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SPRING 2015 AQUARIUS

New York Section American Water Works Association

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Cover photo: Ashley Waldron Photography

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presented in this publication. The concepts, ideas, procedures and opinions are not necessarily
recommended or endorsed by NYSAWWA.
I t is a true honor for me to take on the role of Chair of the New York Section of the American Water Works Association. To reflect on the fact that for 101-years, New York State water professionals have gathered to learn, discuss and promote important issues facing the water industry is truly a success story.

Serving on the Board for the past four years has been a rewarding experience as well as a privilege to work alongside the dedicated members of the Section Board, Section staff and the many volunteers that make this organization a success. I have known our past Chair, Kevin Castro, for more than 20-years and I realize the tremendous job I have ahead of me in following in Kevin’s footsteps and all those who have preceded him. I will work diligently to continue their vision and to introduce new and innovative ideas to improve and strengthen the Section for future generations of water professionals.

In looking forward to my year as Chair, I am blessed to continue working with these same dedicated individuals as well as welcoming new members in order to make a positive impact on the future of this Section. We recently held a meeting that included our Section Executive Director, past Chair, the incoming Chairs for the next three years. The purpose was to coordinate our goals so that the mission of the Section remains focused and strong for the foreseeable future. As a result, three main goals came to the forefront that align with the Sections Strategic Plan. They are:

Creating a forum for members that will enable utilities and individuals to seek answers to their inquiries and questions regarding all areas of water supply.

Sustainability of our organization. This goal will look to recruit and develop new volunteers into future Section leaders. It will also focus on tapping into the knowledge of our seasoned/retired professionals while enhancing the Young Professional mentoring program.

Establish an Administrators/Public Officials certification program. This program would offer sessions that would allow Administrators and Public Officials to understand what we as water professionals do and the complexities of the work performed. Topics would include rates, budgets, public relations and human resources. In addition, the possibility of recognizing and presenting awards to Public Officials for achievements in the water industry is under consideration.

I am also excited about our new venue for this year’s Tifft Symposium. It will be held at the Renaissance Westchester in West Harrison from September 22 -24, 2015. So all of you located in the Southern New York, NYC and Long Island areas, get ready to take advantage of the great opportunity that is being offered to you. The possibility of rotating the Tifft Symposium throughout the state makes it more accessible to all industry professionals and allows the opportunity for operators, administrators and engineers from across New York State to be exposed to the many benefits the State Section has to offer.

Please also consider volunteering on one of our many committees. The variety of the Section’s committees makes it easy to find one that encompasses your interest or passion within the water industry. There is a committee for anyone who wishes to volunteer while at the same time enhancing your career, creating the opportunity to network with fellow professionals and for you to be a part of an organization recognized as the professional resource for all concerned about our most precious resource.

Again, I would like to thank all of our members, volunteers, Board members, Section Staff and Committee Chairs for helping to make the NYSAWWA the success it is today. I look forward to working together and continuing this success into the future.
Our Next Generation of Water Professionals

It’s that time of year where students graduate, enter their last year of schooling or begin to think “What do I want to be when I grow up?” I’ve been fortunate to plant the seed to listening ears of how awesome the Water Industry is! My favorite lead-in lines are:

Water sustains life! It is the MOST important thing necessary for life.

The water we drink today has been around in one form or another since dinosaurs roamed the Earth, hundreds of millions of years ago.

No one else can walk into a classroom of students and say something that amazing. Ok, well doctor’s safe lives and police officers risk their own lives to make sure people are safe. Those professions are incredible and I’m thankful each and every day for their talent and selfless dedication, but I have on my water hat right now and therefore I’m bias. Water is life and even has been written into superhero powers! Needless to say, water is exciting; ever-changing; ground-breaking technologies advancements are emerging; and who doesn’t want to make a difference in the world?!

There is a high demand for new leaders to be the face of the water industry and a limited supply of people willing to work for it. The opportunities for careers in our industry are endless and this is where you come in. We need to be our own cheerleaders and recruiters. Everyone depends on water to live and water is depending on all of YOU to keep it flowing. I encourage you to be our best advocate and help our next generation emerge!

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Nominating Committee for Section Director

American Water Works Association

New York Section

The Nominating Committee for Section Director has nominated Michael Hooker, Executive Director of the Onondaga County Water Authority as the next Section Director from New York. The next term for Section Director will begin in 2016. Mr. Hooker served on the New York Section Board and was Section Chair from 2003-2004. He also has served as the Chair of the Association Water Utility Council and various other Association Committees.

An eligible candidate for Section Director shall have completed the term as Chair of the Section and be a member of the Section. Other candidates for the office of Section Director may be placed in nomination by receipt by the Executive Director of a petition for the nomination signed by not less than twenty (20) active members. Such petition shall be received no later than September 1, 2015 and the Chair shall be notified promptly.

If there is more than one candidate for the office of Section Director, a ballot shall be distributed to the Section Membership. The Executive Director shall deliver the ballots to the Chair of the Board who shall announce the results of the vote by November 1, 2015. The newly elected Section Director shall take office as prescribed in the Bylaws of the Association.

If there is only one (1) nomination for the office of Section Director received by the Chair by January 1, 2016, the Chair shall be instructed to cast one (1) ballot for the nominee and announce the new Section Director at the business session of the Annual Meeting. The newly elected Section Director shall take office as prescribed in the Bylaws of the Association.

Signed petitions for Section Director nominations can be mailed to: Jenny Ingrao, Executive Director at NYSAWWA, 614 7th North Street, Liverpool, NY 13088.
New Location for this year’s 2015 Edwin C. Tifft Jr. Water Supply Symposium

This year the 2015 Edwin C. Tifft Jr. Water Supply Symposium will be heading downstream to the Renaissance Westchester Hotel in West Harrison, NY on September 23 and 24. The Section is excited to announce this move and it comes after much thought and consideration. The Section hopes to better reach all our members in the state and plans to rotate this conference every three years with the following locations: 2015 – Westchester County; 2016 – Erie County (Buffalo, NY); 2017 – Onondaga County (Syracuse, NY).

“As we are all aware, New York is a very large state and we have members from the far most western to the far most eastern part of the state. The board has analyzed data for over a year and a half on membership statistics and it was determined that the Section needs to be doing more to reach all our members geographically. We are really looking forward to this move and we anticipate our members will also,” said Jenny Ingrao, Section Executive Director.

The Symposium will open with a Keynote Address by Mark W. LeChevallier, Ph.D., American Water speaking on Microbial Control Strategies for Main Breaks and Depressurization. Many main breaks are small and can be fixed with a repair clamp while pressure is maintained. However, when a main break must be depressurized before the leak site can be controlled (an uncontrolled shutdown), there is a possibility that contaminants could enter the distribution system during excavation and repair. Microbes are of greater concern because even with dilution, some microbes (e.g., virus) at very low numbers can cause an infection. Many studies have previously used quantitative microbial risk assessment (QMRA) to estimate the waterborne disease burden in communities or to assist in developing drinking water treatment regulations. However, no prior study has used QMRA to evaluate the risks and control measures for main breaks. Regulatory agencies are increasingly looking for science-based decision making to provide guidance to reduce the contamination risks associated with main breaks. Existing standards may require both catastrophic main breaks and minor leaks to issue precautionary boil water advisories and/or bacteriological tests for verification. This causes unnecessary burdens to utilities and customers in the form of confusions and extended service outage periods. To address these issues, a research project was conducted to evaluate the best management practices for controlling exposure and risk from pathogens during main break events. This presentation will focus the development of the microbial risk model, its application under field conditions, the need for concurrent pressure monitoring, and a discussion of the new AWWA C651 standard for Disinfecting Water Mains.

Dr. LeChevallier received his Bachelor of Science and Master’s degrees in Microbiology from Oregon State University in 1978 and 1980. He worked as a Research Associate at Montana State University where he received his Ph.D. in Microbiology in 1985. Since 1985 he has worked for American Water, a water utility operating in 40 states, and Canada; serving over 15 million people. Dr. LeChevallier is currently the Director of Innovation & Environmental Stewardship at the American Water Corporate Center in Voorhees, NJ. In this capacity he directs a staff of about 40 for both the research and environmental compliance programs.

Several of his papers have received awards from the American Water Works Association for outstanding contributions to the science of water treatment. He was the recipient of the George Warren Fuller award in 1997 from the New Jersey section of the American Water Works Association, the Abel Wolman Award from the American Water Works Association in 2012, and is a fellow of the American Academy of Microbiology. Dr. LeChevallier has been the principal investigator or co-investigator on over 80 research grants totaling over $36 million from the US Environmental Protection Agency, American Water Works Association, the Water Research Foundation, WateReuse Research Foundation, WERF, and various State agencies. Dr. LeChevallier was named by Public Works magazine as a 2005 Trendsetter to “recognize leaders in the public works community who have defined policy, brought their community or an issue into the spotlight, or set the standard within the industry.”

This year’s Tifft program features sessions on: Regulatory Updates; Water Quality and Public Health; Groundwater; Utility Finance and Management; Panel Discussion: Water Main Breaks; Water Treatment Facilities and Pump Stations; Storage, Conveyance and Distribution Systems; Sustainability and Water Conservation; and Aging Infrastructure and New Construction. Early bird registration will open on Monday, July 6. For more information on the 2015 Edwin C. Tifft Jr. Water Supply Symposium visit www.NYSAWWA.org. *Important Exhibitor Information: This year we will only be accepting 20 exhibitors, so space is limited and based on first come first serve.
In 1994, the EPA released a report entitled “Strengthening the Safety of Our Drinking Water.” This report detailed violations of drinking water standards, including monitoring violations, where microbiological and chemical standards were exceeded. The report showed that some 30 million people – about 12 percent of America’s population – were served by drinking water systems that violated one or more public health standards during one or more reporting periods. In addition to these findings, the 1993 cryptosporidiosis outbreak in Milwaukee and subsequent “boil water” alerts in Washington D.C. and New York City further emphasized the need for additional safer drinking water standards.

It was this concern for safe water that led to a cooperative effort between six drinking water agencies and resulted in the Partnership for Safe Water. The Partnership is a program that brings regulators and drinking water suppliers together in the effort to safeguard the quality of water leaving a treatment plant or traveling through a distribution system.

The original Partnership program focused on optimization of the treatment plant. There are four phases as you proceed through optimization……

Phase 1 is a commitment on the part of operators and upper management. The idea is to change the focus from simply meeting water quality standards to evaluating the operation of a treatment plant and making improvements that result in your plant exceeding water quality standards.

Phase 2 is the collection of baseline data including raw and filtered water turbidity data.

Phase 3 is a self-paced assessment of how your plant functions. Once the utility performs the self-examination, a plan is developed for implementing improvements in operation.

And in Phase 4, you are fully optimized and have achieved the highest possible levels of individual filtered turbidity performance.

In recent years, the Partnership has also added a similar effort to optimize operation in distribution systems. Information on system pressures, chlorine residuals, disinfection by products and water main breaks are used to characterize performance in the system. As with the treatment plant program, a plan will be developed to guide the utility towards optimal performance.

The benefits of participating in one of the Partnership programs are many…… improvements in preparedness, potential cost savings, positive recognition for your utility and staff and especially, an improvement in water quality and public health. It doesn’t matter if you are a large or small treatment plant and you do not need to be a national AWWA member to participate!

On October 28-30, 2015 the AWWA and Pennsylvania Section of the AWWA are holding a Water System Optimization Conference in Hershey, PA. Conference attendees will learn best practices and tools that help improve water system performance.

The technical program will feature treatment plant and distribution system optimization strategies, new technologies, products and services, and Partnership program highlights. In addition, Partnership staff will be available to answer questions and guide your utility in your participation in the program.

If you would like to participate in the Partnership program, this conference is a must. To get more information or to register, go to the Pennsylvania Section AWWA website at www.paawwa.org and click on “Training Events”. Or contact our New York State AWWA Section office at 315-455-2614.

Barb Martin, AWWA
Don Hershey, PA-AWWA

Pennsylvania Section AWWA along with the Partnership for Safe Water is proud to host the 2015 Water System Optimization Conference October 28-30, 2015. The conference is both a celebration of the Partnership for Safe Water’s 20th Anniversary and a forum for utilities across the globe to share ideas, experiences, and best practices for water treatment plant and distribution system optimization.

Save the Date!
Be sure to “Save the Date” now to ensure your participation at this historic event. Preliminary conference details are below so that they may be incorporated into the utility travel planning and budgeting process. Visit the Partnership for Safe Water website (www.awwa.org/partnership) and access the conference page on the menu for more information and to register.

• Conference dates – October 28-30, 2015
  (half-day on October 30)
• Conference location – Hershey Lodge/
  Hershey, Pennsylvania

Attendee registration, sponsorship, and exhibitor information is posted on the Partnership and PA-AWWA websites. Registration fees are set at an affordable cost so that utilities of all sizes will be encouraged to attend. Attendees will include utility managers, water quality specialists, treatment facility managers and operators, distribution system managers and operators, regulatory personnel, engineers, scientists, manufacturers, and lab analysts.

Early registration is encouraged as space at the Hershey Lodge is limited!

Great Networking Opportunities and Award Receptions
With group lunch events and evening activities, the conference provides numerous networking opportunities for all attendees. Partnership for Safe Water award presentations are planned throughout the conference to recognize the program’s 2015 award winners.

Take Advantage of the Partnership’s Subscription Dues Discount for Attending the Conference
For utilities thinking of participating in the Partnership for Safe Water program, this is the perfect time to begin your journey toward optimization. That’s because new utility subscribers that attend the conference will receive a 10% discount - or $50 savings (whichever is greater) - on their first year Partnership subscription fees. This potential savings can substantially reduce the cost of Partnership program participation for small systems, and nearly cover the cost of full conference registration for larger systems.

Separate Technical Programs for Treatment Plants & Distribution Systems
Technical tracks will introduce the latest developments in treatment plant and distribution system optimization to participants – from tried and true techniques to innovative tools for water system optimization. Presentations will feature utility success stories, case studies, and prominent speakers from utilities and organizations across North America. Therefore, you will not want to miss this premier optimization event. Continuing education units will also be available for attendees from select states.

We look forward to celebrating the Partnership’s 20th Anniversary with many of you at the 2015 Water System Optimization Conference!
Get Optimized!

Learn Strategies from Water Utility Experts

Presented by the Partnership for Safe Water and Pennsylvania Section AWWA, the Water System Optimization Conference will feature practices and procedures of top-performing utilities. Conference technical sessions will cover a broad range of relevant topics in treatment plant and distribution system optimization. For two decades, the Partnership has been indispensable in helping systems optimize performance—a milestone we’ll celebrate to mark our 20th Anniversary!

Attend the conference to:

- Participate in technical sessions
- Network with water utility thought leaders
- Learn about new products and services
- Earn valuable CEUs (applied for in selected states)

Visit awwa.org/partnership or paaawwa.org/safe-water/ to register, exhibit, sponsor the conference and reserve lodging.

Partner with the Partnership

Our optimization programs are designed for utilities, by utilities and encourage systems of all sizes to assess performance; develop and implement improvement strategies; and achieve optimization.

Subscribe to the Partnership’s Treatment Plant and Distribution System Optimization programs by visiting awwa.org/partnership; or call (303) 347.6169 and let the Partnership help guide your utility’s journey to success!
New York State Department of Environmental Conservation (NYSDEC) is proposing changes to the Petroleum Bulk Storage (PBS) and Chemical Bulk Storage (CBS) regulations. These proposed changes are Phase I of a two phase process. Phase II will occur after the USEPA finalizes their regulations on storage of petroleum and hazardous substances in underground storage tanks. The Phase I modifications will have no impact to water suppliers with PBS and CBS facilities. Under Phase I the regulations will be revised to:

- Reflect changes made to state and federal laws
- Consolidate existing state and federal regulations so they are all in the state regulations
- Increase consistency between the state and federal regulations, particularly with respect to key definitions and structure

The changes under Phase I is the good news. This seems too good to be true and it is because Phase II will require the NYSDEC to amend the state regulations to match the federal regulations related to operator training for underground PBS and CBS facilities. This will have a noticeable impact on water purveyors since the revisions will require that any facility with at least one underground storage tank (UST) must have a certified operator. This will require the training and testing of staff in addition to the required certifications in place for water system operations. Basically the proposed regulations will establish three classes of operators, A, B and C. The three classes of operators are defined below:

- **Class A operators** - have primary responsibility to operate and maintain the UST system and typically manage resources and personnel to achieve and maintain compliance. Training for Class A operators should allow the operator to make informed decisions regarding compliance with regulatory requirements.

- **Class B operators** - have daily responsibility for on-site operation and maintenance of UST systems. Training for Class B operators should provide an in-depth understanding of operation and maintenance aspects of UST systems.

- **Class C operators** - are daily on-site employees who are generally the first line of response to events indicating emergency conditions. Training should allow the Class C operator to take appropriate action in response to UST related emergencies or alarms caused by spills or releases from an UST system.

- Only class A and B need to be trained and tested. Class C operators are trained by class A and B operators, but don’t need to be tested. It may be possible that one person can be both class A and B. However this still needs to be clarified.

The Class A operator test will cover the following subject matter: spill and overfill prevention; leak detection; corrosion protection; emergency response; compatibility; financial assurance; registration; temporary and permanent closure; recordkeeping; environmental and regulatory consequences of releases; and knowledge and training requirements for Class B and C operators.

The Class B operator test will cover the following subject matter: operation and maintenance; spill and overfill prevention; leak detection; corrosion protection; emergency response; compatibility; recordkeeping; environmental and regulatory consequences of releases; and training requirements for Class C and C operators.

Current facility operators must become class A and/or B operators by being trained within one year after the proposed regulations are adopted. Subsequent class A and B operators must be trained within 30 days of assuming duties. It should be noted that UST owners and operators will be allowed to designate contractors as their Class A and B operators as long as they are responsible for all areas required in the training for the class of operator designated. DEC will make the exam accessible on-line or in hard copy format taken at a DEC office. The exam will be free and an open book format. DEC will also offer free training materials.

The following hyperlink provides a draft of the NYSDEC Operator Training Program document that includes additional details regarding the exam: [http://www.dec.ny.gov/docs/remediation_hudson_pdf/der40.pdf](http://www.dec.ny.gov/docs/remediation_hudson_pdf/der40.pdf)

According to the NYSDEC, adoption of the Phase I and II regulatory changes will be implemented simultaneously as early as late May/June but no later than September or October of this year.
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G.P. Jager & Associates
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Mobile: 716-697-5543
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Erik Rosenfeldt, PhD, P.E., Julie Herzner, P.E., and William Becker, Ph.D., P.E. – Hazen and Sawyer
James Bromka – Village of Waterloo

Despite efforts to control nutrients in our surface waters, algal blooms have increased in frequency and severity in recent years. Here in New York State formerly “pristine” waters such as Seneca Lake have experienced major blooms in the last couple of years.

In August 2014, the City of Toledo reported elevated microcystin results in their finished water. Even though microcystin is not regulated anywhere in the United States, residents were warned to not drink the water or use it to cook or brush their teeth for two days. The water emergency in Ohio’s fourth-largest city put a national spotlight on harmful algal blooms (HABs) in Lake Erie and throughout the country.

While this event put the issue of algal toxins front and center in the public view, it is not the first incident of its kind in the United States. Water utilities who have not traditionally experienced algae-related issues in northern climates are now experiencing HABs, and even utilities well-versed in algae issues are experiencing new seasonal and magnitude event patterns. The seemingly ubiquitous and expanding nature of HABs, coupled with the Toledo event which received national media attention, is making algal mitigation critical for many water utilities. In order to effectively deal with HABs and resulting potential algal toxins and T&O issues, it is important to understand the underlying risks, root causes of HABs, and also what can be done by water utilities to address HABs, algal toxins, and algae-related taste and odor.

**Harmful Algal Blooms – The who, what, when, where, and why**

Harmful algal blooms are overgrowths of algae in water, and those caused by certain types of algae (particularly cyanobacteria, also known as blue-green algae) are a concern for water utilities worldwide. Their persistence in water supplies causes numerous problems for water treatment plants. Cyanobacteria are not true algae, but rather gram-negative bacteria which contain chlorophyll and perform photosynthesis. The major concern associated with the presence of cyanobacteria is the metabolites they produce, including taste and odor (T&O) compounds (particularly 2-methyl isoborneol (MIB) and geosmin) and a range of toxic compounds known collectively as algal toxins, or cyanotoxins. Presently, about 30 species of cyanobacteria are known; however, not all produce T&O or toxins and those that can don’t always do so – they can turn production on and off. Most of the toxic action produced by cyanotoxins can be classified as either (1) hepatotoxins (taken up by the liver causing weakness and anorexia); (2) neurotoxins (affecting the nervous system); and (3) dermotoxins (causing skin and mucous irritations upon contact).

**Table 1: Summary of Factors Leading to Algal Blooms**

<table>
<thead>
<tr>
<th>Contributing Factor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nutrients</strong></td>
<td>Runoff from agriculture, roads and stormwater, including point sources like wastewater and confined animal feed operation discharges, is a source of nutrients.</td>
</tr>
<tr>
<td><strong>Seasonal</strong></td>
<td>Warm water conditions (late summer and autumn) promote algae proliferation.</td>
</tr>
<tr>
<td><strong>Still Water</strong></td>
<td>Calm, clear water (reservoirs, lakes, quarries, slow moving rivers) provide ideal algae habitat.</td>
</tr>
<tr>
<td><strong>Extreme Weather</strong></td>
<td>Stronger storms increasing runoff, droughts concentrating nutrients, warmer temperatures, and longer growing season aid algae growth.</td>
</tr>
</tbody>
</table>

Regulation of algal toxins in the United States and the world

US EPA recently announced Health Advisory Levels for microcystin and cylindrospermopsin that have been established for low, medium and high levels of exposure. Heath advisories are non-regulatory concentrations at which adverse health effects are not anticipated to occur over specific exposure durations (e.g. one-day, ten-day, and lifetime). A ten-day Health Advisory recommended concentrations for total microcystins are 0.3 μg/L for children younger than school age and 1.6 μg/L for all other age groups, and for cylindrospermopsin are 0.7 μg/L for children younger than school age and 3.0 μg/L for all other age groups. A “Do Not Drink/ Do Not Boil Water” advisory is recommend for microcystin concentrations greater than 1.6 μg/L in the finished water.

The World Health Organization also has a chronic exposure guideline value of 1 μg/L for microcystin and a maximum tolerable daily intake of 6 μg/L for an adult (WHO 2011). The WHO’s guideline value assumes that the presence and concentration of microcystin is an adequate surrogate for any other algal toxins that may also be present.

**What leads to algal toxins and T&O issues?**

A summary of these factors outlining natural and anthropogenic sources of these promoting conditions is shown in Table 1 adapted from Pearl et al., 2011.

Algal blooms in Seneca Lake
Table 2: Guidelines for Understanding Potential for Algal Growth

<table>
<thead>
<tr>
<th>Cyanobacteria Potential</th>
<th>Water Temperature (°C)</th>
<th>Total Phosphorus (g/L)</th>
<th>Occurrence of Thermal Stratification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>&lt; 15</td>
<td>&lt; 10</td>
<td>Rare or Never</td>
</tr>
<tr>
<td>Low</td>
<td>15 - 20</td>
<td>&lt; 10</td>
<td>Infrequent</td>
</tr>
<tr>
<td>Moderate</td>
<td>20 - 25</td>
<td>10 - 25</td>
<td>Occasional</td>
</tr>
<tr>
<td>High</td>
<td>&gt; 25</td>
<td>25 - 100</td>
<td>Frequent and persistent</td>
</tr>
<tr>
<td>Very High</td>
<td>&gt; 25</td>
<td>&gt; 200</td>
<td>Frequent and persistent / strong</td>
</tr>
</tbody>
</table>

Looking Ahead: Impacts of Extreme Weather and Climate Change

Since a number of factors can lead to HABs, the long-term outlook for a particular water source is highly dependent upon local and regional conditions including nutrient inputs, watershed land use, long-term climate patterns, and local weather. Nevertheless, while site-specific HAB behavior will persist, most predictions suggest that the general warming trend and an increase in the frequency of extreme wet and dry conditions attributable to climate change will tend to favor an increase in the frequency and likelihood of HAB events, as summarized in Table 3. Further, increased nutrient loadings due to future changes in land use to support increasing populations and/or shifts in the distribution of population densities could have an equal or greater impact on HABs.

Table 3: Extreme Weather and Climate Change Associated Impacts on HABs

<table>
<thead>
<tr>
<th>Weather Event</th>
<th>Impact on Factors Leading to HABs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warmer Temperatures</td>
<td>-Increased growth rate of cyanobacteria; out-compete other phytoplankton.</td>
</tr>
<tr>
<td></td>
<td>-Increased stratification; cyanobacteria can regulate buoyancy and move between stratified layers</td>
</tr>
<tr>
<td>Increased Severity of Spring Precipitation</td>
<td>-Increased nutrient loadings</td>
</tr>
<tr>
<td>Drought Cycles</td>
<td>-Increased concentration of nutrients in waters</td>
</tr>
<tr>
<td></td>
<td>-Warmer waters</td>
</tr>
<tr>
<td></td>
<td>-Minor rains during drought can flush additional nutrients into lakes/reservoirs</td>
</tr>
<tr>
<td>Wind Events</td>
<td>-Destratification of lake and suspension of nutrients</td>
</tr>
</tbody>
</table>

What can be done about algal toxins/T&O?

In developing long-term plans, it is important to recognize that an increased risk of HABs will likely lead to increased costs to water utilities associated with additional treatment at the plant, source water treatment and management, and mitigation of impairments to environmental and recreational uses (Hamilton et al., 2013). Algal related toxins and T&O management strategies can be achieved by several means, providing utilities with flexibility in determining how to best mitigate algae issues in their system. Management strategies can be categorized as:

- Focusing on preventing algal blooms from occurring by sampling and monitoring for HABs and conditions likely to promote HABs
- Managing algal blooms to minimize impact of cyanobacteria and formation of algal toxin and T&O compounds
- Treatment of algal toxins and T&O compounds in the drinking water treatment plant

A holistic approach to algal toxin and T&O management can be comprised of strategies from multiple areas of impact, providing multiple barriers for T&O management. Several management strategies which can be implemented individually or as part of a multi-barrier approach for reducing algae related toxins and T&O from finished water are presented below, including potential advantages and disadvantages for each strategy.

Sampling/Monitoring

Cyanobacteria occur primarily in the summer and fall, but may occur at any time of the year, even under the ice in winter, meaning routine monitoring is important. Source water monitoring will vary based upon the water body type and size, and is generally very specific to each utility. Monitoring can range from simple grab samples to automated samplers, and analysis can range from identification and enumeration with a microscope to genetic testing for cyanotoxin producing genes.

Monitoring and early detection of cyanobacteria can help to increase the options available to a utility, to either avoid elevated numbers of cyanobacteria or adjust treatment to deal with the T&O compounds and/or cyanotoxins. A monitoring program with monthly samples is a good way to obtain baseline information. A multi-parameter meter can also be deployed in the water body to collect continuous real-time data, which is used to evaluate water quality changes between scheduled monitoring as well as provide an alert to trigger additional sampling.

Prevention / Management

The most holistic solution to removing the threat of algal toxins to water supplies is to reduce the levels of nutrients, especially phosphorus, entering the water body from the watershed. Municipal water supply utilities that control the land surrounding raw water sources may implement a variety of best management practices (BMPs) that target nutrients and other water quality contaminants at the watershed level, including restrictions on land use, enhanced monitoring, modified farming practices, construction of riparian buffer zones, or creation of stakeholder partnerships to reduce point sources. However, many utilities have limited control over source water watersheds due to political, financial, or practical reasons.
Several physical and chemical processes have been shown effective in reducing the impacts of algal blooms, including cyanobacteria, within reservoirs. However, since the options often involve altering the natural state of lakes and reservoirs, careful consideration of the implications of such actions needs to be evaluated. Approval from state agencies is also needed prior to applying chemicals directly to the water body. Additionally, formation of HABs involve a complex and poorly understood set of processes including the dynamics of competition between cyanobacteria and other phytoplankton species; local weather and wind dynamics; water temperature and stratification; and in-lake hydraulics. Nevertheless, in-reservoir control methods have been successfully applied and should be evaluated on a case-by-case basis. Table 4 lists several of these methods, and identifies key advantages and disadvantages of each of the options.

**In-Plant Treatment**

HAB-related issues in water supplies can also be mitigated during drinking water treatment. Conventional water treatment (flocculation, coagulation, sedimentation, and filtration) is effective in removing algal cells, but not for any extracellular algal toxins or dissolved T&O in the water column. Utilities often rely upon powdered activated carbon (PAC) to deal with algal-related tastes and odors, but high concentration outbreaks often require high doses, and PAC also shows some disadvantages. Some compounds are regulated and must be monitored. Some compounds may lead to toxin release, and some can be harmful for human and aquatic life. Table 5, adapted from Adams et al (2013), summarizes treatment efficacy of these conventional physical and chemical treatment processes for removal of algal cells, and extracellular toxins and T&O compounds.

Additionally, oxidants like ozone, chlorine dioxide, potassium permanganate or free chlorine can be used to control algae in-plant, but can actually lyse cells causing release of toxins and T&O compounds. In some cases the oxidants can be used to treat the resulting of effectiveness of various oxidants for disinfection of algal cells, and oxidation of various algal toxins and taste and odor compounds, adopted from Adams et al (2013).

### Table 4: Advantages and Disadvantages of Chemical and Physical Algae Control Methods

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper sulfate</td>
<td>-Significantly reduces algae populations, resulting in potential elimination of toxin and T&amp;O release</td>
<td>-May lyse cells and release intracellular toxins and T&amp;O compounds</td>
</tr>
<tr>
<td>Chlorine</td>
<td></td>
<td>-Kills many types of aquatic life</td>
</tr>
<tr>
<td>Potassium permanganate</td>
<td></td>
<td>Some compounds are regulated and must be monitored</td>
</tr>
<tr>
<td>-Alum or Ferric for Phosphorous Deposition</td>
<td>-Removes nutrients from water column</td>
<td>-Must dredge sediment or risk re-release of nutrients</td>
</tr>
<tr>
<td>Physical Processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Reservoir Mixing</td>
<td>No chemical or biological addition</td>
<td>-May not be effective for all cyanobacteria</td>
</tr>
<tr>
<td>-Hypolimnetic aeration/oxygenation</td>
<td></td>
<td>-Cost prohibitive for all but relatively small lakes and reservoirs</td>
</tr>
<tr>
<td>-Dredging to remove in-lake nutrient sources</td>
<td></td>
<td>-Research still occurring to fully understand the system impacts.</td>
</tr>
</tbody>
</table>

### Table 5: Physicochemical Processes and their effectiveness at eliminating extracellular cyanotoxins of interest in finished water

<table>
<thead>
<tr>
<th>Physicochemical Processes</th>
<th>Sedimentation</th>
<th>Filtration</th>
<th>Membranes</th>
<th>Sorption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coag/Floc/ Sed</td>
<td>Coag/DAP</td>
<td>Direct filtration w/o coag</td>
<td>Direct filtration w/ coag</td>
<td>Bank filtration</td>
</tr>
<tr>
<td>Cyanobacteria Cell Removal</td>
<td>- 90%</td>
<td>50 - 100%</td>
<td>Likely</td>
<td>Possible</td>
</tr>
<tr>
<td>Microcystin</td>
<td>Not</td>
<td>Expected</td>
<td>Not</td>
<td>Expected</td>
</tr>
<tr>
<td>Cylindrospermopsin</td>
<td>Not</td>
<td>Expected</td>
<td>Not</td>
<td>Expected</td>
</tr>
<tr>
<td>Anatoxin A</td>
<td>Not</td>
<td>Expected</td>
<td>Not</td>
<td>Expected</td>
</tr>
<tr>
<td>Saxitoxin</td>
<td>Not</td>
<td>Expected</td>
<td>Not</td>
<td>Expected</td>
</tr>
<tr>
<td>MIB and geosmin</td>
<td>Not</td>
<td>Expected</td>
<td>Not</td>
<td>Expected</td>
</tr>
</tbody>
</table>

*Compound is well remove until carbon apacity is exhausted

### Table 6: Effectiveness of typical oxidants for disinfection of algal cells and oxidation of extracellular toxins and T&O in drinking water treatment

<table>
<thead>
<tr>
<th>Oxidants</th>
<th>Cyanobacteria Disinfection (may lead to toxin release)</th>
<th>Microcystin</th>
<th>Cylindrospermopsin</th>
<th>Anatoxin A</th>
<th>Saxitoxin</th>
<th>MIB and geosmin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effective</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Effective</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Free Chlorine</td>
<td>Effective</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Effective</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Monochloramine</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td>Chlorine dioxide</td>
<td>Moderate (pH)</td>
<td>Slow/no oxidation</td>
<td>Slow/no oxidation</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td>Permanaganate</td>
<td>Moderate (pH)</td>
<td>Slow/no oxidation</td>
<td>Slow/no oxidation</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td>Ozone</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td>AOP</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
<tr>
<td>UV</td>
<td>No</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
<td>Effective</td>
</tr>
</tbody>
</table>
In the end, it is up to each utility to evaluate occurrence, frequency, impacts and risks associated with harmful algal blooms, and to decide upon a control/treatment strategy which best suits their needs. Generally, as more events similar to Toledo occur nationwide, it is likely that regulators and the public will take notice. Looking ahead, the following steps would be recommended for any water system concerned about HABs and associated algal toxin and T&O events:

1. Creation of a Source Water Protection Plan considering conditions which could give rise to HABs and algal toxin events.

2. Develop source water monitoring tools and an alert level framework to understand HAB occurrence and predict associated problems.

3. Use algal toxins and T&O control in assessments of planned (or in place) WTP processes.

4. Develop short-term and long-term action plans to minimize threats from algal toxins.

5. Develop “triggers” for action items related to treatment/response and “no drink water” notice.

---

**References**


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The New York Section American Water Works Association held its Annual New York Water Event the week of April 14, 2015 in Saratoga Springs, New York. Over 680 water professionals attended this year’s conference which featured Awards; Operators Day; Contests; great new Session Tracks; 96 exhibitors in the Exhibit Hall and more!

On Tuesday, April 14 the Section recognized several individuals for the commitment and dedication to the Section. Awards presented include: George Warren Fuller Award to John W. Frazer, Jr., Town of Colonie, a Division of Latham Water; John M. Driven Award - Thomas Clark, Monroe County Water Authority; John Lechner Award of Excellence - John Fiedler, Mueller Company; Recognition to the Water Industry - Anthony J. Geiss, Jr., Onondaga County Water Authority; and Jamie Howard, outgoing board member for his commitment, dedication and hard work to the New York Section American Water Works Association.

Wednesday morning concluded the awards portion of the event in which the Section recognized several individuals and organizations as follows:

- Small Sized Project of the Year - New York American Water, Reynolds Channel Water Main Direction Drill, and project engineer H2M Architects & Engineers;
- Medium Sized Project of the Year - City of Rochester Bureau of Water, South

![Image](https://example.com/image1.png)

![Image](https://example.com/image2.png)

![Image](https://example.com/image3.png)

![Image](https://example.com/image4.png)
Clinton Avenue Water Supply Conduit Modernization, project engineer Bergmann Associates; and Town of Colonie, Mohawk View Water Treatment Plant Filter Underdrain Repair, project engineer Barton & Loguidice;

• Large Sized Project of the Year - Monroe County Water Authority, East Side Water Supply Project, project engineer O’Brien & Gere;

• Section Safety Award - Onondaga County Water Authority and United Water New York Division;

• Recognition for Service to the Water Industry - Senator Charles E. Schumer;

• Operators Meritorious Service Award - Robert Samuels, City of Rome

• Service Provider of the Year - H2M Architects & Engineers

• Young Professional of the Year - Roopesh Joshi, NYCDEP

• Operator of the Year - John Nappi, Garden City Park Water District

Top Ops is a challenging contest that tests the everyday knowledge of water treatment operations in a “Jeopardy” format. Back to compete at this year’s AWWA’s Annual Conference and Exposition are last year’s national fourth place team from Monroe County, Mike Terrore, Christine Thornley, and Derek McKeon.

The fast-paced Meter Madness contest pits competitors against the clock to assemble a water meter from a bucket of parts. Competitors practice year round to compete at the Section and the
winner goes on to compete at AWWA’s Annual Conference and Exposition (ACE). This year’s winner is Mike Vienna from the Town of Phelps.

The Best Tasting Water Contest had eight water utilities competing across the state: City of Canandaigua; Suffolk County Water Authority; Plainview Water District; Latham Water District; New York City Department of Environmental Protection; the Village of Old Westbury; Monroe County Water Authority; and the City of Rochester. A panel of judges scored the contestants on: Taste; Odor; Color; Clarity; Mouth Feel; and Aftertaste; and with a score of 106 out of 120 Latham Water District took the title of the “2015 Best Tasting Water”!

New this year was the Young Professionals and Students Fresh Ideas Poster Presentation. This opportunity provides presentation experience and also a chance to learn more about the rapidly evolving drinking water industry through interactions with drinking water industry professionals. Posters were judged on the following criteria: Originality; Significance of Work; Technical Content and Quality of Abstract. Five posters were presented and this year’s first place winner was Ashley Waldron IE, Barton & Loguidice and graduate student at Clarkson University. She will be representing the New York Section at this year’s AWWA’s ACE.

Next year’s New York’s Water Event will be on April 12 – 14, 2016 in Saratoga Springs, New York. Also, upcoming is this year’s Edwin
C. Tifft Jr Water Supply Symposium on September 23 and 24 in West Harrison, NY (Westchester County).

About the New York Section American Water Works Association -

Established in 1914, the New York Section American Water Works Association is part of the largest nonprofit, scientific and educational association dedicated to managing and treating water, the world’s most important resource. With approximately 50,000 members, AWWA provides solutions to improve public health, protect the environment, strengthen the economy and enhance our quality of life.
**General Municipal Engineer**

BSCE, with minimum four (4) years experience in municipal engineering and New York PE Registration or ability to gain PE in one year. Candidate shall have strong knowledge and experience in the following: water supply/distribution systems and wastewater collection/treatment systems. In addition, the candidate shall have good technical writing skills, project planning abilities as well as knowledge in plan and specification preparation. Position requires a strong work ethic, interpersonal skills and desire to be a team player. Position is for a self starter and has the opportunity for growth.

Hunt Engineers, Architects & Land Surveyors, PC is an Equal Opportunity Employer with offices in Horseheads NY, Rochester NY and Towanda PA. Contact Info: Hunt Engineers, Architects & Land Surveyors, PC; Attn: Timothy Steed, 100 Hunt Center, Horseheads, NY 14845, (607) 358-1000, resumes@hunt-eas.com

**Wastewater Engineer**

BSCE, with 7-10 years experience in municipal/industrial engineering with a focus in wastewater treatment design. Knowledge in wastewater collection, water treatment and distribution a plus. Applicant should have PE and New York Registration or ability to obtain.

Successful candidate should be intimately familiar with calculations and considerations for various treatment processes including activated sludge, extended aeration, aerobic/anaerobic digestion, solids handling, etc. Position requires excellent work ethic, client relations, personnel skills, self starter and a team player. Experience should include directing support team in developing design documents, and creating plans and specifications for the public bid environment. Position is for a self starter and has opportunity for growth. Hunt Engineers, Architects & Land Surveyors, PC is an Equal Opportunity Employer with offices in Horseheads NY, Rochester NY and Towanda PA. Contact Info: Hunt Engineers, Architects & Land Surveyors, PC; Attn: Timothy Steed, 100 Hunt Center, Horseheads, NY 14845, (607) 358-1000, resumes@hunt-eas.com

**Communications Assistant Internship**

The New York Section American Water Works Association (NYSAWWA) is looking for a Communications Assistant Intern. Hours are flexible and will range from 8 - 10 hours/week. The Internship will be held at the NYSAWWA office in Liverpool, NY. Internship is for the summer and is a paid internship. Responsibilities include: Help create marketing materials to promote the Section and its events; Coordinate marketing and communication pieces including email, newsletter, website and social; media outlets; Promote and implement member benefits; Interview members and write member spotlight feature; Assist with in-house graphics and design projects as needed; Update website and content as needed; Help to develop Section’s Communications Plan on “The Value of Water”; Develop way to increase our social media followers; Report to Executive Director on progress/issues that arise when calling our members. For more information visit: www.NYSAWWA.org or contact Jenny Ingrao, NYSAWWA Executive Director via email jenny@nysawwa.org.
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