of Ohio's involvement in AWWA. Ohio's first water association was known as the Central States Water Association which would later become the Central States Section of AWWA and then in 1938, Ohio became a separate section of AWWA. A great deal of research has been performed to uncover the development of Ohio's Water History which was little known by veteran members of the section.

The Ohio Section AWWA Is Pleased To Offer...

An Educational book entitled... "History Of Ohio's Water Systems"

RESERVATION FORM

I wish to reserve for myself _____ copies of the book "HISTORY OF OHIO'S WATER SYSTEMS" at the pre-publication price of \$30.00 per copy.

I understand the book is not due to be published until first quarter, 2010 but by my signature I am committing to purchasing the reserved quantity at the \$30.00 per copy price. I understand that shipping and handling (if requested) will be in addition to the per copy cost of the book. **I understand that the pre-publication price of \$30 per copy expires January 8, 2010.**

Signature _____

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Mail this completed page to:



**OHIO SECTION AWWA
History Committee
3972 Indianola Avenue
Columbus, Ohio 43214**



Director's Report



**Brian Bisson,
Director**

We have just completed a successful 2009 Annual Conference in Cleveland. I extend my thanks to Debbie Kaye, AWWA VP and visiting officer, for her updates and words of encouragement to the Section. Debbie is the California/ Nevada Section Director and lives in southern California. She left 100 degree heat to brave the wind chill temperatures of our golf

outing, proving once again that our AWWA VPs are versatile and always good sports.

The Ohio Section has a great tradition of leadership, which was highlighted at our conference by the attendance of three past presidents of AWWA. Our past Ohio Presidents, Marlay Price and Ron Schwarzwaldner, were in attendance, along with Katie McCain from Texas. Their continued interest and guidance are much appreciated.

Doug Brookhart and Al Wansing, co-chairs of the Section History Committee, have put together a History of the Ohio Section. The book will contain hundreds of historic post cards and write-ups on water utilities and people important to our industry from the past 100+ years. The

Section History will go to the printers in the first quarter of 2010. It will be a must have for those of us involved in the water utility industry in Ohio. Hopefully, many of you had an opportunity to see the draft book at the Section History Committee booth at the conference. If your utility has some history you'd like to share, please contact Doug at dbrookhart@jheng.com.

Another highlight of the conference was the signing of the Affiliation Agreement by our new chair, Danella Pettenski. The Board had unanimously approved the agreement just prior to the conference, and the Ohio Section was the 27th section (out of 43) to approve it. As a reminder of why this agreement is important to have, recall that past Newsletters outline the purpose of the Affiliation Agreement is to reduce liability and litigation risk, improve communication, clarify business practices between AWWA and each Section, and to enhance organizational infrastructure.

My congratulations to Danella Pettenski who began her term as chair and to the newly elected Board Members: Dave Merleno, NE Trustee '09 – '12; Bob Gardner, our second term treasurer '09 – '12; and Bob Davis, our new Vice Chair. I look forward to working with you and the rest of the Board. The Board is a diverse and talented group, well positioned to take on whatever challenges and opportunities that lay ahead.

If you have any questions about AWWA, feel free to call me at 330.397.0788 or e-mail me at bbisson@aquameria.com.

Robert Davis Elected Vice Chair



Robert "Bob" Davis was elected Vice Chair at the Business Luncheon on September 30th. Bob has been the Director of Utility Services for the City of Warren Ohio, for the past eight years. As Director, Bob is responsible for the overall operation and maintenance of the Water Divisions. Bob has served as Water Superintendent for seven years for the City of Warren and six years for the City of Campbell. Bob has over 23 years experience as a water professional and holds a Class IV Water License.

Bob has been a member of the AWWA for 18 years. In 2000, Bob began his journey through the chairs of the Northeast District.

Bob received the Tatlock Award for his service as Northeast District Chair. He is currently serving his third year on the Governing Board as Northeast Trustee. Bob has given presentations at OTCO and local, district and state conferences for education training and contact hours.

Bob is a graduate of West Virginia University with a Bachelor of Science degree and played linebacker for the WVU Mountaineers where he participated in the Peach Bowl, Gator Bowl, Hall of Fame Bowl and Blue Bonnet Bowl. Bob is married to Felicia and has three children, Raquel, Brittany, and Corey, and two grandchildren.

Robert Gardner Elected Treasurer



Robert Gardner was elected to a second three year term as Treasurer. Robert received a diploma in Auto-Diesel Technology from Northwestern Business College in Lima Ohio in 1981. Then in 2002 he received his Bachelor of Science in Business Administration from The Ohio State University, with a major in Accounting.

Robert is currently the Chief Operator for the City of Westerville and supervises operations at the Westerville Water Plant. He began his career as plant mechanic with Westerville in 1983 and has been instrumental in implementing new technologies and upgrades at the 7.5 MGD surface water treatment plant.

Robert enjoys the experiences that come from volunteering with the OAWWA and all the people he meets in doing so. Robert began his service with the AWWA in 2003 as Southeast District Treasurer and in 2005 became Assistant Treasurer to the Ohio Section AWWA. Since 2006 Robert has been serving as Treasurer of the Ohio Section of the AWWA.

In his free time Robert enjoys umpiring baseball and spending time with his family. He is married to his wife Cindy and has two sons Trent and Matthew.

Dave Merleno Elected Northeast Trustee



David Merleno was elected Northeast District Trustee. Dave has 38 years experience in the water and wastewater industry. He currently holds the position of Director of Public Utilities for the City of Ravenna. He began his career in 1971 with the Fairfax County Water Authority in northern Virginia. Through the years, David has held water and wastewater licenses in the states of Virginia, New Jersey, Pennsylvania and Ohio while serving in progressively responsible positions. He currently holds an Ohio Class IV Water Operator License.

In the past, Dave has served as the N.E. District Chairperson and more recently on the Ohio WARN Committee. He is currently serving on the steering committee for the Middle Cuyahoga Watershed group while maintaining involvement in the Breakneck Creek Watershed Coalition, which is a sub-watershed of the Cuyahoga River. He has also participated in OTCO Workshops with miscellaneous presentations. While his current responsibilities include electric, natural gas, water, wastewater, storm water and utility billing, his first love continues to be water treatment plant operations.

Dave is supported by his wife, Karen for over thirty years, and enjoys helping-out with her internet business in his spare time. He is an avid Browns, Cavaliers, Indians and Kent State Golden Flashes fan, and also enjoys leisure time with a little fishing and a lot of gardening.



continued from page 1 - Chardon

A pilot filter plant was undertaken by Kinetico, Inc. of Newbury, Ohio to evaluate the effectiveness of their Macrolite filter media in removing arsenic. After receiving approval for the pilot plant protocol from the Ohio Environmental Protection Agency (OEPA), Kinetico completed the field work and produced a pilot study report that was also approved by OEPA. The pilot study indicated that; water filtered through the Macrolite media meets the SDWA limit of arsenic at 10 mg/l in 95% of the samples tested; the media performance achieved the design target limit of 8 mg/l arsenic in all filter effluent samples; and reduced iron and manganese levels to below the secondary contaminant limits were also achieved. In 2005, after OEPA's approval of the pilot study, the detailed design of the full scale WTP was initiated.

It was decided that the facility would be located adjacent to the existing raw water well-field. Locating the WTP close to the well-field site represented good placement for water flow and for operational considerations. The available property in the immediate vicinity to the well-field was limited and the City agreed to locate the WTP outside its jurisdictional boundaries in adjoining Munson Township.

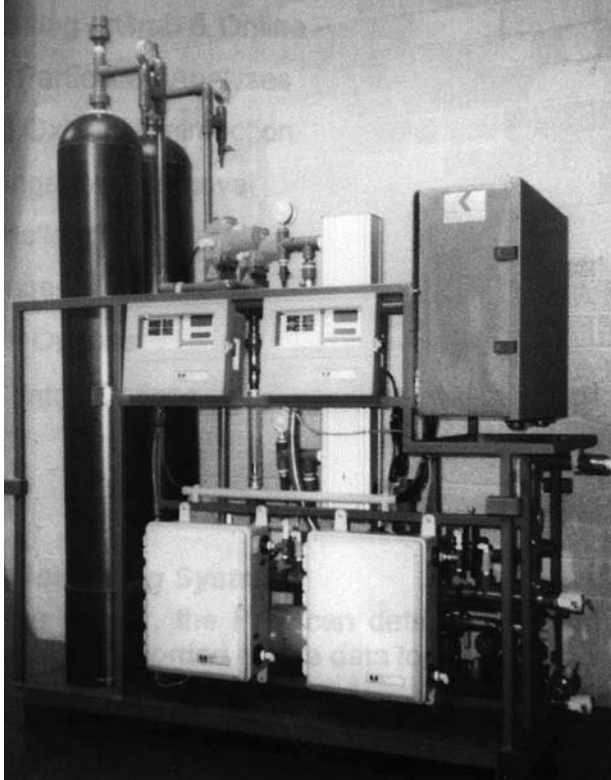
Chardon is a small City in Geauga County in northeast Ohio. The quaint suburban lifestyle and the old fashioned "Western Reserve" look is a staple of the local communities and more specifically the City that has the slogan of "Home of the Geauga County Maple Festival". Although modern in its operations and services, the City strives on maintaining its Geauga County heritage.

From the onset, many design challenges emerged. The challenges and concerns were divided into three prime categories: Location, Operation and Capital Cost. The main location challenges were by far the most critical and they were specific to the style of the exterior of the proposed building. The City and its consultants worked closely to outline and evaluate various building design concepts. Two architectural building shell concepts emerged. A Barn concept and a "western reserve" residential type of structure were considered. Because of the size of the structure and the need for high ceilings to accommodate the treatment and filtration equipment, it was decided to utilize the Barn concept. The State of Ohio is known for its red barns and thus became the theme for the Chardon project. The barn concept presented the

opportunity to utilize a large building that can blend into the surrounding suburban residential neighborhood with undue attention to its size and function. Although a modern structure, the outside features were authentic. From the cupolas to the vents and stone foundations, the Ohio barn look was well presented. Access was limited to the back side of the structure to keep operations of the water department out of the view of the traveling public and without disturbing the adjacent neighbors. Delivery of chemicals and other items by trucks were another concern that was addressed by utilizing unidirectional traffic patterns within the WTP site and force the truck traffic to return to the maintain traffic artery and not travel on the local side streets.

Another major design challenge was the integration of the water department personnel into a different mode of operations when providing filtered and treated potable water to their customers. No longer can the well pumps provide uninterrupted water stream directly into the distribution system. The raw water now flows into the WTP where after filtration and chemical feed it is stored in a clear well. Subsequently, when needed, water is pumped from the clear well to the distribution system utilizing high service pumps. This completely changed how the operators produced potable water, but the change was tempered by the use of the local filtration system and the ability to use automated features and telemetry for monitoring and control. By Far, the use of Kinetico's Macrolite media had the largest effect. The rate of flow of water through the media was three times higher than applicable rates in conventional filtration systems. Therefore the size of the filtration system was reduced to one third the size of a conventional sand filter. Only chlorination was required to be introduced to oxidize iron and manganese and cause the adsorption of arsenic. The design engineers and the City operations specialists worked closely with Kinetico and the water system operators to facilitate the operations of the WTP and outline the needed efforts. This process significantly simplified the treatment of water, minimized the use of chemicals and provided for remote monitoring of the WTP facility. The existing water department work force was able to adjust their day-to-day operations and absorb the additional workload required for the WTP without the need for additional hires.

Pilot Testing of Chardon's Raw Water by Kinetico, Inc.



A review of the Chardon raw water wells water quality parameters indicated that well # 1 exhibited the highest levels of arsenic and iron in the raw water. So the pilot testing commenced at well # 11 for a period of two weeks (ten business days). The objectives of the pilot study were:

1. Meet the SDWA limit for arsenic of 10 ppb in 95% of samples.
2. Demonstrate consistent and reliable arsenic levels in all filtered samples at 8 ppb.
3. To demonstrate reduction of Iron levels in the filtered water to below 0.3 mg/l
4. To demonstrate reduction of Manganese levels in the filtered water to below 0.05 mg/l

The pilot system was operated at a 10 gpm/sf filtration rate. A backwash rate of 8 gpm/sf was used for duration of 10 to 20 minutes. A 0.25% sodium hypochlorite solution was added to achieve 1.0 mg/l free chlorine in the filtered water. The agreed to testing within the pilot test protocol document was accomplished and the following results were achieved:

1. Influent arsenic ranged from 17 to 27 ppb. Effluent arsenic ranged from 3 to 5 ppb. All the filtered water samples met the goal of 8 ppb or less.
2. A total of 34 filtered water samples were tested for iron. Influent samples ranged between 0.87 mg/l and 2.39 mg/l with filtered water samples below 0.03 mg/l.
3. Manganese influent levels were recorded between 0.09 mg/l and 0.11 mg/l with filtered water levels between 0.02 and 0.05 mg/l.
4. The reaction between the raw water and applied chlorination/oxidation chemical was quick and required one to minutes to complete and thus a reaction vessel was not required.
5. Filter runs and Backwash efficiency had an efficiency of 96.7% with an 8 hour filter run and a 20 minute duration of backwash cycle.
6. Influent raw water turbidity was recorded in the range of 0.3 to 0.16 NTU with filtered water

continued on page 10



continued from page 9 - Chardon



The third major challenge was the project capital cost. Fortunately, the City leaders worked closely with their local legislatures and representatives and were able to secure a \$ 1.5 million dollars in a federal grant (Section 594 of the Water Resource Development Act of 1999) to offset the total project cost. Another cost saving revolved around the use of the Kinetico filtration system. The typical cost of pressure filtration system is fairly comparable when the system size is similar, but cost savings were achieved by the City of Chardon with the smaller foot print of the filters and the streamlined operations. In addition, the City secured a low interest loan through the Ohio Water Supply Revolving Loan Program. The total project cost including construction, engineering, administration, etc. was \$ 7,322,000.

Other design challenges included issues of coordination between the City, Munson Township and the Geauga County Engineer's office. To minimize impact and disturbance to the local Township roads, trenchless technology was used to install sanitary sewers that carried the filtration backwash waste product from the WTP. Additional property was also purchased by the City to shorten the length of new water mains along the public right of way of Township roads. The treatment building and clear well were moved to the aft of the property as much as possible to further blend the facility into the neighborhood, and coordination

regarding zoning, landscaping and fire protection between the City and the Township strengthened the relationships and improved the features of the project. The local communities and agencies worked together and realized a successful project.

On June 23, 2008, the Chardon Water Treatment Facility was placed in full operation sending filtered and treated drinking water to the distribution system. After a few months of operations, the average influent concentration of arsenic is between 12 mg/l and 15 mg/l; influent Iron 0.650 mg/l and influent Manganese at 0.064 mg/l. The treated finished water has none detectable limits for arsenic, iron and manganese. The operations of the facility are moving forward with the existing staff and no new hires. No more than 4 hours per day, on average, are spent at the WTP as originally planned for. Remote telemetry and monitoring of operations kept the operators abreast of the WTP operations. In the first three months of operations, the City of Chardon achieved compliance with the requirements of the arsenic rule.

