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This is my final article as Chair of NC AWWA-WEA, and how fitting it is that the theme is Risk Analysis and Management. As an engineer, I inherently evaluate the pros and cons and risks of every decision I make. I often ask myself “what’s the worst that can happen?” so I can prepare for the worst and plan for the best. It felt like a big risk to step up and lead NC AWWA-WEA, and it took time and careful consideration before I felt prepared. I am so glad that I took the risk as I have gained so much in this role, and am truly humbled by the opportunity. I want to thank former Executive Director Lindsay Roberts, for giving me the confidence to serve as Chair. And a special thank you to my employer, Heyward Incorporated, for fully supporting my leadership in NC AWWA-WEA as well as the volunteer effort of all Heyward employees.

The NC AWWA-WEA Board of Trustees is constantly going through a risk analysis and management evaluation of our critical assets, including the programs we implement, our volunteer and staff resources, and our financial health. While our process doesn’t follow the Risk Analysis and Management for Critical Asset Protection (RAMCAP) discussed in this issue of NC Currents, the method we use in strategic planning is similar and very beneficial.

The risk that weighs heavily on my mind today is the risk that we may not have enough volunteer resources to fulfill our training and education goals. We have many members and event participants in our association. Relatively speaking, we have only a few volunteers to develop, coordinate, and implement the education and training programs. The Board is working hard to fully assess this risk, the consequences, and ways to mitigate or prevent this resource shortage.

We need your help with the consequence analysis. How would you be impacted personally by a shortage of volunteers? Think about how NC AWWA-WEA provides value to you. Perhaps the value is keeping you and your team up-to-date on the latest rules and regulations. Perhaps the value is...
Message from the Chair

preparing you for the next level of certification. Perhaps the value is in managing public concern over lead in drinking water, on the heels of the Flint, MI crisis. Maybe the value has been career enhancement, as you broadened your perspective and technical expertise and network with other leaders in the industry. Whatever the value is for you personally, I’d like to ask you to thoughtfully think about it, share that benefit with others and encourage them to think about the value of NC AWWA-WEA to them.

Now ask yourself, were volunteers involved in bringing that value to you? What if there were no volunteers to help? We pride ourselves in being a volunteer association operating jointly as a Section of the American Water Works Association and a Member Association of the Water Environment Federation. Being a volunteer association is our core foundation, yet it is also our biggest vulnerability. We depend on volunteers to deliver value to you, our members.

So in my last article as Chair, I ask you to please take a risk with me. Think about the value NC AWWA-WEA has brought to you, and the value you expect to receive in the future. Learn more about how and where you can take on a larger role as a volunteer, in delivering value to others. It’s ok to be uncertain, or not feel qualified, but take a risk that there is a place for you to add value as a volunteer and let us help prepare you. At the same time, take a different risk and speak out, be a vocal advocate for NC AWWA-WEA. Challenge yourself to recruit three active volunteers to help us fulfill our mission, and help them reap the value that has benefited you. Finally, share your leadership skills with NC AWWA-WEA as a committee chair, council chair, or Board member. We need diverse perspectives and experiences in our leaders, and I am confident you have much value to share. I understand most people are risk averse. I promise you, the risks I am asking you to take here come with very little downside and a tremendous amount of reward. If you don’t believe me, ask a current or past association leader, and then ask them how they see you fitting into NC AWWA-WEA leadership.

Thank you, the readers of NC Currents, participants, members, and volunteers of NC AWWA-WEA for bringing so much value to our North Carolina water community. This year in particular, a huge thank you is due to the Executive Director, Catrice Jones, and her staff. They have done a tremendous job in transitioning this association through significant staff changes this year, while keeping up the momentum and service to our members. We are truly blessed to have such a competent, dedicated, and passionate staff. Thank you for supporting our volunteer association!
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As I begin writing this article I am en route to Florida to meet my best friend and help her prepare for the next chapter in her life. In one month she will begin a new job in a place where she has no family or friends nearby. Although she is excited about the opportunity, she is a little apprehensive about moving farther away from ‘home.’ From the beginning of this journey, she has questioned her professional and personal abilities to take this major step. I have attempted to provide support, as needed – reassurance when she needed to be lifted up, an ear when she needed to vent, a shoulder when she needed to cry and a comedy routine when she needed to laugh. I admit that my opinion may be a little biased, but to me she is one of the bravest, most intelligent, and capable people that I know. She has dealt with tremendous loss and disappointment over the years, yet she still maintains a positive attitude and demeanor. However, when she reflects on her life this is not what she sees.

To a certain degree we all have a distorted view of ourselves – myself included. It is human nature to compare ourselves to others and want what we don’t have. This distortion causes us to base our self-worth on what we ‘think’ other people have or know. At times, this leaves us feeling ‘less’ accomplished than our friends, ‘less’ settled in our lives, ‘less’ knowledgeable than the person we work with, or ‘less’ important than our supervisor. Not to say that I am immune to instances of self-doubt, but I attempt to go into life thinking that people are not ‘less’ than others; instead, we are just ‘different.’ These differences are what make the world exciting and unique, every day. Interactions with people who have different life experiences and viewpoints, present opportunities to challenge beliefs and reexamine the world we live in.

On a similar note, each of us has moments where we feel that things would be simpler if people acted or thought the same way we did. We say things like “more things could be accomplished if we didn’t have to contend with naysayers” or “the world would have fewer problems if we all shared the same values.” I challenge this thought process by saying: how boring and unfulfilling life would be if this were the case. There is no excitement in knowing every step a person will take or every thought that crosses their mind. It would be like going through life on autopilot. People would not be challenged or motivated to strive to improve themselves or the world. All of these feelings are important parts of personal and professional growth. They are what lead you to seek out educational opportunities just for the sake of learning or ways to gain additional skills you need to get a promotion.

So the next time you are sitting around envying someone or feeling that everyone else’s life is easier or better than your own, consider this: that very person may be thinking the same thing about you. Don’t waste energy on envy or having negative feelings on the ways they are different from you, but take some time to look in the mirror to find what is the real issue at hand. Are your feelings coming from a feeling that you are missing something in your life or is it fear of the unknown? Instead, take time to talk to this person and you might be amazed what you learn. You might even walk away valuing your own life even more.
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Summary of the NC Section AWWA and NC WEA Board of Trustees Meeting
Thursday, March 17, 2016 at the City of Raleigh Operations Center, Raleigh, NC.

The following actions were taken:

1. Audit and 990 Tax Preparation
   • A clean opinion was received on the audit.
   • Decrease in cash for 2015 primarily due to the unusual events.
   • Total assets of the endowment increased by $20,059 due to current year contributions.
   • The Designated Reserve Fund at end of 2015 is $666,435 which is 48% of the annual operating expense budget.
   • All 990 information on the tax forms is consistent with the audited financials.
   • Governance policies required by the IRS are in place, including record retention, whistleblower, and disclosure of reasonable compensation.
   • Calculation of “Public Support Percentage” is required, with the minimum allowable being 33%. NC AWWA-WEA is at 97.19%.

2. Action Items
   • Logo Review/Update – reviewed and approved an updated version of logo to submit to AWWA and WEF.
   • Advertising Policy – reviewed and approved an advertising policy.
   • Approval of WBOEE nominee – approved appointment of Aubrey Butler.

3. Strategic Governance
   • The board participated in a Strategic Planning Review Session led by Jackie Jarrell.

4. Chair’s Report – Julie Hellmann
   • Summarized meeting with AWWA representatives regarding membership.
   • Discussed the purpose of AWWA Summer Workshop and recommendation to send treasurer and new board members in the future.

5. Executive Director’s Report
   • Summarized endowment dinner held on February 21.
   • Status update on registration numbers and hotel block performance for Spring Conference.
   • Update on structure of The Academy Taskforce. Reviewed performance of March classes and current registration numbers for April class.

6. Consent Calendar – Approved
   • Minutes of the board meeting of January 21, 2016.
   • Accepted Treasurer’s Report
     • Total assets as of January 31, 2016 were $1,138,445.01, with $1,103,269.98 in checking/savings, of which $409,074.00 is endowment funds. The balance of unrestricted net assets (checking minus endowment) is $694,195.98.
     • Total assets as of February 29, 2016 were $1,213,536.99 with $1,178,361.96 in checking/savings, of which $409,074.00 is endowment funds. The balance of unrestricted net assets (checking minus endowment) is $769,278.96.
     • Water For People profit and loss as of February 29, 2016 is -$39 for net income YTD of -$39.
     • Balance sheet as of February 29, 2016 reflects total current assets of $205.40.
   • Accepted Award Description Updates
     • Kasey Monroe Outstanding Service Award, Industrial Award, and Ebert Award.
   • Committee Reports – Reports received through March 3, 2016.
   • WEF Report – none provided.
   • AWWA Report – none provided.

7. Other Business
   • One AWWA Operator Scholarship – Item was tabled until next meeting.
   • Brief discussion about the JD Power and Associates survey data.

8. Adjournment – next meeting is at 10:00 a.m. Thursday, May 19 2016 and will take place at the Greensboro Coliseum (1921 W Gage City Blvd, Greensboro, NC).
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### 2016 Committee Chairs and Board Liaisons

#### Board Committees

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#### Annual Conference Coordinating Council

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<thead>
<tr>
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<th>Contact Info</th>
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<tbody>
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#### External Affairs Council

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For more committee information visit individual committee web pages on www.ncsafeewater.org.
## Technical Program Council

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<tr>
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## Schools Coordinating Council

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<td>Professional WW Operators</td>
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Institute Training Program

After participating in the Institute Program hosted by Two Rivers Utilities (TRU) this past May, one of TRU’s staff members commented that it was “the most relevant continuing education class he had ever attended.” That was gratifying to hear, says Stephanie Scheringer, the utility’s Division Manager Wastewater Treatment, because it was exactly what TRU needed and wanted from the Institute.

“There were several aspects of NC AWWA-WEA’s Institute Program that were quite appealing to us,” says Scheringer. “NC AWWA-WEA’s ability to provide customized training for topics we selected was a key factor. Like many utilities, TRU has experienced some turnover in operational staff due to retirements, so having the ability to tailor training topics to our staff’s specific needs is optimal.”

Before the existence of the Institute, TRU’s approach was to review the training catalog searching for pertinent seminars that would enable operators to fulfill educational requirements for their certifications. Along with the Annual Conference and the Operator Schools, these seminars were NC AWWA-WEA’s most frequently attended training programs.

“In the past, we picked ‘hot topics’ in the industry and created one and two-day seminars and workshops in various locations throughout the state,” explains Reed Barton, Chair of the Seminars and Workshops Committee. With members and utilities expressing a desire for training that was more closely tailored to their particular needs, the NC AWWA-WEA Board responded by approving a transition to the program that, in 2015, was launched as the Institute.

On February 5, 2015, Charlotte Water hosted the first Institute at its Field Operations Zone 2 location in Charlotte. “We wanted to be the first to partner with NC AWWA-WEA and act as a sponsor to this new initiative,” says Cheryl Stanford, Organization Development and Training Specialist at Charlotte Water. The Institute meshes well with Charlotte Water’s existing approach to continuing education. Their Training Link Team, which consists of approximately 20 members representing each division, meets two to three times a year to discuss high priority training topics.

Similarly, before approaching the NC AWWA-WEA to request an Institute, TRU surveyed supervisory staff to identify training needs and made a list of desired topics. They then worked with a planning group from the Seminars and Workshops Committee to refine them. “In the Institute Program, host utilities play a much greater role in setting the agenda and directing overall goals and learning objectives for the event,” says Barton.

The City of Raleigh Utilities Department has hosted two Institutes so far. “We looked at it as a cost savings opportunity,” says Training and Development Manager Maisha Williams. Having training on-site cuts down on time and travel expenses. Furthermore, staff members who do not enjoy traveling are relieved to have the course held locally.

“NC AWWA-WEA is made up of individuals and utilities from across the state, and a clear message we were getting from them was the widespread need to push their training dollars further,” notes Barton, adding that the host is responsible for providing a venue and ensuring a minimum number of attendees. “It’s like a block purchase.”

Each Institute makes a certain number of spots available for open registration to individuals outside of the host utility. Meanwhile, the host receives preferred pricing for the sessions.

For instance, when hosting its first Institute, the City of Raleigh Public Utilities offered 80 spots to its staff and 10 to guests. “Our staff was able to receive excellent training organized by an association that is highly respected,” says Williams. “We are excited by the fact that Raleigh has held two Institutes, and both times Lamya King has been among the volunteers from the Seminars and Workshops Committee who have helped with the planning. She explains that when a utility expresses interest in hosting, the committee organizes a planning group, typically consisting of four volunteers. The planning group starts by setting up a meeting with the utility to receive the list of topics and sort through the logistical details such as venue and timing.

The planning group then looks for speakers to develop a presentation for each topic. “Utilities can help hand-pick the speakers if they wish,” notes Barton, adding that the goal is to use every resource available to connect top educators and experts in their fields with the operators, engineers, plant staff, and management staff at utilities. “I think we’ll have greater opportunity to bring in highly sought-after speakers now that we’re asking them to provide fewer, more focused presentations.”

King notes that each Institute planning group helps to build up a roster of high-quality speakers. “That’s when it gets...”
fun and exciting,” she says. “We try to keep the presentations as engaging and hands-on as possible.” The group divides the list of topics and connects every two weeks with updates.

The planning group works closely with the utility throughout the entire process. For instance, the Training Link Team at Charlotte Water met with NC AWWA-WEA volunteer George Simon in the lead-up to their Institute in September. “We provided him with content that we wanted him to give to some of the speakers,” says Stanford.

“Having a large portion of our wastewater staff together is a rare opportunity,” says TRU’s Scheringer, adding that having operators and supervisors receive information from a single source is a challenge in an environment that must be staffed 24/7 at multiple sites. “We appreciated being able to interact with each other as well as with peers from other utilities.”

Barton points out that many utility staff attendees have a license specific to water operators or wastewater operators, and some have both operator licenses. An Institute can offer a curriculum that covers topics that are pertinent to both water and wastewater professionals. “One of the benefits of that is cross-training,” explains Barton. “It’s not what they do every day, but it helps the trainee become more effective as part of an overall utility team.” Other utilities, he adds, prefer their operators to be able to focus exclusively on either water or wastewater topics, allowing for a greater depth in the topics taught.

The City of Raleigh Public Utilities Department (CORPUD) is a case in point. The first Institute hosted by CORPUD in 2015 included sessions addressing water and wastewater operators as one group. In contrast, the Institute held in August 2016 delivered two classes side by side: one water and one wastewater. Half of the operators at the utility underwent training while the other half ran the facilities. Then the next day, they switched. “In two days, we were able to train a large number of attendees,” says Barton.

Williams notes that by having “two separate agendas,” operators were able to have “a deeper experience.” The decision to change formats was prompted by responses to the evaluation form, which is included in every packet handed out to attendees at the beginning of each Institute.

“We can’t overemphasize the importance of the feedback forms,” says King, noting that the information is shared with the entire Seminars and Workshops Committee. “They are critical to helping us make the Institutes better and better.”

Charlotte Water made some changes based on feedback received after hosting its first Institute with 100 people. To create a more intimate and engaging learning environment for attendees, future sessions will be smaller. Subsequently, the second Institute with NC AWWA-WEA in September 2016 was reduced to 60 attendees, with 49 people from Charlotte Water and 11 guests. At the same time, even more emphasis was placed on speaker selection. “Our Institutes are open to all employees at Charlotte Water; therefore, we want to ensure all employees would be able to leave with a valuable take-away from each speaker,” says Stanford, adding that lessons learned even included small practical tips such as not preparing the lunch too close to where presenters were speaking.

Aside from the food, the rest of the event is managed by NC AWWA-WEA volunteers, from registration, speaker introductions, moderating, and ensuring that sessions don’t go over their allotted time. For the August 2016 Institute in Raleigh, two NC AWWA-WEA staff members showed up on the first day to help with registration. “It wouldn’t have been possible without all the volunteers and support from
the Association,” says King. “You always have a group of people you can lean on. It’s never up to just one person.” She adds that seeing all the attendees engaged has been very rewarding. The more Institutes she helps to plan, the more comfortable she feels with the process.

“I really enjoy it,” explains King. “There is a lot of value in it. I look forward to making it a better experience each year for both the attendees and the presenters.”

Barton notes that the Seminars and Workshops Committee is always looking for more volunteers to help plan and carry out the Institutes. At the same time, NC AWWA-WEA is continuously improving the Institute program. For instance, smaller utilities are being encouraged to co-host an Institute so that they can take advantage of preferred pricing. Recently, ‘mini’ institutes have been held, such as the one at TRU where 22 seats were reserved for people within the utility, while 18 seats were purchased by guests from five different utilities.

“It was the commitment by all involved in the planning process that made the Institute so successful,” says Scheringer. “Throughout the process, the committee members were very accommodating. They really wanted detailed input to tailor the sessions to our utility’s needs and ensure the speakers understood what topics were requested. They had an obvious desire to provide a meaningful training session. Due to the many benefits of the Institutes, it’s expected that we would host again in the future.”

“I look forward to making it a better experience each year.”
Member Portrait

Leila Goodwin
The Serendipity of Life

When Leila Goodwin retired from her position as Water Resources Manager with the Town of Cary in September 2015, she left a gap that was hard to fill. “I left at a time when there were some other staff changes,” she recalls. “So I indicated that I would be willing to help out by transitioning and making my institutional memory available.”

That institutional memory and industry experience is considerable, built on a career that started after Goodwin graduated with a Masters in Civil Engineering from Carnegie Mellon University in 1985. At the time, she had no idea she would be spending the next 30 years working in water and wastewater.

Applying for a variety of jobs, she accepted a position as a Project Engineer with CH2M Hill (now CH2M) in Gainesville, Florida. “The joke forever afterward was that I interviewed them as much as they interviewed me,” she laughs. “I clicked with the people there and the projects sounded interesting so I took the job.” Because her work mainly revolved around water supply, she became involved in the American Water Works Association (AWWA).

After 10 years in Gainesville, she transferred to the Charlotte office where she began to work very closely with one of the clients, the Town of Cary. Beginning to feel a little “burned out” with consulting, Goodwin was ready for a change. Unbeknownst to her, the Town of Cary was in the process of creating a Water Resources Manager position.

Seeing the posting, she noticed that the description was a perfect match for what she was already doing for them as a consultant. “I told myself that I either need to apply for this or never complain again,” recalls Goodwin. The position involved planning and regulatory work related to water resource management, including issues of water supply and wastewater treatment. The focus was less on day-to-day operations and more on long-term strategy and the big picture. “Nobody will know if I did my job well until 2020 or 2030,” notes Goodwin, only half-joking. “That’s all a part of working in long-range planning. You don’t immediately see the results of what you spend your time on.”

Because her work included long-term planning for wastewater treatment, she decided to join the Water Environment Federation (WEF). Her participation was overdue. When she was still working for CH2M Hill, one of her Charlotte colleagues was Joe Stowe, an industry legend and a big booster of the NC AWWA-WEA. “He said, you need to get involved,” recalls Goodwin.

When she first started volunteering with the NC AWWA-WEA, there was no Water Resources Committee or a committee that focused on long-range, general water management issues. Instead, she joined the Government Affairs Committee.

Then in 2005, John McLaughlin started a Water Resources Committee and asked Goodwin to join. “I was thrilled that there was finally a committee for what I spend most of my time on,” recalls Goodwin. From vice-chair, she became the chair, at the same time continuing to serve on both Government Affairs and Water Reuse committees. She has also served several times on the Nominating Committee.

Goodwin was instrumental in reviving the Water Resources Committee last year, after it was temporarily disbanded. “We’re planning a portion of an afternoon session at the Annual Conference,” she notes, adding that the committee’s work also supports the Confluence Conference. “Confluence is all about resource planning and management.”

Then, in 2014, Goodwin was appointed by Governor Pat McCrory to the North Carolina State Water Infrastructure Authority (SWIA), created by the North Carolina General Assembly to assess and make recommendations about the state’s water and wastewater infrastructure needs. “That is one of the highlights of my career,” she says, adding that SWIA consolidates multiple state and federal funding programs for water and wastewater infrastructure under its purview. “Part of our task is to try to streamline and better leverage that funding.”

Over the past two years, the SWIA has modified the point system for assessing applications and tried to cut through some of the red tape. Goodwin notes that she has learned a great deal about how projects are funded as well as how differences in size and geography affect utilities. “What causes utilities to be in a position to need grant funding in order to operate or do a special project?” asks Goodwin.

She has also worked on a small sub-committee, consisting of three of the nine SWIA members, with the goal of creating a master plan for water and sewer for North Carolina. Addressing the need for utilities to become more proactive in managing and financing their systems, the plan will focus on three areas: 1) aging and critical infrastructure; 2) attaining long-term viability; and 3) ensuring utility revenues provide appropriate infrastructure funding levels. Completion of the first draft is expected before the end of this year, after which it
Goodwin has also found that being on the SWIA has broadened her interests. Last year, at the NC AWWA-WEA National Conference, newly retired, she went to a session on ‘how to communicate with your board’ to learn how to be more effective in her new volunteer role. She was also able to leverage the leadership training offered to NC AWWA-WEA chairs.

“Now I always have my ears open to what will help further the Authority’s work,” explains Goodwin. “I spoke to Dave Saunders about the Academy and whether there is some collaboration possible.” One of the things the Authority has identified as important is tapping into existing training and education resources rather than trying to create new programs.

There are many organizations with similar goals, notes Goodwin. “What we want to do is to leverage these resources to meet some of the needs we have identified,” she says, adding that these partnerships are still at the exploratory stage. “There is synergy when so many organizations are aiming at the same goals.”

That synergy is something she has experienced on a personal level from her involvement in a broad range of organizations. Along with AWWA and WEF, Goodwin is a member of the American Water Resources Association and the Society of Women Engineers. She also served in a variety of leadership positions for the American Public Works Association. “From a management point of view, being involved in leadership roles for multiple organizations was a real benefit at work,” she reflects.

Since October 2015, however, Goodwin has been ‘mostly’ retired. In her spare time – even as a retiree, she does not have a lot of that – she practices and teaches yoga at a local studio.

“From a management point of view, being involved in leadership roles for multiple organizations was a real benefit at work.”
Greg Morgan is a big believer that, given the opportunity and the training, operators and their crew can work their way up to leadership positions in water and sewer. Having fulfilled that very potential, he brought an important perspective to the task force preceding the launch of the NC AWWA-WEA’s Academy, an initiative that will help provide members of the industry with the skills they need to move up the career ladder.

As for Morgan, he had to do it all on his own. Growing up in Union County, he spent the early years of his life just struggling to get by. “We didn’t have much,” he recalls. But what he did have was determination.

When Morgan was 15, he fell in love with a 13-year-old girl who would later become his wife. Because of their family situations, for all intents and purposes, both teenagers were raising themselves. In fact, just after they started dating, Morgan’s girlfriend also assumed responsibility for raising her two half-sisters.

At the age of 16, Morgan left high school, finishing his diploma at night so he could work during the day. “A college degree does not define a person’s capability to succeed if they are given an opportunity,” says Morgan, adding that in the mid-90s construction in the area was booming. “We had a backhoe on every corner in Union County,” recalls Morgan. The County is adjacent to Charlotte, which, at the time, was bursting at the seams.

Morgan pinpoints this time as the start of his career. Earning a good wage was doubly important, since he was now helping raise his girlfriend’s two half-sisters as if they were his own. “By the time I was 18, I was putting in water and sewer lines as well as storm drains for a developer,” he notes, adding that connecting with the County inspector overseeing the work helped open some further opportunities.

In 1999, he married his sweetheart, and that same year, they adopted a child. Their daughter is now 17 years old and thriving, but she needed special care her first year, including a three-month stay in Hemby Children’s Hospital, and tube feeding for another six months. “That’s what drove me to join the local government utility for Union County,” explains Morgan. “That gave me a chance to get insurance benefits for my child. I have been truly blessed!”

From 2000 to 2004, he worked his way from an entry level to a crew leader position, responsible for repairing manholes and pump stations. Meanwhile, the ongoing battle of their extended family compelled Morgan, his wife and their three children to move away from Union County and relocate near Raleigh.

In Raleigh, Morgan went to work for an engineering firm, overseeing rehabilitation projects on sewers across North Carolina. A little less than two years later, he was offered a position as a field supervisor for Union County. “So we moved back in 2006,” says Morgan, “and I’ve been with Union County ever since.”

In 2005, the yearly spill summary for Union County’s sewer system was 2.4 million gallons. As of last year, the county was spilling less than 100,000 gallons per year. “I was part of an organizational effort to reduce sanitary sewer spills,” explains Morgan, noting that he earned his Grade 4 Wastewater Collection and Water Distribution, Backflow/Cross Connection certifications along the way. “I’m extremely proud of being part of the team that reduced the amount of wastewater entering our streams and our environment.” He credits the men and women he works alongside every day – from engineering, to management, to field staff – for making this happen. They are the same people who helped Union County go from 200 miles to more than 600 miles of sewer lines in the past 15 years.

Morgan notes that the most challenging part of his work revolves around public education, making the public understand the importance of the work that his crew performs each and every day. Becoming involved with the NC AWWA-WEA provided him with some of the tools to address this challenge.

His first involvement was at the 2007 Annual Conference in Charlotte. It was the first time Morgan led a team in the Operations Challenge. At the time, the NC AWWA-WEA Annual Conference only included one of the five Challenge events: Collections. That year, the Union County Sewer Rats won first place. At first, they were excited by the prospect of going to the national competition at the Water Environment Federation Technical Exhibition and Conference (WEFTEC). “Later on we found out that we weren’t going to nationals, because we didn’t have a clue what the other four events involved,” laughs Morgan. He adds that, even if the team members had been prepared, the NC AWWA-WEA did not have the funding to send them.

Never one to shy away from a challenge, Morgan joined Bob Norris and Billy Allen in working with the then Executive Director, Lindsay Roberts, to develop an Operations Challenge Committee. Together, the four of them also drafted a sponsorship policy, presenting it to the Board of Trustees for approval.

After Norris retired, Morgan and Allen co-chaired the Operations
Challenge Committee, implementing a new event every year until all five were part of the North Carolina event. “Now the board regularly approves funds to send the overall winning team to WEFTEC,” says Morgan, noting that he has also served on the Local Arrangements Committee as the liaison with the Operations Challenge Committee since 2010.

Three years ago, Mike Osborne, then Chair of the NC AWWA-WEA Board of Trustees, called Morgan to ask if he would take part in a task force to look at training gaps. The core group was composed of 10 people from across the state, ranging from public works directors, to engineers, to people like Morgan and T.J. Lynch who started on the front lines and have worked their way from the bottom up.

“The gaps we found included the soft skill training that people like me need to become a supervisor or a leader,” explains Morgan, “in order to take the next step in their career.” The work of the task force led to the development of the Academy, an initiative rolled out in 2015 to better meet the needs of NC AWWA-WEA members and their employers.

While he was serving on the task force, he was approached and asked to consider being on the Board of Trustees. It wasn’t a hard sell. Morgan has a deep appreciation for the role the NC AWWA-WEA has had in his professional development.

“NC AWWA-WEA has enabled me to collaborate with others in this industry, in this state and in this region,” he explains. “Having open lines of communication with folks from all over the state and being able to teach the next generation of operators is very fulfilling.” Morgan is one of the instructors on support system awareness for the Academy.

Serving his second year as the board’s Professional Wastewater Operators Representative, Morgan continues to be an outspoken voice for men and women like those who work alongside him at the utility. “Without my team, I’m nothing,” says Morgan. “As an industry, we have to create a gateway so we can teach the skills that are needed for them to become the leaders of tomorrow.”

He points out that a large segment of the industry’s workforce is set to retire. The industry will always have a huge succession problem unless it is willing to build capacity from within. “If nothing else, my goal is to stand behind these operators, to make sure they are front and center,” he says. “Whether it’s through the operations challenge or my speaking at a board meeting, and saying this is the training they need, I’ll do everything I can to help bring this training to the table so we can create successful succession plans for our utilities.”

Last year, Morgan and Brian Tripp delivered a presentation on the Academy at the AWWA Regional Meeting of Section Officers in Key Largo, Florida, sharing North Carolina’s experience with representatives from the other states in attendance. “The other states were very surprised that we were willing to take this on,” recalls Morgan. “They were very interested in what we are doing.”

He points out that attendance at the schools put on by the Academy continues to grow. Meanwhile, another part of the task force for the Academy is working on securing accreditation for the courses, something Morgan considers key to the success of this initiative. “Once these two solid footings are built,” he says, “I feel very strongly that the Academy is going to take off. It is already starting to gain some momentum. People are coming from across the state because they see the value in educating their workforce.”

Union County Sewer Rats at WEFTEC 2014 in New Orleans. Morgan is second from the left.
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Learn more at www.ncsafewater.org
Plant Spotlight:
City of Albemarle-Tuckertown WTP
By Chris Maidene, Treatment Plant Supervisor and John Rutledge, Smart Cover Systems
(NC AWWA-WEA Plant Operations & Maintenance Committee)

General
Located in central NC, the City of Albemarle is the largest city in Stanly County, with a current population of approximately 16,000. The city was incorporated in 1857 and is the county seat. In addition to several manufacturing facilities, Albemarle is only minutes from Morrow Mtn. State Park, which is part of the Uwharrie Mountains.

The City of Albemarle currently operates two Water Treatment Plants. The Tuckertown WTP is located on Highway 49 near the Tuckertown Reservoir bridge and Stanly County line. The second plant is the Highway 52 WTP located on Highway 52 North. The source water for the Highway 52 WTP is the Narrows Reservoir. The drinking water from both of these two plants is blended in the distribution system then sent to the City of Albemarle and Stanly County Utilities.

Planning began in 1983 for the Tuckertown WTP and after construction the plant was put into operation in 1991. The WTP currently employs a total of eight plant personnel with an annual operating budget of approximately $4 million.

The plant treats raw water that is pumped from the Tuckertown Reservoir, which is part of the Yadkin/Pee Dee River Basin. The reservoir is located between Badin Lake & High Rock Lake.

The WTP has a design flow of 6.8 mgd and operates with an average daily flow of 3.2 mgd and a maximum daily flow of 5.5 mgd. The plant was originally designed such that it could be expanded to 30 mgd, but due to the loss of some local industry additional water capacity is not needed at this time.

Process Flow Description
Raw Water Intake and Pump Station
The Raw Water Intake and Pump Station were originally built in 1985 to supply water to the Highway 52 WTP. After the Tuckertown WTP was completed in 1991, the water was sent to the plant and the remainder of the Highway 52 line was converted to a finished water service main. The intake structure includes one intake screen and two vertical turbine pumps rated for 3,500 gpm at 200'. The intake screen includes a backwash and air scour system. The pumps were installed as part of the original 1985 installation. A third pump was added when the new WTP came on line.

Raw Water Reservoir
The Raw Water Reservoir was built to provide water supply to the plant during periods of high turbidity or contamination in the Tuckertown Reservoir. It is an earth construction type with a HDPE liner. The maximum capacity is 42 million gallons at its highest elevation. It includes three floating aerators that are located between the outlets.
**Flash Mix Tank and Flocculation**
Prior to the Flash Mix Tank, alum is fed into the raw water line. It is mixed in the 16,500-gallon tank using one 5-HP vertical turbine mixer. A raw water sample is sent from here to a raw water turbidimeter and streaming current detector (SCD). The SCD is used to manually adjust the alum feed. Raw water entering the plant flows through a 20-inch Venturi flow meter with an integral butterfly control valve.

Once flow leaves the flash mix tank, it enters a dual train flocculation basin. The basin consists of six cells with each cell having a capacity of 31,500 gallons. The flocculators consist of six vertical turbine slow speed mixers – one each cell, three per train.

**Sedimentation Basins and Filters**
The Sedimentation Basins consist of four 439,250-gallon conventional style rectangular basins. The flow from the Flocculator Basins enters through a central channel. Each flocculation train can be isolated to flow into any of the sedimentation basins. Sludge removal is accomplished using a vacuum sludge removal system with its primary control panel located next to the main control panel in the operations building.

The Filter Basins include four conventional dual cell filters that are made up of anthracite, sand, gravel and gullet. The flow from the sedimentation basins enters through a central channel allowing flow to be isolated into any of the filters. Each filter has an area of 364 SF and a flow rate of 3.05 gpm/SF and is equipped with rotary surface sweeps and washwater troughs. The pipe gallery instrumentation includes filter effluent turbidimeters and flow meters. Three dual filter consoles are located directly above the pipe gallery on the main floor of the operations building. From each console, manual backwash control can be initiated.

**Clearwell and Finished Water Pumps**
The 280,000 gallon clearwell is constructed of cast-in-place concrete and includes baffle walls to provide the required cycle threshold value.

There are two 250-HP finished water pumps that are rated at 8.2 mgd. If required, the flow can be trimmed using discharge butterfly valves. Finished water is pumped to the stripping towers to remove VOCs and then pumped into the 4 MG ground storage tank. Finally, the finished water flows into the distribution system.

**Chemical Feed and Disinfection System**
The chemical feed system consists of fiberglass reinforced plastic (FRP) bulk storage tanks and metering pumps. Bulk storage includes two 10,000-gallon tanks each for alum and caustic, one 6,000-gallon tank each for fluoride and sodium bisulfate and drum storage for polymer and orthophosphate.

Disinfection is achieved by a conventional gas chlorination feed system. It consists of two manual chlorine gas
vacuum feeders (two standby) rated up to 500 PPD. In the summer the system feeds 2.3 ppm and in the winter it feeds 1.8 ppm. Chloramination was determined to not be an option due to a kidney dialysis center that receives water from the WTP.

**Stripping Tower and 4 MG Ground Storage Tank**
The Stripping Tower and Ground Storage Reservoir are located on a hill overlooking the plant. The finished water pumps send water from the clearwell to the stripping tower and a portion to the 1 MG backwash tank. The stripping towers consist of two force draft, packed tower aerators for removal of volatile organic compounds (VOC). The towers are 12 feet in diameter and 24 feet in height. They each utilize two 20-HP fans at 23,600 CFM. Post chlorine is fed into the tower outlet piping and then pumped to the 4-MG ground storage tank.

**Solids Treatment**
Sludge removed from the sedimentation basins are pumped to the sludge tank. The backwash water is collected into two decant basins. Supernate decanted off the decant basins is sent to the lagoon for holding, while sludge from the decant basins goes to the sludge pit. The sludge is removed by a sludge removal company contracted by the city then land-applied to a seven-acre field adjacent to the WTP.

**SCADA System**
The original WTP was equipped with a large freestanding control panel with chart recorders, meters, indicating lights and a graphic display panel. While the panel still exists in the control room, the primary control functions of the plant have been replaced with a supervisory control and data acquisition (SCADA) system. This system consists of computer monitors, human-machine interface (HMI) software and communication network that allows the operators to view the operations of the plant. The filter backwash system is automated using programmable logic controllers (PLC), but can be placed in manual if necessary.

**Laboratory**
The laboratory staff performs a variety of analyses at the in-house lab located in the operations facility. Process and finished water are analyzed for total coliform, E. coli bacteria, hardness, iron, and fluoride on a daily basis. A spectrophotometer is used for many of the analyses, most frequently for iron, fluoride, and chlorine. It is also used for nitrate and copper for the purpose of reservoir management, UV254 absorbance to quantify organic material in process water, and the estimating of total trihalomethanes (THMs) content. A Colilert test is used for bacterial analysis of water sampled at the plant as well as the 15 samples collected each month in the distribution system. All parameters that require testing only quarterly or less frequently are outsourced to an independent lab.

**Challenges**
One of the biggest challenges for the WTP has been THM and haloacetic acid (HAA) issues. In order to address this issue, it was determined that the chlorine feed rate required adjustment to minimize the THMs and HAAs while still providing the required amount of disinfection and residual to the finished water. In addition to this, prechlorine feed to the head of the plant was eliminated to further minimize THMs.

**Unique Process Features**
The most remarkable feature of the plant is that it utilizes force draft, packed stripping towers for the treatment of VOCs. Air stripping is accomplished in the packed tower when dissolved molecules are transferred from water into a flowing air stream. The water is pumped to the top of the tower and sprayed uniformly across the packing through a distributor. It flows downward by gravity in a film layer along the packing surfaces. Air is blown into the base of the tower and flows upward, contacting the water. The packing provides a very large surface area for mass transfer of VOCs from the water to the air and out the top of the column. After this process, the water is sent to the ground storage tank and then on to distribution.

**Wildlife**
The plant sits on 200 acres and has abundant wildlife living on acreage behind the facility. Wildlife such as deer, turkey, osprey, coyotes, barn swallows, and eagles nesting can often be seen. The Tuckertown Reservoir is home to countless fishermen who can be seen anytime day or night near the plant entrance or on the water. It is one of the many beautiful areas that North Carolina has to offer.

For additional information:
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Albemarle, NC 28002-0190
Phone: (704) 986-9656
cmaidene@albemarlenc.gov
www.albemarlenc.gov

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![Filter consoles](image2)
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96th Annual Conference
Raleigh Convention Center, Raleigh, NC

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You may choose to register online or download and print the registration form.

Mark your calendars and plan to join us for NC AWWA-WEA’s 96th Annual Conference November 13-16, 2016 in the Capital City of Raleigh, NC!

The 96th Annual Conference is expected to draw over 1,200 water and wastewater professionals along with over 163 exhibitors from across North Carolina to the Raleigh Convention Center. Attendees can look forward to three days full of educational and recreational activities, as well as time to enjoy the sights and sounds of downtown Raleigh.

VISITING NATIONAL OFFICERS
Jacqueline Torbert
American Water Works Association, Vice-President (2016-2017)

Jacqueline Torbert has been a member of AWWA since 1992. Currently she is the Utilities Water Division Manager at the Orange County Government in Orlando, Florida.

Jacqueline has served in numerous capacities within the Florida Section, including Section Chair, Vice-Chair, Treasurer, and General Policy Director and is the current chair of the Florida 2030 Committee. At the Association level, Jacqueline has served on the Ad Hoc Governance Review Committee, Diversity & Member Inclusion Committee and the Strategic Development Advisory Group for AWWA’s Philanthropic Initiative.

In addition to AWWA, Jacqueline is a member of the Association of Metropolitan Water Agencies, the American Public Works Association, and the Water Environment Federation.

In 2009 Jacqueline was honored with the Fuller Award. She received her Bachelor of Science degree in Biology and Chemistry from Stillman College. She lives in Oviedo, Florida with her husband Spencer.

Jackie Jarrell
Water Environment Federation, 2015-2016 Trustee

Jackie Jarrell, PE is a member of the 2015-2016 Board of Trustees for the Water Environment Federation (WEF), an international organization of water quality professionals headquartered in Alexandria, Virginia.

Jackie has been with Charlotte Water for more than 25 years. For the past 15 years, she has been responsible for the overall management of the operation and maintenance of five wastewater treatment facilities consisting of a total capacity of 123 million gallons per day (mgd) with the largest plant permitted at 64 mgd. She is also responsible for the related Residuals Program producing over 90,000 wet tons/year, and the Industrial Pretreatment Program with over 60 Significant Industrial Users.

Recently, her role was expanded to Operations Chief responsible for wastewater and water operations, which includes oversight of regulatory functions, process control, and continuous improvement programs within the operations areas.

As a WEF member, Jackie has held multiple leadership and committee roles within WEF including serving as the chair of the Utility Management Program Symposia and the first vice chair of the Utility Management Committee.

Also an active member of the North Carolina Water Environment Association (NCWEA), she helped develop NCWEA’s strategic plan in 2013 and continues and is the current chair of the Nominating Committee. She has also chaired the Public Education Committee, the Annual Conference Committee, and the Program Committee. In 2013, Jackie served as the Member Association chair and worked on related subcommittees such as Water For People (including a trip to Bolivia in 2011), the Wastewater Schools Committee, the Endowment Committee, and the Plant Operations Committee.

She has also been actively involved with the NC Water Quality Association, a regulatory advocacy organization of utilities in North Carolina as a past chair, and she is a current board member.

Jackie is a registered professional engineer in the state of North Carolina and holds a Biological Wastewater Grade II OIT. She received a BS in Engineering from the University of North Carolina-Charlotte. Jackie was the recipient of the Arthur Sidney Bedell Award in 2014.

CRISIS IN FLINT, MICHIGAN
– Background and Lessons Learned

A pre-conference Sunday special session will introduce the hot topic of the crisis in Flint, Michigan by providing background information on issues related to the crisis.

www.ncsafewater.org | 39
Company Overviews:

- A.C. Schultes of Carolina (ACSC) is a licensed, insured and bonded General Contractor as well as full-service Utility and Well Contractor in both North Carolina and South Carolina. ACSC provides a full range of water and wastewater construction services to government utilities, private utilities, engineering firms, industrial facilities, commercial farms, golf courses and more. A proven leader in assisting environmental customers with complex water and wastewater demands, we are experts at turn-key water and wastewater construction and also offer emergency services.
- A.C. Schultes of Carolina is the exclusive dealer, field service provider and repair facility for Singer Valve in the Carolinas.
- Since 1957, Singer Valve has been designing and manufacturing automatic control valves for the global water industry including Pressure Reducing, Pressure Relief/Sustaining, Altitude and Pump Control Valves.

Project Highlight:

Customer: Craven County Water Department (New Bern, NC)
Project: Potable Water Supply System
Details: ACSC was subcontracted by Shook Construction (Apex, NC) to construct eight (8) new water supply wells and their corresponding pump houses. Pump station construction included the installation of all pumps, motors, piping and 24 Singer Valves – three (3) at each site. ACSC provided all of the labor, equipment and materials to install the valves listed below:

- 106-DW Deep Well Pump Control Valve is the main valve in the three (3) valve application. This valve is normally open, and, on pump start-up, a pilot solenoid is energized to start closing the valve at a rate governed by the closing speed control.
  - Initially, the valve discharges air, water and sand to waste. The open valve discharges all pump flow.
  - As the valve closes slowly, flow is transferred to the main line smoothly, increasing the pipeline flow without surges.
  - When the valve is fully closed, all pump flow is in the pipeline, with no control valve losses.
  - When shut-down is required, the pilot solenoid on the valve is de-energized to commence opening.
  - The pump is kept running while the valve slowly opens. Increasing proportion of the flow is diverted to waste with less passing through the check valve, until all flow is diverted through the nearly fully open DW valve.
  - The pipeline check valve closes quietly without surges.
  - When the DW valve is almost fully open, a stem mounted cam triggers the limit switch to stop the pump.
  - The valve prevents pump starting and stopping surges. There is no energy loss while pump is running.
  - The valve separates opening and closing speed controls, discharges initial air/water silt to waste, on well applications and discharges stagnant water at start-up from dormant wells.
- The additional valves in this application are the 106-HC Hydraulic Check Valve that allows one way flow only and the 106-RPS-L&H Surge Anticipating Relief Valve that is designed to anticipate surges to avoid severe water hammer often associated with power failure surges.

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The Opening Session keynote speaker will be Michigan Congressman Dan Kildee from Michigan. He will address the Flint Water Crisis and how local, state, and federal agencies can meet the needs of the aging infrastructures of cities around the nation, particularly in aging legacy cities like Flint. Congressman Dan Kildee is a lifelong Michigan resident, who in just his second term in Congress, has become a powerful force for Michigan.

Congressman Kildee currently serves on the Financial Services Committee, in addition to being a Regional Whip. In his first six months in office, he secured $100 million in federal funds to help remove blighted and abandoned homes throughout Michigan, including in Flint and Saginaw. In the US Congress, he has fought to protect after-school programs and create summer jobs projects for youth to help reduce violence and provide opportunity.

The Wednesday forum, will build on the special session and the opening keynote presentation with a panel discussion on lessons learned from the crisis in Flint, Michigan and the likelihood of a similar situation occurring in North Carolina. Presenters are expected to include one or more persons specifically familiar with the Flint crisis, representatives of the NC Public Water Supply Section (PWSS), consultants in the field, local universities, and NC water systems. Significant time for panel and audience discussion will be included.

TECHNICAL SESSIONS
Informative technical sessions will be running throughout the event with technical papers presented in five concurrent tracks divided by topic into water, wastewater, collection & distribution, special topics, and policy & management. Monday afternoon will include a special Young Professionals session, with presentations intended to introduce industry topics to newcomers, and guide career development. On Tuesday afternoon, a new Water Resources session will feature a diverse group of speakers on climate statistics, climate change research, and case studies of utilities addressing the need for resilience in the face of uncertain water supply and sea level impacts.

FACILITY TOUR
E.M. Johnson Water Treatment Plant
Built in 1967, the E.M. Johnson Water Treatment Plant is the oldest and largest of the City’s treatment plants in operation. With source water from Falls Lake, it has a maximum capacity of 86 mgd. Equipped with a sophisticated laboratory used to perform extensive water quality analysis, the staff chemists, microbiologists, and technicians at the plant collect, test, and analyze Raleigh’s drinking water between 6,000 and 7,000 times a month. They look for many substances such as trace metals, petroleum products, pesticides, and bacteria.

The E.M. Johnson Water Treatment Plant is also home to one of North Carolina’s largest rooftop solar photovoltaic (PV) arrays. This solar PV array is the first in the southeast to use First Solar’s Thin Film PV technology, which allows the panels to generate electricity for longer periods during the day. In 2013, 2014, and 2015 the plant received the AWWA Phase 3 Partnership for Safe Water Director’s Award, as well as the Area Wide Optimization (AWOP) Award. The plant also received Best Tasting Water honors from NC AWWA-WEA in 2013, and tied for first place in 2015.

STUDENT ACTIVITIES
Several activities are planned for Monday to get students involved in the Annual Conference and to introduce them to NC AWWA-WEA. To make attendance on a student budget possible, free Monday only registration is available for students. For more information on Annual Conference student activities, and to register, please contact Allison Reinert at (919) 863-9269 or areinert@hazenandsawyer.com.

Student Poster Contest – Students involved in research related to environmental/water resources topics are encouraged to present their work in the Student Poster Contest. Monetary prizes will be awarded for first, second, and third place posters. The first place winner will also be awarded the opportunity to present their poster at the National AWWA ACE conference in 2017!

Student & Young Professional Lounge and Social – Visit us in our reserved lounge to relax, put your backpacks down, and talk to your peers. At the end of the day on Monday, join us for the Students & Young Professionals social in downtown Raleigh.

Student Lunch – Make connections with other students and industry professionals during a reserved lunch on Monday, November 14, 2016 from 12:05 pm to 1:45 pm. This is a great time to discuss the conference, career paths, and NC AWWA-WEA membership.

Young Professional Technical Session – This technical session track on Monday afternoon provides students and young professionals with an overview of a broad range of topics within the water and wastewater industry, and gives students and young professionals the opportunity to present in a comfortable atmosphere.

Below are the presentations scheduled for this year’s Young Professional session.

- Seven Tips for Building a Successful Career – Tyler Highfill, Highfill Infrastructure Engineering
- Transferring O&M Information to a Web-Based Format – John Cannon, GHD
- Coming and Going – An Overview of Infrastructure Common to Water Distribution and Wastewater Collection Systems – Eric Smith, CDM Smith
- How to Tell a Great Story – Karen Ray, City of Raleigh
- Let’s Go to the Beach: Evaluation and Modeling of a Coastal Community’s Storm Drain System and Outfalls to
PIPE TAPPING CONTEST
The Pipe Tapping Contest is a competition of skill in which teams compete for the best time in opening a cement-lined, ductile iron pipe and installing a tap. Pipe tapping teams consist of a maximum of four persons, including three workers and one coach. The competition is open to both men’s teams and women’s teams. Winners from the 2016 NC Pipe Tapping Contest will be eligible to compete in the 2017 National AWWA contest at ACE.

OPERATIONS CHALLENGE
In the Operations Challenge events, four-person teams, along with their coach, compete in events that challenge their skills in various wastewater-related activities. The winner is determined by a weighted point system. At the national WEFTEC competition, there are five events in the Operations Challenge: collection system event, laboratory event, process control event, pump maintenance event, and the safety event. The 2016 North Carolina Operations Challenge Competition will include all five of these events.

BEST TASTING WATER CONTEST
All utilities are invited to submit a sample and see how the taste of their drinking water measures up to the taste of others in the state. A panel of volunteer judges will rank individual samples and results will be combined to establish the overall ranking. Awards will be given for first, second, and third place. In order to participate, samples must be turned in at the conference registration desk by 5:00 pm on Sunday, November 13.

SILENT AUCTIONS
TWO silent auctions will take place during the Annual Conference: one benefitting the NC SAFEWATER ENDOWMENT and the other benefitting NC WATER FOR PEOPLE. Both silent auctions will be located close to each other and will have similar hours. When placing a bid, please take notice of the specific auction and that auction’s timeline and contacts.

The NC Safewater Endowment Fund Committee Silent Auction raises money for the endowment fund. In previous years, this fun and popular event has added significant contributions to the Endowment Fund. Additions to the fund increase the number of scholarships to be given in the future, and the dollar amount of the scholarships.

Available auction items and their bid sheets will be on display Sunday through Tuesday near the committee tables or the conference registration desk. Items will also be displayed at the Chair’s Dessert Reception on Monday evening. Bidding will remain open until 1:20 pm on Tuesday, with the highest bid winning. Winners may pay for and pick up their item at the Gavel Gala on Tuesday from 5:30 pm - 7:00 pm.

Your Call to Action! The Endowment Committee is currently asking individuals and organizations to donate items for the Silent Auction fundraiser. Past Silent Auctions have successfully offered jewelry, sterling silver, figurines, and other collectibles. Members have also donated top quality artwork, woodwork, pottery, and art glass, as well as services, vacation spots, and dining experiences. Cash donations are also acceptable, and a representative from the Endowment Committee will shop for you and will provide a receipt for your tax-deductible donation.

To donate items for the Silent Auction, contact Linnell Stanhope, Crowder Construction Company at (919) 367-2008. Your interest and participation in this event are greatly appreciated. More information will follow online at www.ncsafewater.org and in NC AWWA-WEA eNews emails.

The Water For People Committee Silent Auction raises funds for Water For People projects. Visit the Water For People table all day on Monday, and until 1:20 pm on Tuesday to bid on items. Winners will be called to pick up their items after 1:20 pm on Tuesday. All proceeds from this auction will go to Water For People.

Hanging Rights to a Piece of History – Would you like to display an incredible piece of history in your office? During the Water For People silent auction, we are offering hanging rights to a unique 400-year old framed print that shows a hand pump and well system designed by the renowned 17th century scientist Athanasius Kircher. Kircher was a contemporary of Descartes and Galileo and helped Bernini with his famous fountain in the Piazza Navona in Rome. The item itself was printed first on a Gutenberg type press, and then, to place the graphic, a wood block engraving was used for the illustration. It has been dealer verified as being printed circa 1676 and was donated by John Carman.

This one-of-a-kind historical artifact is being offered on a lending basis. The winning bidder will own the rights to display the piece for one year and then pass it on to the winning bidder the following year.

GOLF TOURNAMENT
The golf tournament will be held Sunday morning at the Lochmere Golf Club in Cary, NC. Cost to participate in the golf tournament is $85 per person and includes entry fee, range balls, tee prize, breakfast, lunch, prize for 1st place, long drive and closest to the hole prizes. Other prizes will be given by random drawing. Sign up as a team or sign up as an individual and you will be placed on a team.

AWARD PRESENTATIONS
The conference continues in the tradition of recognizing industry professionals and organizations for their achievements. The presentation of specific awards will be distributed across several conference events, Sunday Welcome Reception, Monday Awards Ceremony, and Tuesday Gavel Gala & Awards Banquet. Please plan to join us to congratulate your fellow professionals.
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Several conference events offer an opportunity to show your support of NC AWWA-WEA while promoting your organization. Each event offers unique benefits and exposure to different groups within our conference attendees, and you are encouraged to select the sponsorship combination that best fulfills your needs. All of these sponsors will be recognized with a sign at the event, and acknowledged during the event opening and/or closing. Sponsors listed below are current as of August 16, 2016. There may still be time to add your company’s name to this list. Contact the NC AWWA-WEA office for details.

### 2016 Conference Sponsorship

**CORPORATE SPONSORS**

**GOLF TOURNAMENT ($300)**
- Tournament takes place off-site.
- Approximately 70 players are anticipated.

**STUDENT LUNCH ($250)**
- Student attendees and members of the Students & Young Professionals Committee will gather during lunch on Monday. Approximately 40 students are expected to participate.

**OPERATIONS CHALLENGE ($600)**
- This popular event takes place over Monday and Tuesday. Attendees will visit the various events between sessions to watch six to eight teams from across North Carolina compete.

**PIPE TABBING CONTEST ($300)**
- One of our most popular events, attendees will gather in the Exhibit Hall between sessions Monday afternoon to watch four to six teams from across North Carolina compete.

**GAVEL GALA & AWARDS BANQUET**
- (six available for $1,000 each)

**MONDAY CHAIR’S DESSERT RECEPTION**
- (four available for $500 each)

**SUNDAY WELCOME RECEPTION**
- (four available for $500 each)

**PIPE TABBING CONTEST ($300)**
- The Pipe Tapping Contest is also accepting equipment donations. Refer to www.ncsafewater.org for a list of needs.

**GAVEL GALA & AWARDS BANQUET**
- (six available for $1,000 each)

**MONDAY CHAIR’S DESSERT RECEPTION**
- (four available for $500 each)

**SUNDAY WELCOME RECEPTION**
- (four available for $500 each)

**STUDENT LUNCH ($250)**
- The Operations Challenge is also accepting equipment donations. Refer to www.ncsafewater.org for a list of needs.
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**Headworks BIO-IFAS & MBBR**

**Chemical Metering**
- Electronic Mechanical

**Dry Chemical Storage and Handling**
- Bulk Chemical Storage and Handling
- Polymer Systems

**Positive Displacement**
- Sludge Pumps

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- Screw Pumps and Bar Screens
- Grit and Grease Removal
- Tertiary Wastewater Filters

**SmartCover® Self-Contained Turn-Key Man Hole Monitoring Systems**

**Chopper Pumps**
- Rotamix® Digester Mixing Equipment
2016 Conference Schedule

**SUNDAY, NOVEMBER 13, 2016**
- 8:00 am - 3:30 pm: Exhibit Set-up
- 8:30 am: Golf Tournament
- 2:00 pm - 6:00 pm: Committee Display Tables
- 2:00 pm - 3:00 pm: Nominating Committee Meeting
- 3:00 pm - 6:30 pm: Board of Trustees Meeting
- 2:00 pm - 6:00 pm: Conference Registration Desk Open
- 3:00 pm - 4:30 pm: Special Session: Flint, Michigan Crisis – Background
- 4:00 pm - 7:00 pm: Exhibit Hall Open
- 5:00 pm - 7:00 pm: Welcome Reception (First door prize drawing)
- 5:30 pm - 6:00 pm: Moderator’s Meeting
- 6:45 pm - 7:00 pm: Presentation of 5-S Awards

**MONDAY, NOVEMBER 14, 2016**
- 6:30 am - 5:30 pm: Conference Registration Desk Open
- 7:00 am - 7:30 am: Moderator’s Meeting
- 7:00 am - 7:00 pm: Committee Display Tables
- 7:45 am - 9:00 am: Opening Session: The Water Crisis in Flint, Michigan, Speaker: Michigan Congressman Dan Kildee
- 8:00 am - 5:00 pm: Student Poster Contest (Students should be present for poster judging from 1:45 pm - 2:45 pm)
- 9:00 am - 7:00 pm: Exhibit Hall Open
- 9:15 am - 5:10 pm: Technical Sessions (Detailed schedule on page 48)
- 9:15 am - 4:00 pm: Operations Challenge: Collection System, Pump Maintenance, Laboratory, and Safety Events
- 11:30 am - 2:10 pm: Association Buffet Lunch (Sixth door prize drawing)
- 1:20 pm - 5:10 pm: Facility Tour, E.M. Johnson Water Treatment Plant
- 11:30 am - 1:20 pm: Association Buffet Lunch (Fifth door prize drawing)
- 2:15 pm - 2:45 pm: Afternoon Networking Break
- 5:30 pm - 7:00 pm: Gavel Gala
- 7:00 pm - 10:00 pm: Awards Banquet

**TUESDAY, NOVEMBER 15, 2016**
- 7:00 am - 8:00 am: 5S Breakfast (5S Members Only)
- 7:30 am - 1:00 pm: Committee Display Tables
- 7:30 am - 5:30 pm: Conference Registration Desk Open (At 1:00 pm, the registration desk will move to the North Lobby)
- 7:30 am - 1:20 pm: Exhibit Hall Open
- 8:00 am - 5:00 pm: Technical Sessions (Detailed schedule on page 49)
- 9:00 am - 3:00 pm: Operations Challenge: Process Control Event
- 9:40 am - 10:15 am: Morning Networking Break (Fifth door prize drawing)
- 11:30 am: Best Tasting Water Contest
- 11:00 am - 2:15 pm: Facility Tour, E.M. Johnson Water Treatment Plant
- 11:30 am - 1:20 pm: Association Buffet Lunch (Sixth door prize drawing)
- 2:15 pm - 2:45 pm: Afternoon Networking Break
- 5:30 pm - 7:00 pm: Gavel Gala
- 7:00 pm - 10:00 pm: Awards Banquet

**WEDNESDAY, NOVEMBER 16, 2016**
- 8:00 am - 11:30 am: Conference Registration Desk Open
- 9:00 am - 10:00 am: Annual Conference Local Arrangements Committee Wrap-up Meeting
- 9:00 am - 11:00 am: Closing Forum: Flint, Michigan Crisis – Lessons Learned
- 11:30 am - 2:30 pm: Board of Trustees Meeting

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As part of Durham’s focus on proactive infrastructure improvement, it has given much consideration to water supply, which has a long history of successful operation. The City’s Department of Water Management (DWM) operates two water supply reservoirs, Lake Michie and Little River Reservoir. The Lake Michie Dam was constructed in 1927 and provides drinking water as well as fire protection to the citizens of Durham. The dam consists of a 97-foot high concrete gravity section with a 300-foot wide overflow spillway in the center that discharges into the Flat River. On the left side of the concrete section, an earthen embankment extends from the concrete section and ties out to high ground. The reservoir provides about 3.6 billion gallons of raw water storage at its normal pool spillway crest.

When the dam was built, a pumping station was constructed at the base of the dam and includes two electric pumps and two unique hydro-turbine driven pumps. When there is plenty of water such that there is discharge over the spillway, the excess water is conveyed via hydro-turbine to conserve electricity. Conversely, during times when the reservoir is below the spillway crest, the electric pumps are used to conserve water. The water from Lake Michie is pumped to the Brown Water Treatment Plant (WTP) and the Williams WTP for treatment and distribution.

Construction of Little River Dam was completed in 1987 to supplement the raw water supply from Lake Michie. This facility provides an additional 4.9 billion gallons of storage and increases the City’s overall reservoir safe yield to 37 million gallons per day (mgd). The 95-foot high-zoned earthen embankment dam includes a concrete gravity-gated spillway section with nine bays, concrete chute and stilling basin discharging into Little River. The facility includes a pumping station with two electric pumps to convey raw water approximately two miles to the Brown WTP and subsequently an additional six miles to the Williams WTP. Similar to Lake Michie, a hydro-turbine pump is also located at Little River, although the unit is not typically operated due to the ability to gravity flow directly from the reservoir to the Brown WTP when lake levels are high enough.

As part of its long-term water supply planning strategy, the City of Durham, in collaboration with other regional utilities making up the Jordan Lake Partnership, has initiated planning to construct a future water supply intake, treatment and transmission facilities near the western side of Jordan Lake. In combination with the current facilities at Lake Michie and Little River, this new intake would provide

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1. Thomas Fitzgerald, Schnabel Engineering; Charles Johnson, Schnabel Engineering; Simon Watson, Brown and Caldwell; Jeff Adkins, Town of Cary; and Lori Montgomery, City of Durham.

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adequate water supply for the projected demand for the next 50-years. The City of Durham currently has an approved Jordan Lake allocation of 10 mgd, and has requested approval from the North Carolina Department of Environmental Quality (NC DEQ) for an additional 6.5 mgd allocation. This plan requires that the current facilities continue to operate safely and reliably over the 50-year planning horizon.

Realizing the criticality of the Lake Michie and Little River facilities to their long-term water supply needs, Durham retained the services of Schnabel Engineering and Brown and Caldwell in 2015 to develop a 50-Year Rehabilitation Plan and preventive maintenance program for the dams and raw water pumping stations and to incorporate the facilities into their overall asset management program. Work began by creating an inventory of the various dam/raw water pumping station assets and rating each based on its observed condition and performance. This qualitative approach assigned a score for each asset representing the probability of failure. In conjunction with City staff, evaluation criteria were established to evaluate the consequence of failure for various assets. The consequence score considered numerous factors including the importance of the asset to meeting level of service requirements, public and worker health and safety, duration and severity of potential outage, degree of asset redundancy, ease of maintenance and repairs, regulatory implications, and financial impacts. Risk scores were generated for each asset by multiplying the probability of failure score by the consequence score.

A separate evaluation was performed to determine if the dam facilities met current NC DEQ Dam Safety regulatory criteria. This evaluation included a review of spillway hydraulic capacity and stability analyses for the earth and concrete sections of both dams. A potential failure mode analysis (PFMA) and risk assessment was performed for both dams to identify and evaluate dam safety vulnerabilities outside of the regulatory framework and to evaluate the current surveillance and monitoring program.

Each asset was evaluated to consider if it needed periodic re-inspection and preventive maintenance, minor repairs, a larger capital improvement project, or complete replacement. Further assessment was performed to determine if the needed work should be performed by City of Durham staff or if it would be more feasible to outsource (subcontract) the project. Some assets were left as individual projects, while other assets were grouped together by trade for efficiency. Cost estimates were prepared for each recommended project. Prioritization of the most critical assets was performed during a collaborative workshop with management and maintenance staff based on the risk scores developed and the evaluations performed. The highest risk projects were given priority and included in the 10-year capital improvement plan (CIP). In addition, a funding budget was prepared for the 50-year planning horizon to include anticipated long-range rehabilitation needs.

The Lake Michie Rehabilitation Plan identified 50 projects to address asset deficiencies in the 10-year CIP and 85 recurring rehabilitation activities. Given the age of this facility, it was not surprising that a large amount of needed work was identified. Major recommendations at Lake Michie Dam include structural improvements to meet design-storm and spillway capacity needs, subsurface investigations of embankment and foundation condition, evaluating options to ensure concrete dam stability, spillway apron repairs, and sluice gate rehabilitation. Reliability and wear-related issues at the 88-year old Lake Michie pumping station require near-term attention, including a new standby generator to run the electrical pumps, upgrading pump capacity for future water demands, replacing deteriorated electrical equipment, replacing hydraulic valve actuators with electric, roof replacements, and installing humidity control.

The Little River Rehabilitation Plan identified 45 CIP projects and over 100 recurring rehabilitation activities. The highest priority issues at Little River Dam include replacing spillway gate operators and repairing a damaged surface water drainage collection channel. Planned projects at Little River Pumping Station include: a new standby generator, proper abandonment of the inactive hydro-turbine driven pump, thermal destratification system replacement, new building roofs, and improvements to electrical panels and wiring. The Rehabilitation Plan projects total approximately $50 million for both dams over a 50-year planning horizon. The City is incorporating Rehabilitation Plan projects into its CIP, and has already begun work to address the highest priority issues. The projected long-term CIP costs are shown in Figure 1.

In addition to the identified rehabilitation projects, Schnabel and Brown and Caldwell developed 11 equipment life-cycle maintenance
plans and 24 standard preventive maintenance procedures for the most critical dam and pumping station assets. Realizing the criticality of implementation of these procedures, hands-on training sessions were performed in the field to review the preventive maintenance procedures and solicit feedback from staff performing the work. The preventive maintenance plans and procedures have been incorporated into the City’s asset management software.

The City of Durham has taken a proactive approach to increasing the reliability and efficiency of the facilities and providing a path forward to achieve at least 50 more years of service. The information developed during the project will allow the City to determine if it has enough resources to complete the routine maintenance activities after the initial repairs are completed. To overcome the inrush of repairs needed to bring equipment back to normal operating condition, the City will be able to use the prioritized list of project and estimates to contract out the work and expedite repairs. By looking at the life cycle of the assets, the City now has the ability to ensure that the appropriate funding will be available to complete routine and rehabilitation/replacement maintenance activities, which will result in increased reliability with lower costs.

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2 Brown and Caldwell, 5430 Wade Park Boulevard, Suite 200, Raleigh, NC 27607
3 Previously with Brown and Caldwell, Raleigh, NC. Now Water Resources Manager for Town of Cary, NC
4 City of Durham Department of Water Management, 1600 Mist Lake Road, Durham, NC 27701
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Manage Scrap Metal for a Safer, More Sustainable Workplace

By Vic Simpson, Charlotte Water

In our business as utility owners, scrap metal goes with the territory, and it can pile up fast. Those dug-up sections of service lines and mains, leftover new pipe cuts, fittings, old manholes, valve and large meter vault lids, hydrants, worn meter bodies, discarded shipping materials, used-up tools, or truck and equipment parts are all just trash, right? Think again because metal is a commodity. Copper, brass, lead, aluminum, steel, ductile and even good old cast iron all have some degree of value in the metal marketplace. For thieves, it is easy money. For employers, it can pose a potential safety risk, and/or a missed revenue opportunity.

Storing loose, accumulated scrap metal scattered around the workplace – even inside reasonably secure facilities – is a recipe for danger or loss. One-third of 58 criminal incidents documented at Charlotte Water during the past 18 months involved scrap metal theft, attempted theft, or recovery.

It would be easy to shrug off this common and relatively small-time theft, but consider this: Many of those incidents occurred inside the fence line of Charlotte Water crew yards and plants. And in some cases, employees were working elsewhere on-site while emboldened thieves cut or climbed the fence line to prowl about, strip wire or pick up any materials that were not locked up. While these burglars are not usually violent and typically vanish undetected, it is not unusual that they steal to feed a drug habit. In addition, it is chilling to consider the threat to an employee who inadvertently encounters panicked thieves and blocks their means of escape.

Charlotte Water personnel have taken the issue seriously and made
improvements, with more on the way. Beyond the basic physical security practices (e.g., cleared fence lines, well-lit facilities, security cameras/access control/alarms), summarized below are a few simple operational changes and activities your company can consider in order to better manage leftover metal in a way that enhances site safety. In fact, you might even earn some additional incoming cash flow for the organization!

**Audit and secure all scrap materials on site.** It all starts with teamwork and communication, so talk with your coworkers about the purpose of the effort. Remember that your coworkers are proud professionals who rightfully expect a safe working environment and will not tolerate theft in their place of business. In addition, they have a stake in the solution; therefore, they should listen to learn, and also seek input, ideas and volunteers. Consider how much, where and how scrap metal is collected, stored and removed during the course of daily operations.

Here are some important questions to ask: 1. How are your new construction materials and equipment parts secured? 2. Do you deposit scrap metal in covered/locked containers, or open dumpster bins? 3. Are collection containers stored in a well-lit, monitored or high-traffic part of your site(s), or are they parked in a dark corner of the property that is out of surveillance camera range or easily accessed from outside your fence perimeter? 4. Have personnel been assigned to know the quantity and types of metal coming and going at your site(s)? Once you have begun the inventory process and hammer out some simple procedures, it is a matter of training staff on where and how to properly dispose of incoming scrap.

**Consider a metal recycling services contract.** Metal recycling is a competitive industry and many businesses would love to contract exclusively for regular pickup of assorted metals from a high-volume source. Here are some things to consider when finalizing a contract: 1. Negotiate terms such as no-charge vendor pickup and a fair split percentage of shared proceeds from recycled metal processing and sales. 2. Renegotiate new contracts every couple of years. 3. Keep an eye on inventory and do not let it over-accumulate.

Remember that market prices for different metals fluctuate, so do not necessarily expect a big return on recycling metals. Also keep in mind that any proceeds are better than none (it adds up!), and the disposal service itself adds value to your operations in the form of a cleaner and safer worksite.

**Partner with local law enforcement.** Solid day-to-day relationships with local public safety and emergency officials already are cornerstones to effective safety, security and/or preparedness programs. Ask any police officer about scrap metal crimes, and they will tell you it is a prevalent problem for businesses and residents alike. Metals are routinely snatched from building air conditioning units and automobiles (catalytic converters). Abandoned homes or new houses under construction are a popular source of electrical wiring, gutters and even appliances. Invite officers to your facilities; many departments offer free site security evaluations. Share information, including observations and incident details from your end.

Thanks to Charlotte Water’s partnerships with dedicated Charlotte-Mecklenburg Police, observant citizens, helpful employees, and cooperative recycling vendors, the police have identified and arrested several scrap...
metal thieves that victimized Charlotte Water facilities between January 2015 and July 2016.

Remember: Proper scrap metal management offers your utility a win-win-win... You are:
- removing bait/temptation for criminals, thus lowering the likelihood of vandalism, theft/loss or potential workplace violence.
- working with community partners to beneficially reuse a commodity. If your company has a philosophy of sustainable business practices, this is walking the talk.
- most likely earning a little revenue in the process.
Also remember that only the criminals lose!

About the Author
Vic Simpson is Security & Emergency Preparedness Manager for Charlotte Water.

Remember: Proper scrap metal management offers your utility a win-win-win...

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While most of us remember that Dorothy and her friends in the Land of Oz were primarily concerned with the threat of lions and tigers and bears (oh my!), water and sewer utilities and the jurisdictions they serve have much larger threats and consequences to worry about. Though there are no regulatory requirements to develop Emergency Response Plans (ERPs), utilities have a responsibility to identify all hazards, threats, and vulnerabilities and plan for that which has the potential to disrupt water and sewer service delivery or public health.

Planning for unexpected events, natural disasters, accidents, intentional acts, and related consequences seems like a daunting task, and make no mistake, it does take time. It requires a thorough, thoughtful examination of all aspects of a water and sewer utility operation and a sincere commitment of time and proper attitude by all involved, up to the highest level of administration. This article outlines the project methodology, including lessons learned, from the Greensboro Water Resources Department’s (WRD) initiative to improve, consolidate, and integrate disaster and emergency management plans for the purpose of ensuring the operational reliability and resiliency of the utility.

Overview of the Greensboro Water and Reclamation Systems

The Greensboro WRD provides water, wastewater, and stormwater services to a population of approximately 280,000. The department’s water supply division comprises two water treatment plants with a combined treatment capacity of 54 mgd. Water supply is drawn from three raw water lakes using two raw water pump stations and an open-air raw water reservoir. Greensboro maintains three finished water interconnections, purchasing additional supply from neighboring systems. The 1,494-mile distribution system is composed of 20 booster pump stations, three finished water reservoirs, and 11 elevated storage tanks. The water reclamation division operates two plants with a combined treatment capacity of 56 mgd. The 1,419-mile collection system has 49 wastewater lift stations. Also, stormwater program compliance is administered through the stormwater division, making Greensboro’s WRD a one-water utility of seven divisions and 355 employees.

Historical Perspective – Other Plans in Place

The WRD conducted its first Vulnerability Assessment (VA) as required by the Bioterrorism Act of 2002 over 13 years ago for its water supply, treatment and distribution system. The focus was on the drinking water side and not the whole of utility service. Subsequently, the Water Supply Division Emergency Operations Manual (EOM) was developed, which included a Security Response Plan (SRP), operating procedures, and administrative controls. Other plans followed, including High Hazard Dam Emergency Action Plans, Pandemic Plans, and Continuity of Operations Planning (COOP) by departmental division.

Project Focus

The Greensboro WRD enlisted the help of Jack Moyer, URS Corporation, from 2014 to 2015 to conduct a VA and facilitate the development of an ERP for the entire department. The project centered on two primary objectives. Updating the existing VA using the latest criteria (as shown in Figure 1) was first, with emphasis on the wastewater facilities that were not included in the original VA. Second, focus was placed on updating and consolidating existing ERPs for the Water Supply and Water Reclamation Divisions into a department-wide ERP. The process included an assessment of strengths and weaknesses of existing ERPs, and related management policies and procedures across all the utility’s service areas. Other supporting objectives included:

- Using an all-hazards perspective, identifying threats that could cause injury, property damage, business disruption or environmental impact
- Focusing on resiliency of operations
- Incorporating and involving all other divisions and appropriate staff in the department
- Maximizing safety for all WRD employees
- Addressing insider threats
- Considering both hard security measures and soft, such as administrative controls
- Using the principles of the J-100 Risk Assessment Methodology for Critical Asset Protection (RAMCAP) standard requirements and steps for all-hazards risk and resilience analysis and management for the water sector, as shown in Figure 2
- Building into the WRD the use of the National Incident Management System (NIMS) and the Incident Command System (ICS) with required staff training

Project Methodology

In order to revise, expand, and implement WRD preparedness plans, completion of the utility-wide VA was critical. Taking inventory of historical events and future-casting probable incidents that may lead to serious operational and service interruptions was crucial.
Identifying critical assets and credible threats was also central to the effort, as shown in Figure 2. Credible threats to water/wastewater utilities fall into one of three category groups: natural disasters, human-caused, and workforce/infrastructure asset failure. Other elements required for the project methodology to move forward included:

- Conducting detailed site assessment visits to major and remote facilities, followed by a workshop to review initial site assessment findings
- Assessing existing and potential mitigation measures
- As part of the new ERP, developing 16 hazard-specific plans, and fast-action binders for each major hazard, plus developing work station posters
- Providing training for all employees and a tabletop exercise for middle and upper management

Overarching Lessons
Developing an ERP and conducting a VA for an entire utility – where one previously did not exist – presented challenges. Here are some takeaway lessons learned:

- Visible commitment of upper management is critically important.
- Understanding larger organizational plans, such as a city where the utility is a city department that is co-dependent on other internal service providers for its operation, is a key part of departmental preparedness projects. The parent organization’s COOP, if they have one at all, is usually not tailored to meet a utility’s best interests in meeting long-term operational needs presented by a disaster.
- Engagement of internal stakeholders is imperative in developing a culture that supports emergency planning and security awareness at all levels of the organization.

VA Lessons
Other VA considerations that lead to a successful ERP plan include utilization of the proper VA approach, one that focuses on an all-hazards methodology. The original Risk Assessment Methodology for Water Utilities (RAM-W) issued in 2001 evolved to the current J100 RAMCAP standard, which incorporates a number of other useful changes and improvements. After working through a basic J100 assessment and analysis process, a number of ‘low-hanging fruit’ opportunities will emerge, especially in the area of security. It is continually challenging to maintain security systems, from fences to cameras. Hardware can be planned for budgets, but the real and less expensive opportunity that can be acted on quickly is to put good administrative controls in place, such as security procedures, lock/entry management, physical threat awareness, and cyber security training. Examples of these include:

Active Shooter
- According to the FBI, attacks in the workplace and elsewhere are increasing. Most of these incidents last only 10 – 15 minutes, so training and personal preparation is a key action item. It is important to develop personal plans and train at-risk employees.

Cyber Threats
- Presidential Executive Order February 2013 addresses the national concern over repeated cyber intrusions into critical infrastructure. The order states that cyber threats to critical infrastructure continue to grow, representing one of the most serious national security challenges we must confront.
- Rapidly evolving cyber threats not only jeopardize office automation and business systems, but also impact plant Supervisory Control and Data Acquisition systems (SCADA), the industrial control and automation heart of our water and wastewater facilities. Understanding these technological external threats is necessary. Protecting your system against employee and contractor ‘infection’ by virus is equally important, as it may be the more likely source point of failure.

- The AWWA (Process Control Cyber) System Security Guidance Document provides an excellent place to start for developing a response plan.

ERP Lessons
It is always challenging to keep plans up to date, particularly contact information. This type of data should be structured to optimize updates. Also consider incorporating the use of annexes and appendices. Be sure to involve other agencies upon which the utility depends, such as the local health department, first responders (police, fire and other departments), internal service providers, or agencies critical to your business needs (Figure 3). Engage and involve these other agencies and service providers. The value of soliciting their input, as well as training and practicing together, should not be underestimated, as it will help refine ERPs and procedures and clarify roles, responsibilities and lines of communications. Other ERP takeaways include:

- Succession plans for key positions are vital.
- Ensure that employees are empowered to call 911.
- Plan for emergency procurement and contracting provisions.
- Potential power failures involve the greatest water sector interdependency. Lack of proper generator selection, maintenance, and provisions for fueling can provide complications in the event of extended duration.
- Develop crisis communications plans. Designate an organizational spokesperson and consider establishing a Joint Information Center (JIC). Preparing critical media messages in advance and utilizing message mapping and social media establishes consistency and saves time during a crisis.
- Consider joining the Water / Wastewater Agency Response...
Network (WARN). WARN uses a standardized mutual aid agreement and provides mutual aid procedures, guidance and established lines of communications. NC Water WARN has a seat in the North Carolina Emergency Operations Center.

Final Thoughts
Promoting a culture of preparedness and security is essential, and can only be accomplished by including everyone. We should never forget that a utility’s most important assets are its employees and their families. Including a wide range of employees in the ERP process, developing emergency work scheduling, and providing special training and preparation guidance for families before and after disasters will lead to a stronger and more resilient utility. While utilities are not thinking about an attack from a squadron of flying monkeys, real vulnerabilities that threaten the very core of critical operations, employee safety, public health, and service to customers must be inventoried and mitigated. Even though there are no current regulatory requirements that require emergency planning, we have an obligation to keep and maintain the trust and safety of the public we serve and place the safety of employees that make it happen as a top priority.

About the Author
Steven Drew is the director of the Water Resources Department for the City of Greensboro. He has long been interested in the value and benefit of building, implementing, and maintaining emergency response planning programs for utilities. He was recently invited to assist the EPA as the agency begins updating its emergency response planning guidance for water sector utilities.

Figure 1 – Core Criteria Guidance for VAs
- Identify the vulnerabilities associated with physical, cyber, human factors (openness to both insider and outsider threats), critical dependencies, and physical proximity to hazards.
- Describe all protective measures in place and how they reduce the vulnerability for each scenario.
- In evaluating security vulnerabilities, develop estimates of the likelihood of an adversary’s success for each attack scenario.
- For natural hazards, estimate the likelihood of the incident causing harm to the asset, system, or network, given that the natural hazard event occurs at the location of interest for the risk scenario.

Figure 2 – Credible Threats
- Weather events including flooding, large rain events resulting in high wastewater flows, high winds, lightning, ice storms, and tornados
- Major equipment or operational failure
- Power outages
- On-site chemical spills
- Nearby HAZMAT releases
- Fire
- Casual, accidental, and recreational trespassers, vandals, and criminals (theft)
- Disgruntled persons, up to and including armed intruders/active shooters
- Raw water contamination
- Finished water contamination
- SCADA system failure
- Influent contamination
- Personnel illness

Figure 3 – Engaging Other Agencies

Overview of Potential External Notifications

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John Goodman, Safety & Security Engineer – Greensboro WRD
Barry Parsons, Water Supply Division Manager – Greensboro WRD
Elijah Williams, Water Reclamation Manager – Greensboro WRD
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Introduction
Despite the tremendous cost and adverse impact on consumers and businesses, high-profile cyberattacks and security breaches have become so commonplace they might be seen as an unavoidable cost of living in the digital age. More disconcerting is that cyberattacks are increasing in frequency and severity, and their intended purpose now includes extortion and destruction of intellectual property. Managing cyber risks for Information Technology (IT) networks is a top priority for IT professionals.

In addition to the current cyber threat environment, there is growing awareness of an even greater concern — the potential for a cyber-attack on critical infrastructure within the United States. The threat to critical infrastructure, which includes water and wastewater systems, is evidenced by the issuance in February 2013 of Presidential Executive Order 13636 – Improving Critical Infrastructure Cybersecurity. Per the Executive Order, “The cyber threat to critical infrastructure continues to grow and represents one of the most serious national security challenges we must confront. The national and economic security of the United States depends on the reliable functioning of the Nation’s critical infrastructure in the face of such threats.”

Protecting Critical Infrastructure
A key component in protecting critical infrastructure from cyber-attack is protecting the automated systems used to monitor and control critical infrastructure. The systems that control water and wastewater processes are called many names. Industrial control system (ICS), supervisory control and data acquisition (SCADA), distributed control system (DCS) and process control system (PCS) are just a few of the terms that fall under the general category of Operational Technology (OT).

Increasingly, OT networks and systems are coming under attack. Although some high-profile attacks on critical infrastructure have been reported, many go unreported because there are no requirements to report cyber events, unless there is a breach of personal information or financial data. With limited public visibility of attacks on critical infrastructure, it is easy to assume the cyber threat to OT systems is not great. Regardless of the actual number of attacks, malicious software (malware), such as Stuxnet, Havex and Black Energy, that specifically target OT networks and systems, have been developed and used to attack critical infrastructure. These attacks are a powerful reminder that the threat to critical infrastructure cannot be ignored.

Managers of critical infrastructure must be aware of these threats and take steps to manage cyber risks. A comprehensive OT security plan increases the availability, reliability and resiliency of critical systems as well as the utility’s ability to fulfill its mission. For many, the key question is where to begin. The first step in managing a utility’s cyber risk is the development of a business plan that provides the rationale for committing the resources needed to establish, implement and maintain a utility-wide OT security plan.

**ISA-62443 Security for Industrial Automation and Control Systems**
One of the key standards for Operational Technology security is ISA-62443. The multipart standard for industrial automation and control systems (IACS) security was developed by the International Society of Automation (ISA) and provides a flexible framework for developing a comprehensive security plan for critical infrastructure entities such as water and wastewater utilities. An important part of the ISA-62443 standard is ISA-62443-2-1: Establishing an Industrial Automation and Control Systems Security Program. The target audience for this standard is the asset owners and operators responsible for establishing and managing a utility’s cybersecurity program. Unlike other security standards that cover only technical considerations for cybersecurity, ISA-62443-2-1 focuses on the critical elements of a security plan relating to policies, procedures, practices and personnel. As such, it is a valuable resource to management for establishing a utility-wide OT security plan.

The first step in developing an IACS security program as defined by ISA-62443-2-1 is Risk Analysis, starting with the business rationale for cybersecurity. As noted in the standard, “Establishing a business rationale is essential for an organization to maintain management buy-in to an appropriate level of investment for the IACS cybersecurity program.”

**Why a Business Case Is Needed**
A well-defined business case for OT cybersecurity is essential for management buy-in to ensure the long-term allocation of resources needed to develop, implement and maintain a utility-wide program. Without a strong commitment by senior management, utility personnel will find it difficult to prioritize allocation of resources — especially when faced with resource-intensive challenges such as aging infrastructure.

The business rationale for cybersecurity is based on the potential impact that a cyber-event – intended or unintended – can have on public health and safety, the environment, business continuity, emergency preparedness, and public confidence.
Developing a business rationale for cybersecurity identifies the business reasons for investing in cybersecurity in order to lower risk and protect the utility’s ability to perform its mission.

It is important to remember that cybersecurity is not an absolute. It is not a ‘safe’ versus ‘unsafe’ situation, but rather a matter of degree. Additionally, because of limits to resources such as funding and personnel, it is neither practical nor feasible to mitigate all threats. There will always be risks associated with any plan. By defining a business rationale for OT cybersecurity, executive management can define acceptable levels of risk for the utility and provide direction for utility personnel who will develop and implement the security plan.

Additionally, the business rationale involves an evaluation and examination of the cost-benefit aspects of security measures to ensure that monies spent derive the maximum benefit. Almost as bad as doing nothing is deploying resources in an ineffective manner that not only wastes money, but also creates a false sense of security.

_AWWA G-430 Security Practices for Operation and Management_

Another important reason for developing a business case for automation security is that it is fundamental to the creation of a culture of security within the utility. The American Water Works Association (AWWA) standard ANSI/AWWA G430-14: Security Practices for Operation and Management addresses the broad issues of security, and protecting OT is a key facet of security. As noted in the standard, there should be an “explicit and visible commitment of senior leadership to security.”

By establishing the business rationale for automation cybersecurity, management takes an explicit and visible step in its commitment to security. Just as safety has been integrated into every utility’s culture, cybersecurity must also become a fundamental component of a utility’s culture.

**Probability of a Cyber-Attack**

The probability of a state-sponsored cyber-attack on a utility is most likely extremely low. However, water and wastewater utilities increasingly may be viewed as easy targets by radicalized, lone-wolf threat actors. ‘Security by obscurity’ is no longer an option for small and medium utilities that have not considered external threats as a concern in the past. Regardless, an attack is only one of many cyber threats to OT.

The vast majority of cyber events originate internally. Preventing or minimizing the possibility of any cyber event that impacts the availability and reliability of a critical system, intended or otherwise, should be a priority. The business rationale for OT security recognizes that all cyber events can negatively impact operations and is the impetus for a comprehensive security plan that mitigates both intended and unintended cyber events. Reducing the likelihood or the impact of a potential cyber event increases the utility’s resiliency and reduces the possibility of resulting litigation.

**IT Is Taking Care of This**

Mention the word cybersecurity, and many assume their IT department is handling the details. IT professionals, who are responsible for ensuring the availability, integrity and confidentiality of business and enterprise networks, will be important members of a cross-functional team that develops and implements a utility-wide cybersecurity plan. However, the responsibility for protecting OT systems and networks from a cyber event – and the critical infrastructure they control – lies with those who operate and maintain those networks.

Ultimately, all utility personnel will have a role in protecting critical infrastructure from cyber events. Establishing a business case for OT cybersecurity will lead to the development of a comprehensive security plan that clearly defines security roles and responsibilities for all utility personnel, including those involved with emergency preparedness and business continuity.

**Summary**

The cyber threat scenario for critical infrastructure, including water and wastewater systems, is increasing and will become only more challenging in the future. A well-defined business case for Operational Technology cybersecurity is the first step in establishing a comprehensive security plan that reduces cyber risks, increases resiliency, and ensures the availability and reliability of critical water and wastewater systems.

**References:**


**About the Author**

Don Dickinson has 32 years of sales, marketing and product application experience in Industrial Controls and Automation, involving a wide range of products and technologies in various industry segments. He is a past chair of the NC AWWA-WEA Automation Committee and the current chair of the Automation Committee’s Security subcommittee. (Contact information: ddxickinson@phoenixcon.com; 717-944-1300, ext. 3868)
Risk and Resilience Management of Water and Wastewater Systems

An Update on the AWWA J100 Risk Assessment Standard

By John W. McLaughlin, PE, Merrick & Company

Introduction
Anyone who was alive at that time remembers the events of September 11, 2001. Those of us in the water industry also remember how much it impacted and changed how we think about water facilities. It was only about eight months after 9/11 that the federal government required virtually all water systems to develop a Vulnerability Assessment (VA) and Emergency Response Plan (ERP), focused on the results of their VA.

The idea of doing some level of security-related assessment of water systems was a good one. It helped change the landscape and start utilities thinking about their vulnerabilities in a different way. The weaknesses of the early VA/ERP process were twofold: 1) the federal requirement was written specifically around terrorism as a threat and did not include the multitude of other threats or risks faced by water utilities, and 2) the methodologies in place at that time were not true risk assessment/risk management methodologies.

Owing partly to the impacts of multiple, large natural disasters impacting water systems, over the next nine years the world of water system security evolved into an ‘all-hazards’ way of thinking. All hazards means just that; not just looking at the risk associated with one threat, but understanding that your greatest risk might come from a threat that had not been previously considered.

In addition, prompted by a focus on trying to find a common framework to assess risks at a variety of critical infrastructure, the methodologies themselves started to change, and the Risk Analysis and Management for Critical Asset Protection (RAMCAP®) was born. RAMCAP was started through efforts by the American Society of Mechanical Engineers, Innovative Technologies Institute, LLC (ASME-ITI) at the request of the White House. This change started the shift from vulnerability assessments to risk assessments and risk management, and also allowed direct comparison of risks across different critical infrastructure sectors.

General guidance was widely circulated in 2004, still with a focus specifically on terrorist acts. By 2006, the first version to start looking beyond terrorism—to include natural disasters or threats—was produced. This began the move toward the all-hazards framework that is the accepted concept today. In 2009, All-Hazards Risk and Resilience: Prioritizing Critical Infrastructure Using the RAMCAP® Plus Approach was published.

The Current J100 Methodology

It is important to remember that the existing standard is currently in the midst of a significant update process and, as such, what is documented in this section could change. Further in this article, some of the potential changes are listed and discussed, but, as with any standards update process, nothing is final until all the relevant approvals are obtained.

The J100 standard is a methodology to analyze risk and resilience in the water sector and is the only one of its kind. The J100 follows a seven-step process displayed in Figure 1 and listed below:
1) Asset Characterization
2) Threat Characterization
3) Consequence Analysis
4) Vulnerability Analysis
5) Threat Analysis
6) Risk/Resilience Analysis
7) Risk/Resilience Management

Asset Characterization
The asset characterization step determines which assets are critical enough to take through the rest of the steps of a J100. This process can be done through a two-phased approach involving an initial screening step that addresses the fact that the initial set of assets for a utility can be substantial; thus, the effort to take all of them through the entire seven-step process can be unwieldy and unnecessary.

Threat Characterization
The J100 standard allows consideration of a wide range of threats/hazards, including man-made/intentional, natural, and dependency. The standard includes a set of reference threats (Table 1) to consider, but the threats included in this table are not meant to be comprehensive, nor is the user required to include each reference threat in the full analysis. In order to comply with the standard, all the threats must be considered. That does not mean they all need to be incorporated into the complete analysis, just that they be considered. If not incorporated, then the logic behind not using them should be documented. It is important to document the reasons why a particular reference threat would be
excluded as well as why an additional threat might be included.

Along with the asset characterization, this step allows the identification of the threat-asset pairs. The user can now select the critical threat-asset pairs to be included in the rest of the analysis process. These threat-asset pairs are the objects of analysis throughout the rest of the process.

**Consequence Analysis**
With identification of the threat-asset pairs, it is now time to estimate the consequences that might be caused by the specific threat acting on the corresponding asset. The consequence analysis estimates the results of threat scenarios using common quantitative metrics that shall include:
- Number of fatalities.
- Number of serious injuries.
- Financial loss to the owners of the facility. The outage duration used as part of the financial loss calculation will be displayed.
- Economic losses to the community in which it operates.

These metrics can be estimated as either single-point estimates or ranges. They may also be expanded to include additional detail as needed. The consequence analysis may be based upon either detailed calculations or may be estimated by qualified experts.

The term “worst reasonable case” is used with assumptions that normal factors and variables can occur simultaneously, but does not assume that uncontrollable variables of unpredictable events happen simultaneously.

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**Figure 1 – The seven-step J100 process.**

1) **Asset Characterization**
   - What assets do I have and which are critical?

2) **Threat Characterization**
   - What threats and hazards should I consider?

3) **Consequence Analysis**
   - What happens to my assets if a threat or hazard happens? How much money lost, how many lives lost, how many injuries?

4) **Vulnerability Analysis**
   - What are my vulnerabilities that would allow a threat or hazard to cause these consequences?

5) **Threat Analysis**
   - What is the likelihood that a terrorist, natural hazard, or dependency/proximity hazard will strike my facility?

6) **Risk/Resilience Analysis**
   - What is my risk and resilience?
     - Risk = Consequences × Vulnerability × Threat Likelihood
     - Resilience = Service Outage × Vulnerability × Threat Likelihood

7) **Risk/Resilience Management**
   - What options do I have to reduce risks and increase resilience?
     - How much will each benefit in reduced risks and increased resilience?
     - How much will it cost? What is the benefit-cost ratio of my options?
Vulnerability Analysis

This vulnerability analysis step analyzes the ability of each critical asset and its protective systems to withstand each specified threat. The analysis is applied to man-made, natural, dependency, and proximity threats or hazards.

The analysis is conducted using a four-step process, as follows:

1. Review and document existing pertinent details of the facility construction, systems, and layout, including countermeasures, mitigation measures, features that provide deterrence, detection systems, delay features, and response measures.

2. Analyze the vulnerability of each critical asset or system to estimate the likelihood that, given the occurrence of a threat, the consequences estimated earlier will result. This analysis can be accomplished using a fault- or event-tree analysis, path analysis, vulnerability logic diagrams, computer simulation methods, or expert judgment rules of thumb, as long as it can be used consistently across all relevant assets.

3. Document the method used for performing the vulnerability analysis, the worst-reasonable-case assumptions, and the results of the vulnerability analysis.

Table 1 – J100 Reference Threats

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(A1) Helicopter</td>
<td>(AT1) 1 Assailant</td>
<td>(M1) Small Boat</td>
<td>(V1) Car</td>
<td>C(B) Biotoxin</td>
<td>S(PI) Physical — Insider</td>
<td>T(PI) Physical — Insider</td>
<td></td>
</tr>
<tr>
<td>(A2) Small Plane</td>
<td>(AT2) 2–4 Assailants</td>
<td>(M2) Fast Boat</td>
<td>(V2) Van</td>
<td>C(C) Chemical</td>
<td>S(PU) Physical — Outsider</td>
<td>T(PU) Physical — Outsider</td>
<td></td>
</tr>
<tr>
<td>(A3) Regional Jet</td>
<td>(AT3) 5–8 Assailants</td>
<td>(M3) Barge</td>
<td>(V3) Midsize Truck</td>
<td>C(C) Explosive</td>
<td>S(CI) Cyber — Insider</td>
<td>T(CI) Cyber — Insider</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C(R) Radionuclide</td>
<td>Active Shooter</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 – J100 Natural Disaster Reference Threats

<table>
<thead>
<tr>
<th>J100 Natural Disaster Reference Threats</th>
<th>Earthquake</th>
<th>Floods</th>
<th>Hurricanes</th>
<th>Ice Storms</th>
<th>Tornadoes</th>
<th>Wildfires</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ1 - PGA 0.0 - 0.2</td>
<td>F1 - 100 Year Flood</td>
<td>H1 - Category 1</td>
<td>I0 - Minimal Damage</td>
<td>T0 - Fujita 0</td>
<td>W1 - FRG1</td>
<td></td>
</tr>
<tr>
<td>EQ2 - 0.2 - 0.4</td>
<td>F2 - 500 Year Flood</td>
<td>H2 - Category 2</td>
<td>I1 - Isolated Outages</td>
<td>T1 - Fujita 1</td>
<td>W2 - FRG2</td>
<td></td>
</tr>
<tr>
<td>EQ3 - PGA 0.0 - 0.08</td>
<td>F3 - 100 Year Flood</td>
<td>H3 - Category 3</td>
<td>I2 - Scattered Outages</td>
<td>T2 - Fujita 2</td>
<td>W3 - FRG3</td>
<td></td>
</tr>
<tr>
<td>EQ4 - PGA 0.8 - 1.1</td>
<td>F4 - 500 Year Flood</td>
<td>H4 - Category 4</td>
<td>I3 - Numerous Outages</td>
<td>T3 - Fujita 3</td>
<td>W4 - FRG4</td>
<td></td>
</tr>
<tr>
<td>EQ 5 - PGA &gt; 1.1</td>
<td>F5 - 1000 Year Flood</td>
<td>H5 - Category 5</td>
<td>I4 - Prolonged Outages</td>
<td>T4 - Fujita 4</td>
<td>W5 - FRG5</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 – J100 Dependency & Proximity Threats

<table>
<thead>
<tr>
<th>J100 Dependency &amp; Proximity Threats</th>
<th>Dependency</th>
<th>Proximity</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(T) - Transportation</td>
<td>D(T) - Transportation</td>
<td>D(P) - Proximity</td>
</tr>
<tr>
<td>D(C) - Key Customers</td>
<td>D(C) - Key Customers</td>
<td>D(P) - Proximity</td>
</tr>
<tr>
<td>D(E) - Key Employees</td>
<td>D(E) - Key Employees</td>
<td>D(P) - Proximity</td>
</tr>
<tr>
<td>D(S) - Key Suppliers</td>
<td>D(S) - Key Suppliers</td>
<td>D(P) - Proximity</td>
</tr>
<tr>
<td>D(U) - Utilities</td>
<td>D(U) - Utilities</td>
<td>D(P) - Proximity</td>
</tr>
</tbody>
</table>
4. Record the vulnerability estimates as either a fraction, a probability, or the number of successes among attempts.

**Threat Analysis**
With the threats to the utility’s assets already identified and characterized, the next step is to estimate the likelihood of each threat occurring.

For malevolent threats, likelihood is based on the adversary’s objectives and capabilities and the attractiveness of the region, facility, and threat-asset pair relative to alternative targets.

There are three basic approaches to estimate likelihood:
1. The proxy measure may be based on several factors, such as the attractiveness of the utility, size of the metropolitan area, number of governmental facilities in the area, or other attributes, and produces a likelihood value between 0.0 and 1.0.
2. The best-estimate likelihood method is determined based on informed experience of the organization, and input from federal, state, and local law enforcement, and others. The likelihood will be either an ordinal measure, such as low, medium, high, very high, or it can be a probability with a value between 0.0 and 1.0.
3. The current version of the standard also includes use of the conditional assignment, which has the threat probability set at 1.0. This method is only useful for examining the worst-case potential for a variety of malevolent threats. Some may recall that the Sandia RAM-W™ methodology used strictly the conditional method for threat likelihood.

Only the proxy indicator may be used when the results are to be compared with other RAMCAP® analyses.

For natural hazards, the probability is estimated by drawing on the historical record for the specific location of the asset. Federal agencies collect and publish records for hurricanes, earthquakes, tornadoes, wildfires, and floods, which can be used as frequencies for various levels of severity of natural hazards.

Estimates of the likelihood for dependency and proximity hazards are also based on local historical records for the frequency, severity, and duration of service denials. Likelihood of incurring collateral damage from an attack on a nearby asset is estimated based on the local situation and using the same logic in estimating malevolent threats.

**Risk/Resilience Analysis**
The analysis step combines the results from the previous five steps into estimates of the owner’s level of existing risk and resilience. Risk is calculated for each threat-asset pair as the product of the results from the consequence analysis, vulnerability analysis, and threat analysis, using the following equation:

\[
\text{Risk} = \text{Consequences} \times \text{Vulnerability} \times \text{Threat Likelihood}
\]

and the definitions already provided for each step.

Resilience is dependent on elements such as connectivity, interdependencies, complexities, preparedness, continuity of operations, and recovery. Resilience may be considered at several levels, specifically: (a) at the specific asset level, and (b) a more holistic approach considering the utility as a total system.

The asset resilience metric is service denial due to a threat-asset pair, weighted by vulnerability and threat likelihood, and uses the following equation:

\[
\text{Asset Resilience Metric} = \text{Duration} \times \text{Severity} \times \text{Vulnerability} \times \text{Threat Likelihood}
\]

**Why Is the J100 Being Updated?**
Besides the need to regularly review and update any standard, updating the J100 is needed even more because it exists in...
a very dynamic time in the world of water utility security and preparedness.

So, with all that, here are some areas where updates are being considered:

- Many of the updates being considered are meant to expand upon and better clarify the various appendices where guidance on determining threat likelihood is described. In the case of earthquakes specifically, there may be extensive updates to account for better interpretation of the building code and how to apply it to determine consequence and likelihood from an earthquake. This also includes updated reference threats.
- There are also several new threats being considered for incorporation into the standard, including wildfires, ice storms, and condition-based threats.
- Addition of a section titled “Items Under Consideration” for such areas as:
  - climate change
  - cyber security
  - new tendencies in terrorism
  - interdependencies
  - unknown contaminants
  - others?
- Elimination of the option to use ‘conditional’ risk. In conditional risk, the likelihood of a threat occurring—such as a terrorist attack, for example—is set at 1.0, meaning that you are presuming there will be an attack. This presumption can be problematic when trying to truly understand the risk being faced and, therefore, make good decisions using cost-benefit.
- Removal of the use of ‘bins’ for consequence or vulnerability value determination. With bins, there is a range of values to be used versus defining a point value.
- Focus on overall utility resilience versus resilience at the asset level.
- Use net benefits versus gross benefits when considering cost-benefit ratios for decisions on risk reduction measures.

**Why Should It Matter to You?**

Why does it matter to you, or more to the point, why should it matter to you?

- J100 is the most current and comprehensive means to manage risk and resilience in the water sector.
- J100 analyzes ‘all-hazards’ risk and resilience – e.g., sabotage, terrorists, earthquake, tornados, hurricanes, interdependencies, proximity, etc. – with probabilities of occurrence.
• **J100** is the only risk and resilience standard for the water sector.

• Do you really understand the greatest risk(s) your utility faces? Are you prepared to manage them properly?

• **J100**, used properly, allows comparison of risk values from any infrastructure in any part of the US to any other infrastructure in any other part of the US.

• **J100** is an AWWA and ANSI recognized standard; i.e., it implies a standard of care or best practice.

• **J100** has been awarded the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act) Designation by the Department of Homeland Security.

**Summary**

If you take nothing else away from reading this article, the one thing to understand is the importance and value of risk when it comes to sound, logical, and defensible decision-making in any organization. With **J100**, you have the only process that is an AWWA standard, established specifically for the water industry, and adaptable to almost any type of risk.

**Bibliography**


**About the Author**

John W. McLaughlin, PE is a senior consultant with Merrick & Company in Charlotte, NC. He was a member of the original ANSI/ASME-ITI/AWWA J100-10 standard committee and is the current vice chair of the first **J100** Standard Update Committee.

If you take nothing else away from reading this article, the one thing to understand is the importance and value of risk when it comes to sound, logical, and defensible decision-making in any organization.
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Faces of Progress: Chief Timbenawo
By Water For People

There used to be fights at the boreholes because of congestion,” Chief Elida Timbenawo explains with a flourish of her weathered hands. “Now I can rarely find somebody to help me lift my bucket onto my head because everyone can fetch water whenever they want.”

Chief Timbenawo, 73, has served as the Group Village Head for the past 12 years, overseeing 15 villages and chiefs in the Kakoma area of Malawi. She is a sturdy woman, and a force to be reckoned with. She is the reason 7,000 people across 15 villages now have access to safe water and sanitation.

At Water For People, we know that our work hinges on local partnerships and we wouldn’t be able to do what we do without the support and influence of community leaders.

Five years ago we approached Timbenawo with big plans to end open defecation and ensure safe water for all. Even with her support, convincing 640 households to install and maintain their own latrines wasn’t easy. To instill a sense of urgency and compliance, Timbenawo worked with the village chiefs to come up with a plan.

“We established bylaws to incentivize everyone to build latrines,” she says. “We agreed that households with latrines would be given priority at hospitals to receive health care. And it worked, soon everyone had latrines and we could start working on water projects to complement our sanitation efforts.”

Before joining forces with Water For People, villages across Kakoma lacked boreholes and the ones that did exist weren’t working.

“Now we have enough boreholes so everyone is able to access water in a good range of distance,” Timbenawo explains. “Each borehole also has somebody trained to manage it and we are collecting tariffs to fix them when they break.”

Capacity building and tariff collection is just part of Timbenawo’s commitment to Everyone Forever. Recently, community members have been taking advantage of borehole banking, a community-based form of micro-lending that encourages individuals to take out small loans from the borehole funds to help start small businesses or pay for various expenses. These loans are then paid back on a monthly basis with interest.

As the villages continue to rebuild after last year’s flooding and face this year’s drought, borehole banking has become a source of empowerment.

“Borehole banking has had the biggest impact on the household level,” she says. “Right now in our communities it is a lean period for food so people are prioritizing that and using the funds to buy food for their families.”

Over the past five years Timbenawo has seen a change in her people, and even though they still grapple with the effects of flooding and the current drought, the future is bright.

“We didn’t appreciate sanitation and cleanliness but through the work of health workers and Water For People we now see that what we had before wasn’t a life worth living,” she reflects. “It is part of us, part of our life and we are grateful for it.”

At Water For People, we know that our work hinges on local partnerships and we wouldn’t be able to do what we do without the support and influence of community leaders.
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The water and environmental industry has long been a provider of steady employment for a diverse cross-section of many disciplines and water professionals. These include positions such as public officials from boards and commissions, to utility directors, plant managers, operators, and maintenance personnel. In the private sector, employees of engineering firms, construction contractors, manufacturing companies as well as their local representative organizations, and the private operation companies can derive all or most of their livelihood from the water, wastewater, and environmental marketplace.

When the economy turns down and business slows for private concerns in markets such as housing and automotive, the water and environmental industry remains relatively steady, and is a much less volatile market sector. People must have safe water to exist, and wastewater services to maintain a healthy environment and decent quality of life. These basic essentials have become more sophisticated and complex over the years, and have served to keep the water industry in the forefront with opportunities for long-term employment and career advancement.

The mission to endow safe water scholarships for individuals pursuing careers in the water and environmental industry is, therefore, a strategic imperative toward growing and sustaining highly qualified people needed for a sophisticated and complex public and private water industry.

The vendor community is a necessary, and very important, subset of the various market place entities. Vendors provide materials, treatment equipment, chemicals, pumps, pipe, valves and all other items that keep water and wastewater treatment, distribution and collection systems operating on a 24/7 basis. This vendor subset serves to expand the employment opportunities and therefore the need for scholarship programs to help students with a desire for engineering, science and marketing educations. There will always be a critical need for the water industry to continue to attract the best and brightest students and graduates.

As part of this vendor community, manufacturer’s representative organizations offer unique opportunities for young, energetic individuals to establish relationships with all of the water market segments, and entities. Representative firms must maintain relationships on a local basis with all of these public and private companies and their key personnel, as well as with numerous manufacturing firms nationwide, and sometimes worldwide. The process of bringing manufactured products to the water industry can be as simple as direct one-on-one sales. It can also be as complex as planning, design, bid, construction and equipment installation for large-scale public capital improvement projects.

The functions and roles required for these vendor opportunities can be performed by individuals from all walks of life and with all levels of education and work experience. The key element is a strong desire to put the customers first and assist them in meeting their water and wastewater treatment and transportation needs. These firms provide opportunities for outside technical sales people, application engineers, project managers, inside sales and administrative personnel. The backgrounds and educational experiences of these employees are varied and flexible. In summary, the vendor community provides a necessary and very diverse, exciting, and challenging career for water and environmental professionals.

The NC AWWA-WEA Endowment Committee is striving to build an attractive sustainable financial source for numerous scholarships in the water and environmental industry. These awards will assist in the education of students in North Carolina on an annual basis. Funding is growing each year as the public becomes more aware of these educational opportunities. To learn more about the safe water endowment program, please visit the website at www.safewater.org/endowment or contact any Endowment Committee member.
COLLECTION SYSTEM CERTIFICATION QUESTIONS

Questions provided by the NC AWWA-WEA Wastewater Board of Education and Examiners

1. The term ‘timed volumetric’ is usually given when referencing:
   a) Clarifier volume
   b) Digester volume
   c) Disinfection chamber volume
   d) Rate of flow measurement

2. A positive static-suction head will allow a centrifugal pump to first begin operating:
   a) Without priming being needed
   b) With priming being needed
   c) With no effect on its operation
   d) With excessive vibration

3. When starting up a chemical feed system, which of the following would not need to be inspected?
   a) MLVSS
   b) Tank level alarms
   c) Mixers, all present
   d) Dilution water pressures and temperatures

4. The acronym IWTS stands for:
   a) Instream threshold water standards
   b) International treatment of wastewater standards
   c) Industrial wastewater treatment system
   d) Industrial treatment of wastewater standards

5. Filtering media that has been slightly displaced within the confines of the filter can sometimes be regraded back to an operational status by:
   a) Vigorously backwashing with high volumes and velocities of air or water
   b) An extended and properly controlled backwash cycle
   c) A prolonged backwash with low volumes of air or water
   d) Vibrating the media while it is thoroughly wet

Answers:

CERTIFICATION INFORMATION

If you have any questions regarding operator/engineering certification and exams, please contact the appropriate agency.

NC Board of Examiners for Engineers & Surveyors
919-791-2000
www.ncbels.org
Exam Date: 10/28/16
Responsible for Professional Engineers and Professional Surveyors

NC Water Treatment Facility Operators Certification Board
919-707-9040
http://www.ncwater.org/pws
Exam Dates: 8/25/16, 10/7/16
Responsible for Drinking Water Certifications (Surface, Well, Distribution, & Backflow/Cross-Connection)

Water Pollution Control System Operators Certification Commission
919-807-6353
http://portal.ncdenr.org/web/wq/admin/tacu
Exam Dates: 9/8/16, 12/8/16
Responsible for Wastewater Certifications (Animal Waste, Biological WW, Physical/Chemical, Land Application, Spray Irrigation, Collections, Subsurface, and OIT)
WATER CERTIFICATION QUESTIONS

Questions provided by the NC AWWA-WEA Water Board of Education and Examiners

1. Air-and-vacuum relief valves are required at _____ and blowoff valves are required at _____ in a distribution system.
   a) Low points, high points  b) The end of distribution lines, in the middle of distribution lines
   c) High points, low points  d) In the middle of distribution lines, the end of distribution lines

2. When using steel pipe, the highest degree of protection against corrosion is provided by using cathodic protection of a coated steel pipe.
   a) True  b) False

3. A rectangular basin 40 feet long, 20 feet wide, and 12 feet deep has water flowing into it at 200 gallons per minute and water flowing out of it at 100 gallons per minute. In 30 minutes how much will the water depth increase in the basin?
   a) 5.5 feet  b) 3.5 feet  c) 1.5 feet  d) 0.5 feet

4) The squirrel-cage induction motor is the most complex of all AC motors.
   a) True  b) False

5) List the following in order of decreasing effectiveness of backflow prevention – reduced pressure zone backflow preventers (RPZ), vacuum breakers (VB), air gaps (AG) and double check valve assemblies (DCV).
   a) RPZ, VB, AG, DCV  b) AG, RPZ, DCV, VB  c) DCV, RPZ, AG, VB  d) AG, VB, DCV, RPZ

6) When using the listening method for detecting water leaks, in general, the smallest leaks are the loudest.
   a) True  b) False

Answers:
   2. a) Page 33 Fourth Edition Water Transmission and Distribution
   3. 200 gpm - 100 gpm = 100 gpm  
      100 gpm X 30 minutes = 3000 gallons
      3000 gallons / 7.48 gallons per cubic foot = 401 cubic feet
      401 cubic feet / 40 feet X 20 feet = 0.5 feet.

MAINTENANCE TECHNOLOGIST QUESTIONS

Questions provided by the NC AWWA-WEA Plant Operations & Maintenance Committee

1. What does the designation ‘EP’ in gear oils mean?
   a) Excellent product  b) Evenly pushed  c) Extreme pressure  d) Extreme product

2. Which part of a Centrifugal Pump effects pump efficiency and internal product liquid leakage?
   a) Mechanical seal  b) Sleeves  c) Wear rings  d) Stuffing box

3. What kind of continuous level transmitter can be added in the field after tank installation to read tank level through a fiberglass tank, therefore not requiring connection ports to be installed for the device?
   a) Ultrasonic  b) Guided wave radar  c) Capacitance probe  d) Free space radar

4. Select the best answer. Vibration measurements should be taken by placing the sensor on the:
   a) Horizontal, vertical, and linear plane  b) At the pump’s design operating condition
   c) Vertical, horizontal, and axial planes  d) Outboard and inboard bearing of the motor

5. Three basic types of single-phase electric motors are given. Select the exception:
   a) Wound-rotor induction motors  b) Split-phase motors
   c) Repulsion-phase motors  d) Capacitor-start motors

Answers:
1. c)  2. c)  3. d)  4. c)  5. a)
Welcome New Members!

The following people became members of NC AWWA-WEA in April, May, and June of 2016 by joining AWWA or WEF and choosing North Carolina as their home state or as an additional membership state, or by joining at the state level with a NC SLAM membership. We welcome these professionals to NC AWWA-WEA and look forward to seeing them at future events and working with them on various projects and committees.

For information on how to join, and the membership options available, please visit www.ncsafewater.org/page/MembershipJoin. Most of NC AWWA-WEA’s work is carried out through committees. To learn more about each committee, review the list of active committees at www.ncsafewater.org/page/Committees. To express your interest in learning more about a committee, contact the committee chair directly, the NC AWWA-WEA office, or complete the online volunteer form.

**American Water Works Association (AWWA)**
Teresa Abernathy, City of Charlotte
Robert S. Baker, Jr., Moore County Public Works
Jonathan Britt, Greenville Utilities Commission
Lynn B. Solvay
Brandon J. Brown, Moore County Public Works
Jeffrey Bryant, City of Asheville
Keri B. Cantrell, Charlotte Water
Elaine Vastis Conti, Rafaelis Financial Consultants Inc.
Dave Dickey, AECOM
Monica Dodson, Orange Water & Sewer Authority
Michael L. Douglas, Southern Corrosion Inc.
Michael Ellis, Chemtrade Logistics
Christopher E. Evans, Hazen & Sawyer
Bryan Fincher, Veolia Water Technologies
Robert Friend, Union County Public Works
Steven E. Gerlach, Willis Engineers
Andrew D. Griffin, Town of Laurel Park
Jeff Hair, City of Asheville
Katherine M. Hasnain, Duke Law
Dorothy M. Hightower
Randy Hoffer
Megan N. Hopson
Marcus J. King, Charlotte Water
Charles McCall, CDM Smith
Daniel Medley, Town of Mount Gilead
Barry Melvin, UMS, A Division of Xtralight
Marco R. Menendez, McAdams
Sydney P. Miller, City of Durham
Michael Mills, Bluetick Inc
William Moeller
Edwin Newell, Delta Products
Hans Ohren, Apollo Valve Backflow Preventer
Rick Owen, Town of Banner Elk
Ken Plowman, West Carolina Water Treatment
Luisa Rodriguez, Hayward Flow Control
Mark Seastead, GHD Inc
William B. Squires, Town of Wrightsville Beach
Sydnee C. Sutton, Willis Engineers
Dan Towse, Nexus Global
Donald Vanderploeg, JAARS INC
Adrienne L. Wright, City of Northwest
City of Wilson Water Resources (Organizational Member)

**Water Environment Federation (WEF)**
Kristin Connors, North Carolina State University
Christopher Evans, Hazen & Sawyer
Brett S. Fisher, Union County Public Works
Matt Fiss, Fiss Environmental Solutions, Inc.
William Fuller
Steven E. Gerlach, Willis Engineers
Hayden Hunter, Union County Public Works
Shane Majerich, Hydromax USA
Edwin Newell, Delta Products
Edward J. Stempien, III, City of Raleigh
Sydnee C. Sutton, Willis Engineers
David S. Welch, AQCite

**NC SLAM**
Michael S. Acquesta, Municipal Engineering Services Company PA
Elwood Armstrong, Sr., City of Raleigh
Susan D. Auten, Black & Veatch
Dollie Bailey, Charlotte Water
Michael Ball, Metropolitan Sewerage District
Jeffrey Bognar, City of Raleigh
Kirk Bollinger, Utilities Inc.
Rod Bowman, City of Cherryville WWTP
Jeffrey Bryant, City of Asheville
Robert S. Canipe, Lincoln County Public Works
Rusty L. Carpenter, Lincoln County Public Works
Clark Cheek, City of Winston Salem
James Creasy, City of Winston Salem
Beth Cunningham, City of Charlotte
Anthony Dalton, Jr., City of High Point
Antonio D. Elder, City of Winston Salem
Thomas Franklin, Metropolitan Sewerage District
Jonathan Freeman, City of Asheville
Christopher S. Graham, MSD Buncombe County
Nathaniel Harvey, Kimley-Horn and Associates Inc.
Randall G. Head, Davie Public Utilities
Timothy Hoggard, Durham County TWWTP
Kevin Holloway, City Of Asheville
David L. Huff, City of Greensboro
Derrick D. James, Charlotte Water
Qwann S. Jordan, City of Charlotte
Visit www.ncsafewater.org/page/MembershipJoin

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Nishita Sinha from Chatham, NJ won the 2016 US Stockholm Junior Water Prize (SJWP)—the most prestigious youth competition for water-related research. Sinha and 53 other students, representing a total of 47 states and Puerto Rico, competed in the national finals June 17-19, 2016 at the University of North Carolina at Charlotte.

Worldwide, 2.4 billion people are exposed to public health and environmental threats because they lack access to reliable and affordable sanitation options. One promising alternative is a simple two-pit composting toilet that uses a natural anaerobic process to treat solid waste. Despite its efficacy, concerns remain about fecal coliform bacteria in the liquid waste and the impacts on local drinking water sources. Sinha’s two-phase project, “Experimental Studies in Developing Safe Sanitation Solutions,” tested potential low-cost additives to improve this process and evaluated the associated design constraints.

“Nishita’s study to develop safe sanitation solutions showed not only an understanding of the technical issues associated with designing sanitary facilities to decompose the organic component of waste, but also recognized the need to reduce the bacterial concentration associated with the waste,” said Jeanette Brown, chair of the SJWP Review Committee. “The novel way she tested her hypothesis revealed that fecal coliform could be reduced by 83%. We look forward to seeing the results of her continued research and the perfection of her design.”

Sinha received $10,000 USD and an all-expense paid trip to Stockholm, Sweden where she represented the United States at the international competition during World Water Week, August 28 - September 2. The international winner will receive $15,000 USD presented during a royal ceremony by the prize’s Patron HRH Crown Princess Victoria of Sweden.

Other competition winners included the two US runners up, Paige Brown (Maine) and Megan Lange (Ala.) who each received $1,000; and Sarayu Das (SC) who received the Bjorn von Euler Innovation in Water Scholarship Award.

Joshua Zhou, a student at The North Carolina School of Science and Mathematics in Durham, NC, was named the North Carolina winner of the 2016 SJWP competition, and represented North Carolina in the national competition in Charlotte. He was selected for his project, “Low-Cost Heterostructure Semiconductor Uses Energy in Visible Light to Efficiently Breakdown Environmental Toxins Threatening Aquatic Life.”

The purpose of the SJWP is to increase students’ interest in water-related issues and research, and to raise awareness about global water challenges. The competition is open to projects aimed at enhancing the quality of life through improvement of water quality, water resources management, water protection, and water and wastewater treatment.

In the United States, the Water Environment Federation and its member associations organize the regional, state, and national SJWP competitions with support from Xylem Inc., who also sponsors the international competition and the $1,000 Bjorn von Euler Innovation in Water Scholarship Award.

For more information about SJWP, visit www.wef.org.

A team from NC State University represented NC AWWA-WEA in the Student Design Competition at WEFTEC in September 2016 in New Orleans. Team members and recent graduates, Ashley Kabat, Michael Knepper, William Fuller, and Kristin Connors presented a preliminary engineering report for the aerobic digester re-design and upgrade for the Mebane Bridge Wastewater Treatment Plant in Eden, NC. Dr. Michael Wang was their advisor for the project.

Each year, WEF Member Associations send student teams to compete in the Student Design Competition. Every team receives a recognition plaque and certificates for each team member. Prizes are awarded for first through fourth places in the categories of wastewater design and environmental design.
The American Water Works Association held its 2016 Annual Conference & Exposition June 19-22 in Chicago, IL. NC AWWA-WEA was represented by almost 100 members. During ACE16, several NC AWWA-WEA members were recognized for their contributions to the industry.

The American Water Works Association announced the winners of its annual Fresh Ideas Student Poster Competition, which took place during the Association’s Annual Conference & Exposition (ACE16) in June.


Jeff Cruickshank from Hazen & Sawyer was recognized as a recipient of the George Warren Fuller award.

The recently renamed Arnold J. Koonce, Jr., City Lake Dam in High Point was announced as an AWWA American Water Landmark. The award was presented in High Point in August by a member of the NC AWWA-WEA board of trustees.

Katherine Connolly from the University of North Carolina at Chapel Hill received the Holly A. Cornell Scholarship.

Mikayla Armstrong from the University of North Carolina at Chapel Hill received the ARCADIS Scholarship.

Alma Beciragic from the University of North Carolina at Chapel Hill received the Dave Caldwell Scholarship.

NC AWWA-WEA was represented well in the Pipe Tapping Competition with the City of Concord Smokin’ Bits competing in the men’s division and placing fourth overall, and the City of Raleigh Pretty Tough Tappers competing in the women’s division.
News and Notes

NC AWWA-WEA Staff Member Earns Professional Recognition

ASAE has announced that Nicole Banks, NC AWWA-WEA membership & communication director, has earned the Certified Association Executive (CAE) designation. The CAE is the highest professional credential in the association industry.

To be designated as a CAE, an applicant must have a minimum of three years of experience with nonprofit organization management, complete a minimum of 100 hours of specialized professional development, pass a stringent examination in association management, and pledge to uphold a code of ethics. To maintain certification, individuals must undertake ongoing professional development and activities in association and nonprofit management. More than 4,000 association professionals currently hold the CAE credential. The CAE program is accredited by the National Commission for Certifying Agencies (NCCA).

Correction From Summer 2016

The article “A Toolbox for Sustainable Investments” that appeared on pages 40-42 of the Summer 2016 issue of NC Currents contains an error where two captions and photos were mixed up on pages 41 and 42. The correct photos and captions appear below.

The article also neglects to list Elizabeth Blackwelder as an author in addition to Emily Darr and Todd Buckingham.

A key sustainable component was the use of native controlled low-strength material (CLSM) rather than gravel for pipeline embedment. Field-testing was used to evaluate the feasibility of CLSM; numerous sample pits, pictured, were filled with mixes of different soil types and different proportions of cement content.

McKim & Creed Expands Instrumentation and Controls Services

McKim & Creed, Inc., a national engineering, geomatics and planning firm, continues to expand its instrumentation and controls (I&C) / SCADA (supervisory control and data.

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BUSINESS DEVELOPMENT CONTACTS
Jack C. Harrelson, Jr.
jackh@salmondsdredging.com

Dillard Salmons Stevens
stevensd@salmondsdredging.com
acquisition) services, and is pleased to announce the addition of Jason Davis, PE, to its team. Davis has joined the firm’s Raleigh headquarters as a senior project engineer specializing in I&C and SCADA.

Davis has more than 13 years’ experience with designing and programming instrumentation and controls systems. He is a graduate of North Carolina State University with degrees in both electrical and computer engineering, and formerly worked as an associate with Hazen & Sawyer.

I&C / SCADA systems allow utilities and companies to remotely monitor and control equipment and facilities and access real-time operational and security data. I&C and SCADA are widely used in many industries, including municipal water and wastewater management, oil and gas, food and beverage, manufacturing, pharmaceuticals and telecommunication.

McKim & Creed has provided I&C / SCADA services for more than 20 years, and is currently involved with the City of Durham SCADA master plan and the City of Virginia Beach telemetry and communication modernization project.

“I&C and SCADA are two of the many areas of growth McKim & Creed is experiencing right now,” said Mike Stoup, PE, McKim & Creed’s I&C manager. “Jason brings a wealth of experience and expertise in the fields of electrical and computer engineering, and we are happy to have him join our team of I&C / SCADA programmers and designers.”

McKim & Creed has developed a reputation for being successful adopters and innovators of leading-edge technology. The company was recently featured at the International Esri User Conference in San Diego for its use of unmanned aerial systems (UAS), also known as drones, to save approximately 60% in data collection costs for coastal surveys. McKim & Creed was also included in a Wall Street Journal article about how new FAA rules are encouraging innovation within the UAS industry.

The firm has added more than 30 people to its geomatics staff since the beginning of the year, with a particular focus on expanding UAS, subsurface utility engineering (SUE), hydrographic surveying, airborne and mobile LiDAR, GIS and terrestrial laser scanning services in Texas, Georgia, Florida and North Carolina. McKim & Creed operates 21 offices throughout the US and has nearly 400 employees, 200 of which are geomatics professionals.

Esri, McKim & Creed and 3DR Present Results of UAS Proof of Concept for Coastal Survey

June 22, 2016 - On June 26 at the Esri Imaging and Mapping Forum in San Diego, Esri and McKim & Creed, Inc. will present the results of a proof of concept conducted last month along the North Carolina coast in which several local, state and federal agencies tested the feasibility of using unmanned aerial systems (UAS) for beach monitoring surveys.

Municipalities use beach monitoring surveys to prepare for extreme, shore-altering weather events such as hurricanes. Typically, survey data has been collected using conventional land surveying methodologies, aerial LiDAR and hydrographic surveying. The purpose...
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For Additional Information Contact:

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www.southernenvironmentalsystems.com
of the proof of concept, held on May 16 to coincide with National Hurricane Preparedness Week, was to determine if UAS data collection can yield a comparable-quality deliverable quicker and more cost effectively than traditional methods.

Redlands, California-based Esri and McKim & Creed, headquartered in Raleigh, North Carolina, co-hosted the proof of concept at Wrightsville Beach, North Carolina. McKim & Creed, a nationally recognized geomatics and engineering firm with extensive experience in both UAS and conventional surveying, performed the data collection using 3DR’s Solo platform and SiteScan software. Esri, the world’s largest geographical information systems (GIS) company, processed the data using its Drone2Map software.

Kurt Schwoppe, business development for imagery at Esri, Jason Nyberg, senior project manager with McKim & Creed, Todd King, business developer with McKim & Creed, and Keith Bigelow, vice president of 3DR’s enterprise division, will present the proof of concept findings at Esri’s Imaging and Mapping Forum, which was held June 25-26 in San Diego.

About McKim & Creed
McKim & Creed is an employee-owned engineering, surveying and planning firm with nearly 400 staff members in offices throughout the US, including North Carolina, Florida, Virginia, Georgia, Texas, and Pennsylvania. The company was established in 1978 and is headquartered in Raleigh. McKim & Creed specializes in civil, environmental, mechanical, electrical, plumbing, and structural engineering; I&C/SCADA services; industrial design-build services; airborne and mobile LiDAR/scanning; unmanned aerial systems; subsurface utility engineering; and hydrographic and conventional surveying services for the energy, transportation, federal, land development, water and building markets. For more information about McKim & Creed, visit www.mckimcreed.com.

Schnabel Welcomes Jake Wessell, PE
July 26, 2016 - Schnabel welcomes Jacob (Jake) Wessell, PE to the firm as a business development and technical professional, enhancing our relationships with designers, contractors, developers, and owners throughout the southeast.

Wessell holds a bachelor of science in civil engineering from Duke University and a master’s degree in civil engineering from North Carolina State University, specializing in construction engineering and management. His over 16 years of technical expertise includes managing all aspects of geotechnical and environmental engineering services for Federal (DOD) and State contracts, local government agencies, large industrial facilities, and various other entities. Clients have included Army Corps of Engineers, NAVFAC, NCDEQ, NCDOT, and NC Ports.

By facilitating the expansion of Schnabel’s services to existing and new clients in the Southeast, Wessell will support the firm’s strategic growth, overall business development, client service and project delivery.

A licensed professional engineer in North Carolina, South Carolina, and Georgia, Wessell serves as the current president of the Society of American Military Engineers (SAME) Cape Fear Post, which was awarded the “Top Small Post” of 2015 and is actively involved in leadership development programs through SAME.

News and Notes

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Mazzei Welcomes Jim White to Its Team

Mazzei Injector Company, LLC, a manufacturer of innovative injection systems and fluid processing solutions, is pleased to announce the addition to the Mazzei team of Jim White as Regional Sales Manager.

White brings over 15 years of experience in technical engineering, sales, marketing, and management in the field of water and wastewater with focus in the industrial, remediation, and food and beverage markets. Previously he has held sales and engineering positions with DEL Ozone, H2O Engineering and the PulseOx division of APTwater. White is a US Army veteran and graduate of Cal Poly State University, San Luis Obispo with a bachelor of science in industrial technology.

“My interests have always lied with the technical part of the job and being able to solve customers’ problems, and with Mazzei’s emphasis on research and development and state-of-the-art modeling, I believe it is an exceptional fit,” White said. “Mazzei is well known for its innovative, high-quality products and exemplary customer service, and I am delighted to be part of that.”

Jim Lauria, vice president of sales and marketing for Mazzei, noted that White is well suited for his role with Mazzei considering his background. “We are looking forward to having Jim’s passion for providing cost-effective solutions by focusing on customer needs, attention to detail, and fostering key relationships to make each project a win-win for all stakeholders,” Lauria said.

About Mazzei

Founded in 1978, the Mazzei Injector Company, LLC is headquartered in Bakersfield, California. Known worldwide for its mixing and contacting technologies, the company manufactures patented products and processes including high performance Venturi injectors for municipal and industrial water and wastewater, agricultural, pool/
spa and wine industries. The company also provides complete systems with design and engineering expertise for the various industries. For more information, visit www.mazzei.net or contact the company at (661) 363-6500.

Dewberry Welcomes Water/Wastewater Expertise of Erin Gallimore

Erin Gallimore has joined Dewberry’s Raleigh, North Carolina, office as a staff engineer. She will support the firm’s water group, which specializes in treatment and conveyance solutions, process optimization, and permitting support for the municipal, industrial, and power industries.

Gallimore has nearly 10 years of experience in civil and environmental engineering. She helped create new protocols for grease interception research at North Carolina State University, designed performance-enhancing technologies for municipal and industrial treatment applications, and managed preliminary studies and design of major wastewater pipeline rehabilitation projects. At Dewberry, she will be responsible for designing public-sector and industrial water/wastewater processes.

“We’re excited to welcome Erin to our office,” said Dewberry Associate and Project Manager Katie Jones, PE. “In addition to her strong technical and consulting skills, she has a passion for furthering the professional water/wastewater engineering community as a whole.”

Gallimore received her bachelor’s degree in chemistry and her master’s degree in civil and environmental engineering from North Carolina State University. She is a member of the North Carolina American Water Works Association and Water Environment Association (NC Safewater) and the Professional Engineers of North Carolina (PENC).

About Dewberry

Dewberry is a leading, market-facing firm with a proven history of providing professional services to a wide variety of public- and private-sector clients. Recognized for combining unsurpassed commitment to client service with deep subject matter expertise, Dewberry is dedicated to solving clients’ most complex challenges and transforming their communities. Established in 1956, Dewberry is headquartered in Fairfax, Virginia, with more than 50 locations and 2,000+ professionals nationwide. To learn more, visit www.dewberry.com.

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Formed in 1928, NC AWWA-WEA is a volunteer association operating jointly under one board of trustees as the North Carolina Section of the American Water Works Association (NC AWWA) and the North Carolina Member Association (MA) of the Water Environment Federation (NC WEA). We are dedicated to providing water and wastewater education, training, and leadership in an effort to protect public health and the environment. In striving to be the leading educational resource for water-related issues in North Carolina, we recognize the broad scope of the industry and its reach beyond water sources, treatment plants, and pipe systems and its importance in homes, businesses, and the community.

We have close to 3,000 members in North Carolina representing municipal and private utilities, consulting engineering firms, government agencies, equipment suppliers, service providers, and representatives from academia. Working through a network of committees, our volunteers provide the foundation for all Association activities.

What is NC AWWA-WEA?

**VISION**
(What we strive to achieve)
NC AWWA-WEA: THE leading educational resource for safe water in NC.

**MISSION**
(The purpose of what we do)
NC AWWA-WEA is dedicated to providing water education, training and leadership to protect public health and the environment.
Committed to delivering infrastructure solutions that strengthen communities

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2016/17 Schedule of Events

The following schedule is current as of June 6, 2016. For updates or more information, please contact the organization listed with each event. If a listed event does not reference a specific organization, the item listed is a NC AWWA-WEA event. For further details concerning all NC AWWA-WEA events, visit the NC AWWA-WEA website at www.ncsafeewater.org or contact the NC AWWA-WEA office directly at (919) 784-9030.

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<td>Applications due to participate in</td>
<td>NC AWWA-WEA Leadership Development</td>
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<td>the NC AWWA-WEA Leadership</td>
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<td>18</td>
<td>Wastewater Laboratory Analyst Exams</td>
<td>Wilson, NC</td>
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<td>NCWTFOCB Exams (application</td>
<td>Kinston, Morganton, and Raleigh, NC</td>
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<td>13-16</td>
<td>NC AWWA-WEA Annual Conference</td>
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<td>Contemporary Topics in Water/Water</td>
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<td>Wastewater Construction</td>
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<td>NCWPCSOCC Exams</td>
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<td>Salisbury, &amp; Williamston, NC</td>
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<td>13-17</td>
<td>Coastal Collection &amp; Distribution</td>
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<td>Spring Conference</td>
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<td>Maintenance Technologist School</td>
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<td>Eastern Biological Wastewater</td>
<td>Raleigh, NC</td>
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<td>Operators School</td>
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<td>25-28</td>
<td>Physical/Chemical Wastewater</td>
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<td>Western Maintenance Technologist</td>
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<td>12-15</td>
<td>Annual Conference</td>
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The editors of NC Currents welcome the submission of all articles related to the water and wastewater industry. Themes serve as general guidance for each issue, but articles are not limited to an issue’s specific theme. Submission of an article does not guarantee publication. The editorial committee will review and select all articles, and authors will be notified of the status of their submission.

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<tr>
<th>WINTER 2017</th>
<th>RHow We Prevent Flint – Water Quality Challenges in the News (Submission deadline October 3, 2016)</th>
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<td></td>
<td>What lessons can North Carolina learn from the City of Flint, Michigan’s recent problems with lead in drinking water? Could the same drinking water quality problems happen here? How does the industry prevent such situations? How do we effectively communicate with our customers? This issue will focus on water quality challenges that the water and wastewater industry faces. Topics will include all aspects of addressing drinking water quality challenges: regulatory matters such as the Lead and Copper Rule and complying with future regulations; technical questions such as corrosion control and how to handle iron, manganese, and pH; and public perception issues such as communication, public education, and advisories.</td>
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<tr>
<td></td>
<td>Theme Leaders: Kelly Boone, Tom Bach, Lori Brogden, Marco Menendez</td>
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<th>SPRING 2017</th>
<th>Funding and the Value of Water (Submission deadline early January 2017)</th>
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<td>Utilities often struggle with issues surrounding the funding of water projects. Clean drinking water can be taken for granted. Many people outside of our field may not understand what they pay for in their water and sewer bill. This issue of NC Currents will explore how utilities educate the public about the importance of providing clean drinking water and the protection of our water sources and waterways and then ultimately fund projects. Essentially, how do we get both public and political support to protect, maintain and operate our water and wastewater systems? Examples may include: public education efforts, creative utility invoicing methods, funding options, justification methods for rate increases, and long-term planning efforts.</td>
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<td>Theme Leaders: Steve Hilderhoff, Mike Shelton, Marie Sugar</td>
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As we continue to deliver valuable information through the pages of this magazine, in a printed format that is appealing, reader-friendly and not lost in the proliferation of electronic messages that are bombarding our senses, we are also well aware of the need to be respectful of our environment. That is why we are committed to publishing the magazine in the most environmentally-friendly process possible. Here is what we mean:

- We use lighter publication stock that consists of recycled paper. This paper has been certified to meet the environmental and social standards of the Forest Stewardship Council® (FSC®) and comes from responsibly managed forests, and verified recycled sources making this a RENEWABLE and SUSTAINABLE resource.
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- We use vegetable oil-based inks to print the magazine. This means that we are not using resource-depleting petroleum-based ink products and that the subsequent recycling of the paper in this magazine is much more environment friendly.
- During the printing process, we use a solvent recycling system that separates the waste from the recovered solvents and leaves only about 5% residual. This results in reduced solvent usage, handling and hazardous hauling.
- We ensure that an efficient recycling program is used for all printing plates and all waste paper.
- Within the pages of each issue, we actively encourage our readers to REUSE and RECYCLE.
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