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While it will be spring by the time you get a chance to read this, for me it is only a few days into 2015. We had a very successful conference, and then most of us took a break from our Association work to prepare for the holidays, spend time with family, and celebrate the coming of a New Year. This little break’s sailing equivalent is called ‘heaving-to,’ which is a way of slowing the boat’s forward progress and fixing the helm and sail so that the boat does not have to be actively steered. While most of us were ‘hove to’ during the holiday season, the NC AWWA-WEA staff was working diligently to transition from our old MemberClicks database to our new YourMembership database. This change will further automate the day-to-day data collection and reporting needed for our staff to serve the growing needs of both our members and those to whom we provide our educational services.

While I was ‘hove to’ over the holidays, I spent a few days with my best friend and sailing buddy Neil, whose entire livelihood depends on technology. Neil spends his workdays installing high-end home automation systems. While most of his work seems to revolve around the installation of expensive audio/video equipment, on occasion his clients have him install systems that can control every aspect of their home remotely from a cell phone, to include things like unlocking the door to let people in while you are away (after you see them on a video feed, of course), and automating the turning on of certain lights, music, gas logs, etc., when the garage door is activated.

This brings me to the theme for this issue of NC Currents – “Automation: Making Our World More Efficient.” While ‘our world’ is intended to refer to the world of water and wastewater, it also refers to the world at large. This is, of course, because anything we do in ‘our world’ to improve operations at our facilities benefits the world at large. These benefits include improving the quality of treated water delivered to customers, improving the quality of treated effluent returned to a stream, reducing energy consumption, reducing emissions, and so on and so on. In addition, similar to the home systems installed by my friend, technological advancements can be installed that allow operators to monitor and control their water and wastewater facilities remotely via computers, tablets, and/or phones. It seems we are limited only by our imagination. In a world where everything is a click away, why should or would it be different for the operation of water and wastewater facilities?

I covet new technology and automation, and think it would be cool to have an automated house. I also recognize the tremendous benefits that can be realized when we employ automation at our water and wastewater facilities. In fact, if we did not seek to automate our facilities to the maximum extent practical, we would be doing the public a disservice, as we would not be fully optimizing a facility’s performance.

However, technology and automation is a two-edged sword, because these days it can be too easy to rely on technology and not be fully prepared when our technology fails us. For example, early in my career I was working on a design for a major wastewater treatment plant that I will not name, and came to work one day to find that the superintendent and assistant superintendent with whom I had been working closely had been terminated. Overnight, a major storm had come through and knocked out power to the wastewater pump station that conveyed the majority of this 150-mgd wastewater treatment plant’s flow to the headworks. It had been thought that the pump station had dual electrical feeds, so there was no backup generator, but the storm proved that both feeds were on the same grid. Not to worry, as the city and the pump station designers had planned for this eventuality and there was a pond to collect overflows. So why did the superintendents get

Message from the Chair

Automation Makes Our World More Efficient

Chris Belk, PE, Associate, Hazen and Sawyer, P.C.
the axe? Well, there were two pumps that were set to keep rainwater out of the pond so that it would always have the maximum amount of volume available to contain sewage overflows. Rather than have to go out and drain the pond each time it rained, the operators set the pumps on auto. When the power kicked back on, all the raw sewage got pumped right into the river.

When the power goes out, or when our automated systems go haywire, it is important to have on hand a highly trained and skilled operator who fully understands how the treatment processes function. You may or may not have had an experience similar to the one I had early in my career, but we have all experienced the frustration that occurs when our technological devices malfunction.

On the consulting side, the most common occurrence seems to be a printer malfunction the day the deliverable is due. And we have all had those days where we want to throw our computer out the window, or wish we could get our hands on the information technology support person who told us to check that all the cables were connected. (We have probably had to eat some crow on occasion when the problem actually was that a cable was not connected.) And we all reboot before we even bother to call tech support, because we all know that is the first thing they are going to ask us to try and, quite frankly, for whatever reason, sometimes rebooting works.

Unfortunately, when systems go awry at a water or wastewater facility, public health may be put at risk. And while many of us wish for a little more recognition and understanding from the general public with regard to the pivotal role we play in their daily lives, none of us wants to be in front of a TV camera explaining why a boil water notice is necessary or why 100,000 gallons of raw sewage just got discharged to the river.

So while we are embracing technology and reaping its benefits, we must also be aware that there are times when we may have to function without it. NC AWWA-WEA will continue to strive to provide the highest quality training courses to ensure our front-line operators are well equipped to operate automated facilities and that they have the knowledge needed to operate a facility when the automation is not working.

Please enjoy this issue of NC Currents, and know that I look forward to working with all of you this year. By this time next year, you will all have benefitted from the hard work the NC AWWA-WEA staff did over the holidays that allowed you to check your credit hours earned at the conference almost instantaneously, rather than having to wait until nearly the end of December – barring a server malfunction of course.

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Constant Contact sent out automated (but none-the-less sincere!) Christmas and New Year’s greetings to members. Nicole Banks and Catrice Jones spent many hours over the holiday season, getting the new and much more highly automated Association Management Software System “Your Membership” ready for unveiling in January – in order to provide you, dear members, with more highly automated communication about your membership, your registration for technical sessions and your continuing education units (CEUs).

Automation is the order of the day, not just at work, but at home too. Gifts ordered online, are doubtlessly picked from shelves in distant warehouses by automated equipment, to be shipped with instructions and receipts prepared by automation. Once delivered (although not yet by automated drones), my grandchildren’s haul of presents-under-the-tree consisted mostly of items requiring batteries, to produce automated sound and responses.

Check-in at the airport was automated too: automated baggage carts, dispensed after credit card payment; automated terminals producing luggage tags and printing boarding passes; automated sandwiches dispensed in containers for the flight.

All of this automation has shifted work – less service jobs to take orders, book flights, dispense cash at the bank and instead, more tech jobs to design software and build and maintain machinery to deliver those kinds of services. And of course, with so much more data available about everyone’s purchasing, business and lifestyles, there is ever-more work for analysts and statisticians!

Automation is, of course, a blade with two edges. The cutting edge of technology is thrilling, and allows for dynamic growth and change in knowledge, workplace skills, consistency, reliability, replicable quality, collection of data, increased productivity, and so on.

The other edge of the blade means dramatic changes in the workforce that can leave workers behind if they do not have access to new skills and constantly-evolving training. It can also leave behind businesses, including associations, that fail to recognize that the consumer, client, or member has access to a vast array of choices and in this much more competitive environment, and don’t shift their model of service delivery or array of products and services to align with demand.

Automation has also brought with it a huge expansion in the 24/7 world of work. A fire hose of data and connectivity means no holiday, no vacation, and no wedding or funeral is exempt from the pressure to respond. This requires careful consideration on the part of managers everywhere, about how to provide the workforce with a work-life balance while still meeting the requirements of customers and members. Perhaps some of you saw the delightful cartoon movie Big Hero 6, in which Baymax, a robot, is programmed to provide diagnoses, check the vital statistics of human patients, and deliver health information… but Baymax lacks understanding of human emotion.

In October, I had the chance to see firsthand, how precision in technology and relentless connectivity intersects with health needs. I ruptured a tendon in the arch of my foot, and was forced to have my foot reconstructed three weeks before the Annual Conference. Sophisticated MRI and imaging effects provided a perfect diagnosis and the opportunity for the surgeon to plan and execute a perfect repair. Automation was omnipresent in the hospital setting – delivering medication and monitoring vital signs of every kind. In 24 hours of hospitalization, I saw almost nothing of nurses who, no doubt, were able to remotely see all necessary monitoring reports. I could speak to them remotely, and they could respond in kind, but no human hand was there to hold, or press a cool cloth to the forehead.

As a driven, connected, hyper-alert and very self-sufficient person, I found this surgery to be the equivalent of hitting a concrete abutment on a freeway at 100 miles per hour. It knocked me into a primordial state in which I yearned for disconnection, wanting only to be inert, to have rest, warmth, and human emotion.
nurture of the most basic kind! This was absolutely the very thing not to be had for love or money. The world of work communication flowed on relentlessly, requiring – nay, demanding response. Automation made it impossible to retreat to a cocoon. The show had to go on, and it did, and I did the same.

Through all of it, I gained a unique keyhole view of what matters most if we are still to have a world in which humans’ need for rest, solace, kindness, and healing can be met. The good intentions of Americans with Disabilities Act have wrought engineering marvels – some of which work, and some of which, lack thought and perspective. It was not the durable medical equipment giving me mobility the instant I awoke from anesthesia that saved the day, no, it was Bob Norris, who took one look at me, and without a word, brought a garbage can over to lift and support my gnawing foot on the exhibit hall floor. It was WEF Executive Director Eileen O’Neill, who, without a word, simply went out of the convention center, and found somewhere, a cup of hot, black tea with milk and sugar, and carried it to me in the latter half of a 19-hour day. It was Mark McIntire who lifted my spirits with his acknowledgement of the physical and psychic effort that it took me just to be present in the room. It was the friend, who without a word, carried my newspaper up the hill and placed it at my door each day for six weeks, and another, who picked up prescriptions and brought them over with milkshakes to share!

I can say with authority now, that although I have lost none of the wonder, amazement, excitement and appreciation for the marvels of automation, I have gained an even more profound appreciation for the anticipatory impulse of kindness, understanding, and gentleness that is innate in some of my fellow humans. Automation can be an augmentation of human capabilities, but at present, it is not a replacement for human insight, compassion, anticipation, and touch.

We live in a brave new world where change is the order of the day, and technology begets still more change and ever-more sophisticated technology. We, however, remain mortals of flesh, bone, blood, nerves, and soul, always in need of a cup of kindness. It is the connection that we have with one another – it is our families, our friendships, our association with one another in our world of work and play – that makes life worth living.

The NC AWWA-WEA board, exceptional volunteer leaders and staff are keenly aware of the need and responsibility to better understand your needs as members and to refine and enhance the products and services we deliver to ensure that you have from this organization, the information, training, and leadership skills to be at the top of your professions. The Institute program that aligns training with utility director and training coordinator requirements is one of the changes we are implementing this year. Another is the development of Career Ladder training – packages of training to fulfill knowledge and skill requirements to allow you to climb the career ladders in each of your chosen professions. All this change has required mighty changes in our data management, and those of you who have registered for training in this first quarter of the year will already know it.

Whatever else we change in our increasingly automated world, let us pledge that we will not forget for a moment that we owe one another thoughtful consideration so we can anticipate some of the needs of others, the grace to fill those needs without being asked, and the appreciation that we owe one another the human touch.

At NC AWWA-WEA, it is our hope, our goal, our mission to make sure that this organization will be one where you feel welcomed, supported, and where you continue to connect human-to-human.
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The following actions were taken:
• AWWA Visiting Officer Michael Simpson, vice president of AWWA, and WEF Visiting Officer Eileen O’Neill were welcomed, and offered their greetings.

1. Strategic Governance
— discussion of the following:
• Dashboard review – Endowment has been added under Objective #1 so progress can be tracked. It was the consensus of the board that excellent progress has been made in 2014.
• Branding Task Force – Chair Osborne commended Task Force (TF) Chair Julie Hellmann and members of the TF for their excellent work. AWWA has approved changes proposed for the new website. AWWA will establish a group to resolve branding issues common to joint associations and NC AWWA-WEA will participate in the group to ensure equitable brand presence exists for both national entities on all Section/MA material.

2. Action Items:
• Accepted the election results presented by the Nominating Committee. Committee Chair John McLaughlin was praised and thanked.
• Adopted the 2015 budget as presented.
• Approved revisions to the Web Site Privacy Policy.
• Approved a change to the Maintenance Certification Policy, allowing six hours of continuing education in either water or wastewater to qualify for renewal of the certificate.
• Ratified the electronic board vote of November 3, 2014, approving NCRWA’s request to reference NC AWWA-WEA in conversation with North Carolina Industrial Commission regarding pricing of training offered by NCIC.
• Approved the Leadership Mentoring Program Outline submitted by Barry Gullet.

3. Chair’s Report:
• First Career Ladder Academy training modules will start July 2015. A group of utility directors met Monday, November 17, to receive information about the Academy and provide continuing input. NC DENR staff continues to provide input and is supportive.
• Endowment Summit Meeting was held. The board has contributed a total of $123,500 since 2009, including initial fund donations, administrative costs and fund expenses. Frank Stephenson has added $5,000 to his initial $25,000 pledge. It is recognized that Endowment differs from other committees as it is a board-directed activity, with the committee existing to fulfill board direction. Agreements have been reached on board and Endowment Committee roles and responsibilities. Regular updates will be provided at each board meeting to ensure good communication.
• Executive Director Roberts’ annual review has been concluded by the Executive Committee, with high marks given. The 2015 Annual Management Contract has been executed.
• Chair Osborne expressed appreciation for an excellent year and a life-changing experience.

4. Executive Director’s Report:
• New staff member Erin Mallis was introduced.
• Membership report was received.

5. Consent Calendar:
• Approved minutes of the meeting of September 18, 2014.
• Accepted the treasurer’s report for September and October 2014.
• Accepted the annual reports from committees as submitted.

6. Other Business:
• Greg Morgan expressed appreciation for board support to have the 2013 Operations Challenge Team participate at WEFTEC in New Orleans and invited all to the Operations Challenge events during the conference.
• Barry Gullet recognized Jackie Jarrell, member of the WEF.

7. Next Meeting:
Wednesday, November 19, 2014
Summary of the NC Section AWWA and NCWEA Board of Trustees Meeting
November 19, 2014 at the Benton Convention Center, Winston-Salem, North Carolina.

The following actions were taken:

• WEF Executive Director Eileen O’Neill thanked the board for the hospitality provided and noted the unique character of NC AWWA-WEA. Partnership with MAs is very important to WEF and WEF board will work to sustain the relationship with MAs.

• AWWA Vice President Michael Simpson thanked the board for the hospitality provided and commended NC AWWA-WEA as a well-run professional organization. He is impressed by staff, volunteers, the volume of work, and the participation of vendors in the conference. He offered help and support for efforts to resolve branding issues with AWWA.

1. Chair’s Report:
• Calendar of board meetings for the year was provided.
• Board contact list was distributed.

2. Executive Director’s Report:
• Schedule of bank accounts was provided.

3. Action Items:
• Approved the Annual Conflict of Interest Statement.
• Approved the Bank Resolution, establishing signatories for accounts for 2015.

4. Strategic Governance – discussion of the following:
• Received an overview of the endowment program from Endowment Committee Chair Carlos Norris. A review of the Endowment Policy will be conducted in 2015 by a subcommittee of the Endowment Committee, for board review and approval. An increase in the size of the Endowment Committee was requested. Board assistance was requested in explaining and publicizing the endowment. Reports will be included in each board packet. The board concurred that a goal of $1 million within 10 years is reasonable.
• Staff was asked to develop a summary overview in checklist format for each policy in time for the May board/committee workshop.
• Staff was asked to develop a draft Board Grant-Making Policy for board review.
• John McLaughlin was appointed to chair the new Leadership Mentoring Program.
• Additional recognition for awards to utilities will be a goal.

5. Consent Calendar:
• Committee chair appointments and board liaison appointments to councils was approved.

6. Other Business:
None.

7. Next Meeting:
• Thursday, January 29, 2015 at 10 a.m. at CMUD, 4222 Westmont Drive, Charlotte, NC
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### 2015 Committee Chairs and Board Liaisons

(This list is current as of December 10, 2014)

For more committee information visit individual committee web pages on www.ncsafewater.org.

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<tr>
<th>COUNCIL CHAIR:</th>
<th>Conference/Role</th>
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<tbody>
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#### Board Committees

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<tr>
<td>Jackie Jarrell</td>
<td>Charlotte Water</td>
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#### External Affairs Council

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<td>Leslie Jones</td>
<td>GHD</td>
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<td>Sherri Moore</td>
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<td>Chuck Willis</td>
<td>Willis Engineers</td>
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<td>Carlos Norris</td>
<td>Crowder</td>
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<td>Jana Stewart</td>
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<td>Maggie Pierce</td>
<td>Hazen and Sawyer</td>
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<td>Nick Dierkes</td>
<td>Brown and Caldwell</td>
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#### Technical Program Council

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Committee Spotlights

Membership Services
The Membership Services Committee actively seeks to engage new and existing members in the organization. “We work to retain members by encouraging active involvement and ensuring we are meeting members’ needs and expectations,” says Chair Jana Stewart. “Our committee works alongside various other committees to plan, promote, and encourage participation.”

Meetings are held monthly by teleconference, interspersed with a few face-to-face meetings, including one at the Annual Conference. The committee seeks out volunteers who help contact existing members to encourage participation and solicit feedback on the organization and meeting their needs. “We also need volunteers to help plan and organize the Growing Relationships and Opportunities through Water Resources (GROW) events, which take place in various cities around the state,” says Stewart. “We are always looking for fresh ideas to show membership appreciation and to better improve our membership engagement.”

Membership Services reaches out to first-year members to help encourage engagement with phone calls and emails, while also providing welcome packets and personalized follow-up to new members.

Throughout 2015, the committee will continue to oversee the GROW events, reach out to new and existing members, and work with existing committees to help recruit and engage members. “We have an active focus on involving our young professionals in the organization,” says Stewart.

She is well placed to understand their needs. With 10 years of experience in the field, the water resources engineer is right on the edge of the Y and the X generations. “I am able to relate to our younger members but also to reach out and engage our more experienced members,” she notes, adding that she is looking forward to the challenges and opportunities of her first year as chair.

Nominating Committee
Every year, the Nominating Committee prepares a slate of officers to serve on the board of trustees for the NC AWWA-WEA. The committee reviews all nominations and selects candidates that are the most qualified to meet the needs of the Association.

Meetings are held two to three times a year and combine face-to-face interaction with conference call and teleconference participation. Members of the Nominating Committee serve for a period of two years and are appointed by the chair of NC AWWA-WEA. The previous year’s past chair serves as the chair of the committee. There are a total of six members including the chair, with two members rotating off each year while two new members are appointed.

“Last year, we successfully provided a slate of officers that were approved by the membership,” says 2015 Nominating Committee Chair Jackie Jarrell. “In the last couple of years, the Nominating Committee continues to find ways to educate members on the board roles and responsibilities. We hope this will help people to understand the expectations of serving as a member of the board of trustees.”

The committee will hold its introductory meeting in April, during which members will organize activities for the coming year. Also on the agenda is a discussion of ideas or suggestions for any changes or improvements that might be needed. The committee will then go through the process of calling for nominations and selecting the slate of officers to be presented to the membership for approval in September. Jarrell has been a very active member of the NC AWWA-WEA for many years. She has served as chair of many committees as well as chair of the NC AWWA-WEA, and is currently serving on the WEF board of trustees. “I am very committed to our Association,” she notes. “It is important to me that we find a well-rounded group of people who are strong leaders and can serve the needs of the NC AWWA-WEA and our members. I would like to encourage anyone who has a strong desire to serve the NC AWWA-WEA as
Committee Spotlights

External Affairs Council
The External Affairs Council groups similar-focused committees so they can exchange ideas and share resources in areas that make sense. “I try to participate in the various committees’ regular meetings,” says Council Chair Leslie Jones, adding that there are also several members who ‘overlap’ among the committees. “The overall External Affairs Council only officially meets together once a year at the board/committee workshop.”

In between, the various committees occasionally meet in person, but they mainly connect by conference calls in order to make the most efficient use of everyone’s time. Members assist the council by helping to organize bi-monthly Growing Relationships & Opportunities through Water Resources (GROW) events, mentoring and talking to the student chapters, judging regional science fairs, and helping write an article for NC Currents to highlight a project on which they worked, among other activities.

“Each committee has big challenges and exciting plans,” says Jones. “We just need to help guide them in the right direction, in support of the Association’s mission, and help provide enough resources to make these great things happen.”

Jones has been involved with the Association during her entire 15 years working as a consultant in the Charlotte area. “I remember what it was like being a new committee member and not fully grasping the full reach of the various committees’ activities and overall goal of NC AWWA-WEA,” she says. “Using my experience from each level of the Association, I hope that I am able to help make each committee chair’s responsibilities easier and that I can be a helpful resource for them by getting them the information and resources they need to be successful.”

Communication Committee
The Communication Committee is dedicated to promoting NC AWWA-WEA’s water education, training, and leadership opportunities through electronic, social, and printed media. A primary focus of the committee is to enhance communications to all Association members and non-members through the website and publications (e.g., NC Currents magazine).

Together, our volunteers establish the NC Currents publication themes, theme descriptions and theme leaders for each quarterly issue of NC Currents,” explains Chair Sherri Moore. “This is essential to the publication’s overall consistency and success.”
Committee Spotlights

The committee has at least three in-person meetings and three teleconference meetings annually. In-person meetings are held in November during the NC AWWA-WEA Annual Conference and in Raleigh during the spring and summer. The three teleconference meetings are conducted about a month before an issue’s submission deadline to discuss potential articles, set member portraits, and determine the status of the plant spotlight. Other available committee members are welcome to participate. If time and scheduling allow, this discussion may be held during one of the committee’s in-person meetings.

Specific roles on the Communication Committee include chair, vice-chair, editorial coordinator, theme leaders, editorial subcommittee member, and website/electronic subcommittee member.

Over the past year, the Communication Committee has taken a more active role in consulting with other Association committee chairs, forging liaisons opportunities when tasks/goals/functions are similar in nature with the other committees, while encouraging collaborative efforts and support through the Communication Committee forums.

In the months to come, the committee will continue to oversee the website and the content of each publication in order to provide high-quality media, which promotes the Association’s goals and is resourceful to our members. The Editorial Subcommittee and its associated staff will be responsible for developing the review outline and schedule for each publication, providing editorial review following the established Style Guide in order to assure high quality material, coordinating with staff members working with the NC Currents magazine publisher, and completing other related tasks. Meanwhile, the Electronic Communication/Website Subcommittee and its associated staff will be responsible for coordinating employment advertisements, developing electronic policies, and recommending changes for the continuous enhancement of the Association’s website.

Endowment Committee

The board of trustees created the Endowment Committee to ensure that a dedicated group of members would be available to focus on building and managing the endowment fund while developing and promoting the scholarship program, as well as administering the application and award process. Responsibilities also include helping to build a philanthropic culture within the Association to ensure the long-term sustainability of the endowment program.

The committee meets at least quarterly, but more often if needed. Additionally, task force groups are formed, as needed, for such work as developing a brochure to market the program or researching foundations to learn about possible ways to enhance the NC Safewater Endowment Program.

At least one meeting is held in person, with most others conducted by conference call or a combination. The focus is on encouraging participation and capitalizing on the knowledge and skills of all members. Fundraising is the primary responsibility of the committee, so members are asked to agree to talk with NC AWWA-WEA members at schools, conferences, and in all committees. This past year a task force prepared a frequently-asked-questions guide that gives all committee members the answers they need to feel confident in reaching out.

Committee members also help organize fundraising events, such as the auction at the Annual Conference. Volunteers are enlisted to help with this event, as well as with reviewing applications for scholarships, to ensure that applicants are qualified before the applications go to the Selection Committee.

A total of $35,000 was raised in 2014 from various activities, including the auction at the Annual Conference and a Board Challenge Match of $5,000. Meanwhile, a task force developed a brochure profiling the endowment program and the winners of scholarships.

Last year, the Endowment Committee also began to work with Water For People, which is the other philanthropic activity of NC AWWA-WEA. “Water For People is the ‘external’ focus of our giving, with funds raised going to help those in developing nations to gain access to clean water,” explains Carlos Norris, chair of the Endowment Committee and president of Crowder Construction. “The NC Safewater Endowment is the ‘internal’ focus of our giving, seeking to grow interest and awareness of the water profession to ensure that the
best and brightest will choose to make water a career.”

The fundraising goal for 2015 is $50,000, the ultimate goal being to have the fund reach $1 million so more and larger scholarships can be awarded. Committee members are committed to fundraising activities and to promoting awareness of the scholarships, so as to ensure more applicants.

“We are working this year to plan an appreciation event for donors,” adds Norris. “We will solicit short essays and profiles of the winners of scholarships to help members understand and appreciate the importance of supporting the program.” He adds that the committee is always seeking ways to appreciate those who establish named funds.

“Crowder became a named fund donor for the NC AWWA-WEA Endowment Fund,” notes Norris, “because of our desire to ensure that there will be others attracted to our important industry to continue the work that we do. I love the work and the people in the industry, and truly enjoy the opportunity to help others join our profession.

Building an endowment program that will allow the profession to flourish in the future is a legacy that we look forward to leaving!”

Public Education Committee
The Public Education Committee (PEC) works to identify opportunities for all citizens of North Carolina to learn about the water environment through special events, classroom presentations, student competitions, and public service announcements, as well as other events. The PEC strives to bring awareness to the water industry and the services provided to the people of North Carolina.

“We also provide opportunities for committee members to be engaged with the public,” notes PEC Chair Maggie Pierce.

Meetings are held quarterly via conference call, along with two in-person meetings, one at the Annual Conference and one in April. “We have periodic opportunities to present to student or public groups,” adds Pierce, adding that this is something she enjoys greatly.

“While in college, I worked with a Christian organization, Young Life, in which I worked with high school students as a mentor. From there, I gained a love for younger people and teaching them and guiding them. The PEC allows me to merge both the science and the caring for others.”

PEC members can interact with students during its major events, which include the annual fall Model Water Tower Competition, science fairs, and a poster contest. “As a committee, we attend the regional science fairs in the first quarter of the year and present special awards to students whose projects are related to the water and wastewater fields,” explains Pierce. “From these science fairs, we identify projects by high school students to send on to the Stockholm Junior Water Prize competition. We also hold a
poster contest for students in which they depict an annual theme chosen by the committee about water conservation.”

Goals for the coming year include increasing participation at the regional science fairs and bringing back the distribution of world water monitoring kits to local classrooms and teachers.

Water For People Committee
The North Carolina Water For People committee is a state chapter of the national Water For People organization. “Our mission is to provide safe drinking water and sanitation for everyone forever,” says Chair Nick Dierkes. “Currently, we accomplish this by working with local communities in nine targeted countries. Our local committee is tasked with fundraising, increasing awareness of the Water For People mission, and performing in-country work as opportunities arise.”

The committee meets once every two months, typically on the last Friday of the month. Members meet in person in both Raleigh and Charlotte and a conference call option is available for those who cannot physically attend.

Members organize a variety of fundraising events, including an annual golf tournament and 5K Fun Run (in both Charlotte and Raleigh). “We also look forward to engaging in a variety of social and educational events throughout the year,” says Dierkes. The national Water For People organization provides in-country work trip volunteer opportunities at www.waterforpeople.org.

The committee continues to host successful fundraising events and, thanks to the support of NC AWWA-WEA members, was able to raise nearly $10,000 for Water For People in 2015. Earlier this year, thanks to Neptune Technology Group’s participation in a matching donation program, we were able to magnify the committee’s contributions by approximately $8,500,” says Dierkes. “We are looking forward to another successful year in 2015, especially as we collaborate more effectively with the other NC AWWA-WEA outreach committees. Please stay tuned for more details on our events throughout the year.”

A professional engineer with 10 years of consulting experience and eight years on the committee, Dierkes has a strong interest in the Water For People mission and the community benefits provided by the organization. “I feel that volunteering is an important responsibility,” he says, “especially when the mission aligns so well with the work we perform everyday.

Students & Young Professionals Committee
The Students and Young Professionals Committee (SYP) revolves around providing opportunities for both students and young professionals to network with one another and participate in NC AWWA-WEA. The committee is also focused on developing the interests of students and young professionals, informing other Association members about the value and unique contributions of their younger members, creating and maintaining student chapters, and promoting young professional involvement in other committees. Conference calls are held on a monthly basis, and every other month an event is organized that anyone is welcome to attend.

The committee is always looking for members to help provide event ideas and assist in planning and holding these events. This year the committee has expanded and is currently comprised of two sections, with one in the Charlotte area and the other in the Raleigh area. Each section consists of a chair, vice-chair, social chair, and social-media chair positions.

In the coming year, the committee plans to organize quarterly events in both sections. “We will be distributing information about these events through emails, Facebook, Instagram, and Twitter,” says Chair Derek Dussek. “Anyone is free to join, see what we are doing, and post. You can find us through the following. Facebook: NC AWWA-WEA YPs. Instagram: ncawwaweyp.”
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In 2015, Greg Czerniejewski is marking his 24th year in the field of automation. As senior automation engineer for CDM Smith and past chair of the NC AWWA-WEA’s Automation Committee, he has had plenty of opportunities to contribute to the water and wastewater industry. “Even though I am not chair anymore, I am still planning to remain involved with the committee,” notes Czerniejewski.

He is currently involved in the planning process for the forum at the Spring Conference in which members will be able to ask questions from a panel of experts. The subject will be Wireless is here: How can it benefit my utility? “We plan to get the utilities involved in discussing how they are using wireless technology,” says Czerniejewski, adding that a similar type of moderator-led, question-and-answer format used at the conference a few years ago was very successful.

The automation engineer is only too aware of how important it is to bridge the gap between theory and practice, design and implementation. His career has taken him to ‘both sides of the fence,’ from systems integration in the field to automation design in the office.

In 1991, when he graduated with a degree in electrical engineering from Washington University in St. Louis, finding a job in his field of study proved difficult. His first job was as a systems integrator for a company that bid on building water and wastewater treatment system designed by consulting engineers. A large part of his job involved connecting process instrumentation that measured pressure, flow, and level to programmable logic controllers (PLCs) and remote terminal units (RTUs), which were then connected to computers for monitoring and control. That allowed operators to start pumps, open valves, monitor parameters, and prepare reports without constantly making rounds to make sure the plant was functioning. Systems integration made it possible to obtain information from pump stations and elevated storage tanks without having to drive out to physically see what was going on. Another part of his work involved being a field service engineer, going to different plants and calibrating instruments, connecting wiring to control panels, and ensuring everything was running smoothly.

“I got involved with water and wastewater back then and I never looked back,” recalls Czerniejewski, adding that when he graduated with an electrical engineering degree, he foresaw himself doing research and development (R&D) with chip or circuit design. “I would much rather be doing what I am doing now. Taking a consulting engineer’s water or wastewater project design and implementing the instrumentation and controls (I&C) automating processes and solving problems provided me with invaluable experience. So it’s been a blessing in disguise that my career has been in environmental engineering.”

In 1994, he accepted a position with Hi-Ran Systems, a systems integrator in Florida, where the Czerniejewskis had moved to be closer to his wife’s family. His new role expanded his automation experience, involving more opportunities to perform PLC and human-machine interface/supervisory control and data acquisition (HMI/SCADA) programming as well as a substantial amount of travel – in fact, more than he wanted “Almost every week during my last 16 months with them, I would leave Monday morning and come home Friday evening,” he recalls. So when CDM offered a position as a consulting engineer in 1997, he was happy to accept.

During his employment at CDM, his father-in-law was transferred to IBM’s campus in Research Triangle Park in North Carolina. In 2002, due to his father-in-law’s health issues, the Czerniejewskis moved to North Carolina, with Greg taking a job at Lord & Company as a project manager in Durham. “I would have stayed with CDM and had wanted to transfer to the Raleigh office, but the business climate was different then and it was important to CDM to have me working in their design center in Orlando,” he explains.

As a project manager with Lord & Company, Czerniejewski was designing control panels, preparing submittals, creating project schedules, and managing accounts receivables. “I was back in the field doing instrument calibrations and start-ups,” recalls Czerniejewski, “as well as performing project management tasks in the office. Many systems integrators are small companies, so you end up doing a lot of different things. The wide variety of
engineer makes it a great place to learn about automation.”

On the other hand, he did not see a small company as being a place where his career was going to grow. So in 2008, Czerniejewski approached his former employer CDM Smith, and this time they were pleased to have him in the office. “For several years, they had been talking about expanding the Raleigh office into a design center, similar to the office I had been working at in Orlando, he explains. “They were ready to add automation to the list of services being supported locally in North Carolina.” At the time, CDM Smith had a backlog of programming projects in the Southeast.

After his return to CDM Smith, the automation engineer spent the first one to one-and-a-half years going to sites and starting up systems, just as he had done as a systems integrator. But now he had a new challenge. The software integration services being provided by CDM Smith involved performing the PLC and HMI/SCADA programming and coordinating with systems integrators who would provide the control panels, field instruments, and hardware start-up services. Czerniejewski’s unique combination of expertise made it possible for CDM Smith to continue to grow its business in the area of stand-alone Automation projects. He noted, “The timing was perfect for both of us – me for my career goals and CDM Smith to manage workloads and to grow in the mid-Atlantic region.”

Today, he is involved mainly in project management and automation design, including a Charlotte Water combined heat and power project that is using digester gas as fuel for a generator engine that will put power back on the grid. In addition, the generator jacket water and engine exhaust will be harnessed as a heat source for the hot water loops that provide heat for the facility and for the sludge digestion process. “Any of these kinds of projects are going to require some level of customization and automation,” he notes. “The challenge with this project will be to take the packaged systems from the gas conditioning skid and generator vendors and integrate them into Charlotte Water’s existing in-plant SCADA system.”

A few months after re-joining CDM Smith, Czerniejewski became a member of the NC AWWA-WEA’s Automation Committee. His first official role was serving on the program sub-committee, finding speakers for the committee meetings. He then volunteered to be vice-chair and subsequently became chair in 2012, eventually serving a two-year term.

While serving as vice-chair, Czerniejewski worked with his committee chair, Don Dickinson, to form a security subcommittee with the goal of making the Automation Committee a resource to the Association on the topic of cyber security. During his term as chair, the committee held its annual operator’s training seminar as well as its first webinar, followed by two more webinars in his second year as chair. This year, members of the Automation Committee, along with several other committees within the Association, will be very involved with the NC AWWA-WEA’s newest initiative: Institute Training. Czerniejewski explains that the Association will be approaching the large utilities to ask them about the areas in which their operators need training.

“So instead of each committee planning seminars with topics that they think the utilities would want,” he explains, “a customized training curriculum will be developed and implemented by Association volunteers. After they create the agenda to meet the needs of the utility’s operations staff, the Association will set aside a number of seats to sell to any other interested individual in the area.” To assist the Automation Committee in providing automation content for Institute Training, he is working with Terry Draper of HDR to organize past presentations into a kind of “training catalog” of topics that can be presented on short notice. The catalogue will also serve as a marketing tool for the Association to start the conversation with the utilities about the types of topics on which they would like to receive training.

“The utilities are really going to like this approach,” predicts Czerniejewski. “The challenge is going to be how we as committees can support that. It’s going to be an exciting year for the Automation Committee as we try to assist the Association in its vision of being the leading educational resource for safe water in North Carolina.”

Member Portrait

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The year 2015 promises to be an exciting one for Rick Riley, water/sewer maintenance plant superintendent for public services at the City of High Point. "You never know what a day is going to hold and what opportunity is out there," says Riley. As the new assistant chair of the Automation Committee, he will join Devon Carroll in leading the committee forward as it continues to grow. Meanwhile, it has only been a few months now since he signed the adoption papers to formalize the addition of his new 19-month-old son to the family. Life is guaranteed to be interesting.

Not that life has ever been dull for Riley. After graduating from high school, he joined the Marines as a reservist while working for United Parcel Service. He then decided to pursue a bachelor of applied science degree in information technology from Davison Community College, returning to UPS after he graduated in 1996.

Then one night in karate class, an instructor introduced him to a man who was looking for IT help. Going out on a limb, Riley decided to take the entry-level position, despite the fact that it meant a significant cut in pay and lost benefits, including several weeks of paid vacation. "I knew that, in the end, that's where I wanted to be," recalls Riley. "To me, money wasn't everything and to be happy was more than anything. I knew the money would come once I had the experience."

Riley worked at the firm for six years before setting out on his own as an independent consultant. He managed to secure some very large contracts, including one with Unilever that involved around 248 computers. Unfortunately, in 2006, Unilever decided to pull out of Asheboro.

At the same time, the husband – and a current City of High Point employee – of a woman who worked for Unilever called Riley to let him know there was an opening at the water and sewer department with the city's Public Works. Fortunately, Riley had served as an electronics technician specialist during his six and a half years with the Marine Corps Reserves. Applying for the job in that capacity, he was told that what they really wanted was someone who could take care of their IT system. "That fit my bill perfectly," recalls Riley. "I told them about my experience and they were highly pleased."

For five years, he worked for the City of High Point's Public Works Department in the position of electronics technician I. During that time, he was responsible for IT-related items as well as SCADA, including helping to implement the central maintenance management system. Using an 'asset tree,' the work order system helps users to more fully understand the operations of the water and wastewater plants as well as the 28 pumping stations.

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Then, in 2012, the position of assistant superintendent opened up. “During my eight years with UPS, I spent four years in supervision, so I had management experience,” says Riley, adding that he loves to deal with people. “So I decided to take a shot at it.”

The rest is history, of course and, since then, he has continued his movement up the ladder of the Public Works. After six months as assistant superintendent, he spent eight months as acting Superintendent before being hired permanently for the position. “My boss then pointed out to me that I was at a stopping point based on my education,” recalls Riley, “and that if I wanted to keep going up the chain, I would need a higher level of education.” The very next week he signed up for college. He is now only 12 courses away from a bachelor’s degree in business administration.

Not long after he was promoted to superintendent, Riley received a visit from his predecessor, Terry Houk, who also happened to be the founder of the NC AWWA-WEA Automation Committee. “He said that would be a perfect committee for me to join and he would like me to represent the City.” After a year on the committee, Riley received a call from then outgoing chair Greg Czierniejewski, asking him to join Devon Carroll as the assistant chair.

He describes his experience with NC AWWA-WEA as “a real eye-opening experience. I've met a lot of interesting people in a lot of different venues, from salesmen, to workers out in the field to the professionals who put the pieces together,” says Riley. “It’s helped me out because I’ve actually been able to use several of the people whom I’ve met for our needs here with the city.”

Last year he attended his first NC AWWA-WEA Annual Conference, an experience he enjoyed immensely. “I was able to put a lot of faces to a lot of names,” he explains. “I enjoy volunteering, meeting people, and finding out what they do.” He is looking forward participating in the in-person and Web Ex meetings of the Automation Committee in the coming year.

“I’ve met a lot of interesting people in a lot of different venues, from salesmen, to workers out in the field to the professionals who put the pieces together.”
General
The City of Winston-Salem is the county seat of Forsyth County. The Winston-Salem/Forsyth County Utility Commission operates three water treatment facilities, which produce 91 million gallons per day (mgd) of drinking water. The Neilson and Swann water plants treat 48 and 25 mgd, respectively. The R.A. Thomas Water Plant treats 18 mgd from Salem Lake and the Yadkin River. Portions of the original R.A. Thomas Water Treatment Plant (WTP) were commissioned around the turn of the century (1900). Over the years the Commission made many additions and modifications, however there were no major investments made to upgrade the original infrastructure. After evaluating the existing facility, the City decided to demolish the old plant due to the condition of this aging infrastructure and build a new facility that would implement automated water treatment processes and serve the long-term needs of the community. The construction of the new R.A. Thomas WTP began in September 2008 and was completed in September 2011 for a total cost of $55,316,454.

The R.A. Thomas Plant is the only dual source water plant in the City of Winston-Salem system. The plant can withdraw water from Salem Lake and also receive water from the Yadkin River via an approximately 11-mile long raw water transmission main from the Neilson WTP. This dual source system provides reliability and redundancy for the Thomas WTP.

Thomas Plant personnel maintain an aeration system in Salem Lake to provide consistent raw water quality during the summer months. The aeration system minimizes algae growth and prevents seasonal water quality issues associated with lake turnover events in the spring and fall of the year.

Treatment Processes
The R.A. Thomas Plant has two treatment trains each comprised of two rapid mix chambers, one flocculation basin with three mixing zones, one sedimentation basin, and two mono media filters. The plant has two 1.5-MG clear wells and four 6.0-mgd (600 hp) finished water pumps. The wash water and residuals handling facilities are composed of a 0.545-MG reinforced circular concrete equalization basin with four 780-gpm pumps that pump to a wash water clarifier with a maximum weir loading rate of 7.24-gpm per foot. The Thomas Plant uses a residuals pumping station to pump heavy solids from the sedimentation basins and clarifier to two residuals lagoons each with a capacity of 2.1 MG.

The R.A. Thomas Plant employs conventional treatment using 17% aluminum sulfate for coagulation, step down flocculation, sedimentation, and mono-media filtration. The facility has been designed for easy upgrade of plate settlers when increased loading rates would be required for the basins. The WTP is also designed to accommodate the addition of future treatment technologies such as ozone and UV disinfection. Currently, the plant uses free chlorine for disinfection and feeds 10% sodium hypochlorite prior to and after the filters. In addition, the plant can feed potassium permanganate to the Salem Lake raw water to assist with taste and odor events and to control iron and manganese prevalent in the lake raw water. The plant also feeds 24% fluorosilicic acid to prevent dental carries, zinc orthophosphate for corrosion control and 50% sodium hydroxide for pH adjustment (for both pre and post alkali adjustment).
Automation

The R.A. Thomas Plant is completely automated through Programmable Logic Controllers (PLC) and Supervisory Control and Data Acquisition (SCADA) monitoring. The SCADA system consists of nine workstations located throughout the plant that use Wonderware™ as the Human to Machine Interface (HMI). Each major treatment system (filters, chemical feed, residuals, finished water pump station, etc.) is controlled by at least one PLC. Some systems (chemical feed and filters) require multiple PLCs to prevent hardware faults from affecting a process. Each part of the process can be operated in an automatic or manual mode depending on Operator choice. Filter operations, for example, are normally operated in an automatic mode where operators initiate a backwash sequence and the PLC program runs the filter backwash. The filters can be operated manually, if needed, and the operators can control the valve sequencing through a virtual filter panel in the SCADA interface.

The network is broken down into three subnets. The first subnet is the SCADA network. All SCADA workstations reside on the same subnet and move information between each other. The PLCs reside on a separate network and only connect to the SCADA system through two input/output (I/O) servers (two of the workstations are designated as I/O servers). The I/O servers act in tandem as a redundant gateway to channel information from the PLCs. In addition to communicating with the SCADA system, the PLCs communicate with intelligent Motor Control Centers (MCC), valves, and analytical instruments over a third subnet. The plant has several instrument panels that allow operators to monitor the process at each stage and use the information to make process decisions. Every two hours the operators run laboratory analytical rounds to verify the process instrumentation is reading correctly.

The core network inside the building uses Modbus® TCP protocol over Ethernet on copper cabling between the PLCs and SCADA systems. In addition, network communications between the buildings use the same protocol but on fiber optic cable. The PLCs use a combination of methods for communicating with field devices. All equipment connected to MCC communicates using Modbus TCP. All filter and raw water valves are controlled over a Modbus RTU (serial bus) network back to a gateway device, which converts the control signals to Modbus TCP. All analytical panels transmit information to the PLC over Modbus TCP. The remaining signals are hardwired analog (4-20mA) or discrete (24 VDC) signal systems.

A fourth network, completely separate from the process control system, is the camera and access control system. Multiple subnets provide a certain degree of isolation and thereby provide security. The camera and access control system utilizes standard TCP/IP protocol to distribute data throughout the plant.

Each PLC and SCADA workstation power is backed up by an uninterruptable power supply (UPS). All network gear is also backed with UPS. All data collected by the SCADA system is stored on a Structured Query Language (SQL) Server database for reporting purposes. The SQL server, as well as the SCADA I/O servers, includes mirrored hard drives for redundancy and reliability.

Personnel

Although the R.A. Thomas WTP is highly automated, the plant requires the attention of a highly trained operations staff. One senior utility plant supervisor is located at Thomas for general administration. The maintenance supervisor and water treatment superintendent are located remotely but assist the plant operations. The plant has a total of thirteen operation and maintenance employees. Three laboratory employees, located at the Swann WTP regional water quality laboratory, support the Thomas analytical requirements.

The Operator Policy for the Water Treatment Division requires a minimum A-Surface level of certification for senior utility plant operators who act as shift supervisors and requires a B-Surface certification for all utility plant operators. The City of Winston-Salem Human Resources Department offers personal development classes on personal branding, supervisory skills, and succession planning to prepare employees for promotion and the challenges of accepting responsibility for success. The City of Winston-Salem also allows the operators and mechanics to attend State-sponsored certification schools and maintenance technologist program.

The Thomas WTP is proud of recently receiving the following awards:


Addressing Challenges

Historically, the most challenging problem the Thomas plant faced were high manganese levels from the Salem Lake raw water. The City selected a multiple barrier approach to managing these levels starting in the lake itself. In 2002, the City installed an aeration system designed to
prevent seasonal turnover events in the spring and fall. Before installation of the aeration system, turnover events would increase manganese levels and render the lake water untreatable for weeks at a time. The facility also has the ability to feed potassium permanganate (KMnO₄) to the lake raw water at the main Thomas Plant to reduce any remaining manganese. The operations staff can select to feed the potassium permanganate into two different locations in the pretreatment process based on the circumstances and source of the raw water manganese.

**Interesting Design Elements**
The hydraulic grade line of the original Thomas Plant allowed approximately 12 MGD by gravity flow from Salem Lake and approximately 14 MGD from the Yadkin River (via the Neilson Plant). During the design of the new Thomas Plant, engineers determined that the elevations of the raw water piping, treatment trains, and clear wells needed to remain very close to the original elevations in order to maintain these maximum flows by gravity.

This presented a unique engineering challenge for the renovated plant due to the elevation of the ground water table at this location. The foundation of the original clear wells at the Thomas Plant were constructed in the early 1900s and at that time engineers installed pressure reducing valves (PRV) in the bottom of the clear wells to remove ground water from the clear well foundations and prevent the foundation concrete from floating. Since PRVs were no longer an acceptable means for preventing this from occurring, Black and Veatch engineers designed the plant and clear wells with drilled piers to anchor these structures and prevent the ground water in the area from pushing them out of the ground. The wash water equalization basin and main operations buildings also required drilled piers for the same reason.

Each clear well has 148 (296 total between the two clear wells) 24-inch drilled piers placed 12.5 feet apart. The wash water equalization basin and operations buildings combined had an additional 271 drilled piers. The average depth of the piers is between 34 and 44 feet.

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Contact information for more on the automation of the RA Thomas Water Treatment Plant

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# AUTOMATION:

## Making Our World More Efficient

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Automation Is Not (Just) SCADA

A couple of years ago as chair of the Automation Committee, I was leading a conference call to create a title and an agenda for our annual operator training seminar. A few of the committee members thought we had the perfect title with “Improving Operator Effectiveness Through Automation.” That title may sound familiar to those who perused the training catalogs, but that was not the final title. It was modified to “Improving Operator Effectiveness Through SCADA,” at the suggestion of one of our committee members because “SCADA is what operators relate to when we speak about Automation.”

That probably was the better title in regards to marketing the training seminar to our target audience, but it brings up an interesting question: Is automation and SCADA the same thing? For anyone who works in the automation industry on a daily basis, the answer is no – it is more than SCADA.

So what is SCADA and what is automation? The acronym ‘SCADA’ stands for Supervisory Control and Data Acquisition. It can be summarized as a central computer or network of computers that monitor, control, display and store information collected from hardware at the plant or possibly remote from the plant. We can also look at the acronym SCADA more closely to get a better understanding of what it means:

- Supervisory – a method of monitoring (supervising) the plant control system.
- Control – manual or automatic operation of the equipment in the plant.
- Data – the information that is being collected and displayed to the operator.
- Acquisition – the act of collecting (acquiring) the data for display.

SCADA is one facet of automation. As we moved through the planning stages for our operator training seminar, we developed a phrase that summarizes the approach to understanding automation – ‘follow the wire.’ Following the wire from the field to the control room encompasses everything associated with the automation discipline. So where does the wire start? The answer: the field instruments.

Field Instruments
Initially, the automation industry was referred to as Instrumentation & Controls (I&C). In fact, in most consulting engineering firms, the automation design documents are ‘I-drawings’ with the ‘I’ standing for instrumentation. In addition, the national organization affiliated with the automation industry was created as the Instrument Society of America (ISA) on April 28, 1945. When it became a global organization in October 2008, it kept the same initials, but changed its name to the International Society of Automation. Instrumentation is a subset of automation and, regardless of what other components comprise a utility’s SCADA system, the foundation is the field instruments. Some of the most important information at a water or wastewater treatment plant comes from instruments that measure parameters such as flow, level, pressure, turbidity, pH, chlorine residual, etc. Without these instruments, most of the numerical, analog information currently displayed on the SCADA graphics would not exist.

Motors and Pumps
In addition to the field instruments that will provide numerical values to the SCADA system, most facilities have motor control centers (MCCs) to consolidate motor starters and variable frequency drives (VFDs) in an electrical room to more easily distribute power to the motor loads in the plant. The motor starters and VFDs may also be standalone devices, but in either case, they have status information such as motor running, motor failure and motor in auto/remote to indicate that it can be started and stopped from another location other than the MCC or VFD. VFDs contain other diagnostic data such as speed feedback, motor current, and motor runtime and may have their speed adjusted locally (via potentiometer or VFD keypad) or remotely via analog, 4-20 mA signals.

Programmable Logic Controllers
The wire follows the instruments from their field location to a programmable logic controller (PLC). A PLC is basically an industrial computer that has a very specialized operating system, similar to a personal computer. The field equipment and MCCs are wired to the PLC and it can be programmed for monitoring and control. The PLC provides connectivity for, not only the instruments, but also the status of pumps, valves, and other motorized equipment such as clarifiers, blowers, gravity belt thickeners, etc. It is very common practice for a PLC to be located in the same electrical room as the MCC to further facilitate the ease of connecting information to the SCADA system. PLCs provide automatic control through various programming techniques such as ladder logic, function blocks, and sequencers. They also contain software versions of proportional, integral and derivative (PID) loop controllers.
controllers compare an operator adjustable set point and to a process variable (usually the feedback signal from an instrument such as a flow meter, pressure transducer or level transmitter) and generate an analog output signal to adjust the speed of a VFD or position of a modulating control valve.

Human Machine Interfaces and Operator Interface Terminals

Once we have our instruments and motorized equipment connected to the PLC, we still need some way of visualizing the information being collected in the data registers of the PLC. We may also want the ability to interact with the equipment at our plant – start and stop a motor, change the set point of a PID controller, adjust alarm settings, view real-time data values and so on. That is where the Human Machine Interface (HMI) and Operator Interface Terminal (OIT) come into our automation picture.

The HMI software operates on a computer workstation located in a control room or located in various other areas throughout a water or wastewater facility such as a supervisor’s office, the plant laboratory or a specialized process area (dewatering, filtration, etc.). The HMI consists of a database and graphics that are used to display process information and may contain pop-up displays for individual pieces of equipment to allow an operator to change the lead/lag status of a pump sequence or modify a process set point. There will also be buttons on the screen for navigation to different plant process areas in order to organize data in the most efficient manner for plant operations.

OITs are similar to HMI workstations. These devices also display information graphically and provide an operator with an interface to a PLC. They are typically vendor-specific machines that have a proprietary operating system or firmware and are programmed with their own development software, although it is possible that they are industrial workstations, specifically designed to mount in a control panel and utilize an operating system like Windows or Linux.

Regardless of the type of graphical interface being deployed in your plant’s automation system, they must be connected to the PLCs in order to pass data back and forth which brings us to the next ‘wire’ that we must ‘follow’ – network connectivity.

 Networks

There are several types of networks available to connect the various pieces of the automation puzzle. The most common type of network is the process control or SCADA network which provides communications between the PLCs and the operator interfaces – the OITs and HMI/SCADA computers. Before 2000, PLC manufacturers had their own proprietary communication networks for connecting PLCs to the HMIs. With the rise in popularity of Ethernet for networking, it was only a matter of time before Industrial Ethernet was introduced into process control networks. Each manufacturer still utilizes its own Ethernet protocol (e.g., EtherNet/IP, Modbus TCP, Profinet), but they all use Ethernet – which makes it possible to have several different PLC manufacturers on the same network and have them communicate with the HMI/SCADA machines through communications drivers or data servers that are specific to each PLC protocol. Also, most PLC manufacturers either design their PLC processors with Modbus TCP protocol capability built-in or it is available through third party modules to enable dissimilar PLCs to communicate directly with each other.

Another type of network available to the automation engineer is a device network. As the name suggests, this network type provides connectivity between field devices and the PLC. Device networks provide benefits from simpler wiring (i.e., one network cable connection vs. several cables for each status and control signal) and additional diagnostic information. For example, a modulating control valve typically has status signals such as valve in remote,
valve open limit switch, valve closed limit switch, and valve position feedback, as well as a position command signal. If this valve were part of a device network, it would have a single network cable connection as opposed to the multiple signal cables.

**Wireless Networks**

Even though we have been ‘following the wire,’ another connectivity option is wireless networks, which further extend the reach of the HMI/SCADA network. Wireless networks can take many forms, including conventional radios (UHF, VHF, 800 MHz, 900 MHz Multiple Address System (MAS), spread spectrum), microwave radios, Ethernet radios, cellular, satellite, Wi-Fi and many others. These wireless options can be used to extend plant process networks by communicating with remote sites commonly referred to as Remote Terminal Units (RTUs). RTUs can either contain proprietary hardware, software and protocols or can be of custom construction using PLCs and open protocols such as Modbus or DNP3. RTUs can also be deployed in monitor-only applications or can be programmed with automatic control strategies to continue to operate on a loss of communications with the SCADA central site. Wireless I/O (connecting I/O to a PLC without installing conduit and wire between the PLC and the inputs and outputs) and device networks are other applications of wireless technology that can be installed in an automation system.

**Summary**

As you can see, automation encompasses many different technologies and capabilities. Even though you may refer to it as ‘SCADA,’ it is clear that there are many automation components that work together for the data to be displayed on your SCADA graphics, collected by a database for your real-time and historical trends, and retrieved from a database for your SCADA reports. When automation specialists discuss SCADA, they are probably talking about the software and graphics on the workstations. When operators discuss SCADA, they are probably talking about the entire automation system at their facility. Automation and SCADA are not synonymous with each other but, however you look at it, both are important facets of making operators more effective in their jobs.

**About the Author:**

Greg Czerniejewski is a Senior Automation Engineer with CDM Smith, a full service consulting engineering firm that serves Water, Environmental, Transportation, Energy, and Facilities clients. Greg is the past chair of the NC AWWA-WEA Automation Committee and the Automation Committee’s security subcommittee.
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Making a Business Case for Automation Cybersecurity

2014 was a banner year for cyber attacks. The attack on Sony Pictures in November was only the latest in a long string of high profile attacks with significant economic impacts and even political ramifications. Further, cyber attacks are likely to increase, according to a recent survey by the Pew Research Center. As the report notes, “The Internet has become so integral to economic and national life that government, business, and individual users are targets for ever-more frequent and threatening attacks.”

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.”

A key component in protecting critical infrastructure from cyber attack is protecting the automated systems used to monitor and control water and wastewater processes. Fortunately, asset owners and operators have a wide range of resources to help develop a security plan, including guidance from AWWA (www.awwa.org/cybersecurity). Regardless of the guidance used, the first and most important step in developing a comprehensive security plan is establishing the business rationale that justifies the commitment of resources needed to manage cyber risks for a water utility.

Why Is a Business Case Needed?
A well-defined business case for automation cybersecurity is essential for management buy-in to ensure the long-term allocation of resources needed to develop, implement and maintain a utility-wide cybersecurity program for automated systems controlling critical infrastructure. The business rationale 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 automation 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.

Perhaps the most 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. A key directive of the ANSI/AWWA G430-09: Security Practices for Operation and Management standard is an "explicit and visible commitment of senior leadership to security." The AWWA G430-09 standard addresses the broad issues of security, and protecting automation systems and is a key facet of security. By establishing the business rationale for automation cybersecurity, management takes an explicit and visible step in its commitment to security.

Isn’t IT Taking Care of This?
Mention the word cybersecurity, and many assume that their information technology (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 automation systems and networks and the critical infrastructure they control from a cyber event 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 automation 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.

Why Is Protecting OT Different From IT?
Protecting automation systems and networks, also referred to as operation technology (OT), from cyber events can be very different than protecting IT networks. This is especially true in the context of protecting critical infrastructure. Established IT and business cybersecurity
solutions do not necessarily address the cybersecurity needs for OT and critical infrastructure. The business rationale for security recognizes the unique requirements of protecting the control systems and Supervisory Control and Data Acquisition (SCADA) networks that comprise OT.

In the past, cyber threats to OT were of limited concern, given the proprietary nature of legacy systems and the relatively isolated environments in which they operated. Much has changed in the past two decades. The use of open communication standards such as Ethernet has greatly increased interconnectivity between OT and IT networks. There are many benefits realized through increased information flow between control networks, business systems and public networks. However, increased connectivity also has allowed well-known and commonly exploited vulnerabilities in the IT world to migrate into process control networks, increasing the likelihood and severity of attacks on OT. Of greatest concern is the evolving threat scenario of a state-sponsored cyber attack on critical infrastructure, which some people consider inevitable. The business case for OT cybersecurity must consider extreme situations (however improbable) as a possibility, as well as the potential impact on the utility’s resiliency and business continuity.

**Should I Worry About a Cyber Attack?**

The probability of a state-sponsored cyber attack on a water utility is most likely extremely low. However, an attack is only one of many cyber threats to OT networks. 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.

A variety of cyber events can impact system performance, including:

- Human errors: Improper operation of system, introduction and dissemination of malware or phishing, resulting in reduced system reliability or loss of sensitive data
- Malware (malicious software): Harmful software that negatively impacts system operation or loss of data
- Intended, targeted attacks from inside and outside: Sabotage, espionage, white-collar crime or cyber terrorism resulting in loss of control, or denial-of-service of critical systems, loss of sensitive data, extortion or theft-of-service

These threats apply to both IT and OT networks; however, the associated risks have far different implications for OT used in critical infrastructure. When a critical system is disabled or its reliability diminished, the results can lead to:

- Loss of control over critical functions, negatively impacting public health and safety and the environment
- Loss of compliance with regulatory directives, resulting in fines or litigation
- Damage to public image or loss of public confidence
- Denial-of-service resulting in economic losses

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. By reducing the likelihood or the impact of a potential cyber event the utility’s resiliency can be greatly improved.

**Summary**

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

**References:**


**About the Author:**

Don Dickinson is the Senior Business Development Manager for Water Management, Phoenix Contact USA. He is a past chair of the NC AWWA-WEA Automation Committee and the current chair of the Automation Committee’s Security Subcommittee. Don also served on the AWWA Project Advisory Committee for development of Process Control System Security Guidance for the Water Sector.
Reliable communication is the lifeblood of modern Supervisory Control and Data Acquisition (SCADA) systems. Many of our existing SCADA systems use private radio networks, but these networks are reaching the limits of their capacity. System maintenance can be labor intensive, and the Federal Communications Commission (FCC) continues to place restrictions on the spectrum by re-farming to narrower bands. Increasingly, utilities departments want to get out of the radio business.

So what is our best bet for communications in the future? Utilities are moving away from private radio networks toward machine-to-machine (M2M) solutions offered by cellular providers. These M2M data plans appropriately address the fundamental concerns of reliability, emergency response, ease of use, and security. By offering data plans for $5 to $20 per month, they are extremely cost-effective.

But here’s a catch: these M2M plans also come with small data usage budgets, typically 5 to 25 megabytes (MB) per month. Can we do everything we want to do within these small data plans? SCADA typically uses very small amounts of data; however, the overhead associated with Ethernet Protocol and security measures makes data usage prediction difficult.

McKim & Creed conducted a Proof of Concept (POC) test to simulate existing and future SCADA needs of an East Coast utility. Using modern advanced protocol— Distributed Network Protocol Version 3 (DNP3)— we simulated normal data collection, as well as failures, where the protocol would automatically buffer and backfill historical data.

The data usage for all these scenarios was measured during the POC testing, so that we now have a comprehensive and realistic understanding of efficient data usage and a basis for moving forward into the upcoming SCADA upgrade.

Introduction
The Virginia Beach, VA Department of Public Utilities operates 406 sewage pumping stations and 33 water supply facilities of various sizes and descriptions. These systems have seen several generations of SCADA technology over the years. The existing SCADA system uses licensed ultra-high frequency (UHF) serial radio technology, along with unlicensed spread spectrum radios, to provide communications with the distributed remote terminal units (RTUs) and programmable logic controllers (PLCs) at the remote sites. The existing PLC and RTU hardware has become obsolete, and the data capacity of the existing radio system has nearly reached the limit of its data capacity.

McKim & Creed was selected to engineer a Telemetry Communications Modernization Project to take the Virginia Beach Utilities into the future.

Stage ONE of this project provided a System and Goals Assessment phase. Some of the findings of this phase were as follows:
1. Flow monitoring and data collection capabilities need to be expanded to meet operational and engineering needs, regional standards and future needs.
2. PLC/RTU equipment standards need to be updated to eliminate outdated equipment.
3. Communications infrastructure needs to be upgraded to meet future needs.

Stage TWO of this project provided a preliminary engineering report. Some of the highlights of this report were as follows:
1. Adopt DNP3 as a new standard protocol.
2. Adopt a new PLC hardware standard. Three hardware platforms were chosen for evaluation.
3. Consider cellular M2M data plans as the proposed communications infrastructure.

Stage THREE of this project included a POC test which provided the following:
1. Install each of the three proposed PLC hardware systems to provide side-by-side comparison of the proposed hardware and to provide owner experience for the purpose of comparison and evaluation in a broad range of criteria and test conditions.
2. Utilize the DNP3 protocol to provide a comprehensive understanding of the features, benefits, advantages and disadvantages of this protocol.
3. Install each of the three test PLCs on its own cellular M2M data plan to demonstrate the features and discover the pitfalls of SCADA using cellular M2M communications.

Machine-To-Machine (M2M)
In recent years, cellular providers have increasingly encouraged the development of customers in small, data-only niche markets. These applications, known as M2M plans, include a surprising variety of applications, including traffic signals, vending machines, ocean buoys, kiosks, home health care monitoring and
alarming devices, generators, pipelines, proprietary web-based SCADA applications, and a wide variety of conventional SCADA applications.

In large SCADA applications, the one objection to cellular communications has always been the historically high monthly recurring cost. In years past, the typical cost of cellular service for SCADA could be $50 per month or more, which can be generally unattractive for SCADA. At this price point, the public utilities department could typically build its own private radio network as a more cost-effective, long-term solution.

With the development of M2M solutions in the competitive cellular market, the price point for cellular communications can now be less than $10/month. At that price point, the financial aspect of cellular communications becomes much more attractive when compared with the cost of purchasing and maintaining radios, towers, cables, repeaters, path studies, and polling strategies, as well as the burdens of troubleshooting and repair.

There is a broad range of advantages and disadvantages when comparing cellular with a privately owned system. This article does not purport to evaluate these numerous aspects. It is intended to address DNP3 protocol and M2M plan size.

So How Small Are These M2M Data Plans?

**Figure 1** shows typical examples of data capacity and monthly cost. Tier 1 data plans start as low as $1/month, with data usages of about 1MB. For our evaluation, we are targeting a price point of $10/month, which provides data usage of 25 MB/month. For comparison, the existing serial radio could be said to provide about 12 MB/month. This is based on polling hundreds of stations, so the effective serial data capacity is divided between stations. If 120 stations are polled in two minutes, the connectivity to any one station is limited to about one second every two minutes.

However, the data capacity of the M2M link is misleading because communication data is sent by Ethernet.

This carries with it an additional burden of overhead, which will be explained in this article. DNP3 protocol was chosen in order to maximize the useful capacity of a Tier 1 plan, so that the limited capacity of the data plan is efficiently utilized.

**Why Choose DNP3 Protocol?**

DNP3 is a well-established, open-standard protocol. It is widely used in power and gas utilities, and is gaining popularity in water and wastewater utilities. Some advantages include:

- Non-proprietary: Its use is not limited to specific equipment suppliers.
- Versatile: It is highly configurable to meet your needs.
- Efficient: For best use on small data plans.
- Automatic Backfill: Data is never lost.
- Compatibility with HMI: Third-party software is not needed.

DNP3 operation is based on the PLC’s ability to buffer and send events. An event is any analog measurement or digital change in state that needs to be communicated from the PLC to the SCADA host. Each event is time/date tagged so that the real time of the event is accurately known and is not dependent on when it arrives at the SCADA host.

As shown in **Figure 2**, up to 20,000 events can be stored in the PLC. These are retrieved by the SCADA host on any chosen time base, but the time base of the buffered data is never lost. Therefore, if communications are delayed because of unforeseen failures, the event data will eventually be retrieved when communications are restored; historical trends are backfilled and no data is lost.

As shown in **Figure 3**, time-stamped data shows the exact time pumps start and stop, which is not typically available.
with conventional serial polling. Data quality is improved for purposes such as operational troubleshooting, hydraulic modeling or energy management.

In DNP3, data can be retrieved for trending in many different ways. In Figure 4, the measurement is made every 30 seconds, even though the RTU is polled only once every two minutes. With DNP3, you can have complete flexibility in the method of data collection, which is adjustable for every data point. As shown in Figure 4, the PLC can generate one event (reading) every 30 seconds or for any time basis desired. This method can be wasteful of data plan utilization if a short time basis is chosen. Data collection every 30 seconds results in 2,880 events collected per day for that one signal.

In DNP3, data is often retrieved by dead band. It is thought to be wasteful of data plan capacity to send a reading if the signal value has not changed significantly, so the PLC is programmed to create events only when the value changes by a selected dead band. Figure 5 illustrates that a larger dead band generates fewer events, but it also results in a less informative trend.

With all these examples, logging of data can be achieved in a variety of ways. When using an M2M data plan, the goal for efficient use of bandwidth is to provide informative data and trends using as few events as possible. In this test, we have experimented with logging data using a ‘smart’ dead band algorithm. With conventional time based on dead band trends, as shown in Figures 4 and 5, it is disappointing that you often cannot capture the highest or lowest value. In the PLC you cannot predict the future, so at any given moment the PLC has no way of knowing if the current value is the peak or if the signal will continue to rise. Therefore, events do not typically capture the peaks.

In this study, we have experimented with development of a smart dead band algorithm. As shown in Figure 6, the PLC is programmed to remember the previous maximum or minimum value since the last event was posted. Then, at
a later time, the PLC can create an event, which is time-stamped to occur in the past, when the peak actually occurred. Using this algorithm, the event trend can provide excellent usable process information while minimizing the number of events needed. Note that the trend in Figure 6 creates 260 events per day, while the events in Figures 4 and 5 require considerably more events to create less informative trends.

**Ethernet Communications**

Communications on M2M data plans require the data to be converted to Ethernet. When SCADA data is communicated using Ethernet, the usable content of the DNP3 protocol is encapsulated into the larger packets of the Ethernet protocol.

Figure 7 illustrates Ethernet communication of SCADA data. The bus represents the packet that must be sent by Ethernet. The DNP3 data is considered to be a passenger in the bus, known as the payload. Often, the packet is much bigger than the payload. This represents the overhead associated with Ethernet communications in SCADA.

The measured typical data quantities of Ethernet overhead and SCADA payload are shown in Figure 8. Using this data, and experimenting with various data collection algorithms, we were able to provide real measurements of M2M data plan usage as follows:

The tabulation in Figure 9 shows the typical monthly data usage based on various event counts and on polling once every two minutes. An event count of 10 events per poll would result in a data usage of only 9 MB/month.

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Recall from Figure 1 that a Tier 1 data plan can support up to 25 MB/month, so event usage at or below 60 events per poll should be achievable using a Tier 1 M2M data plan. By examination of normal data needs and utilization of efficient algorithms of data collection, this data rate provides a very generous budget for anticipated data usage in SCADA.

Problems Encountered

Sometimes the behavior of communication systems and components can operate one way in a test environment, but can behave quite differently when deployed with real-world conditions. Figures 10 and 11 illustrate the problems encountered when the POC test equipment was deployed under real conditions. These provide some important lessons learned for Ethernet applications of SCADA.

The graph in Figure 10 illustrates the expected data usage for SCADA communications once every two minutes. Wireshark® software was used to capture the packets. Each poll consisted of three packets: read, response, and confirm. Compared to Figure 10, the graph in Figure 11 shows the actual data usage and protocol steps that were captured when the PLC was deployed on a cellular network. The data was successfully delivered, but data usage was higher than expected. Examination of the "Wire Shark" steps showed that the repeated retransmission of the "READ" command was triggered, causing unnecessary additional network traffic with each poll. This behavior of the Ethernet communications would cause significant waste of data plan usage, may result in upsizing the data plan to Tier 2, and could increase the data cost for 400 stations by more than $6,000 per month.

Finding the cause of this bad behavior was complicated because of finger pointing. Suspected causes ranged from the SCADA software, cellular network, PLCs, network IT, routers and firewalls, with each supplier blaming the others.

The graph in Figure 10 illustrates the expected data usage for SCADA communications once every two minutes. Wireshark® software was used to capture the packets. Each poll consisted of three packets: read, response, and confirm.

The Transmission Control Protocol (TCP) retransmissions were caused by the behavior of the TCP Ethernet services of the Windows operating system in response to latency behavior of the cellular network.

Explanations

TCP is a behavior of the Ethernet protocol that guarantees delivery of each data packet. Each packet sent using TCP is expected to be followed by an acknowledgement. TCP uses Return Trip Time (RTT) to measure the time between sending a packet and receiving the acknowledgement. TCP uses a time limit known as Return Trip Timeout (RTO) to decide how long to wait until the packet is assumed to be lost. Whenever a packet is considered to be lost, TCP immediately sends a duplicate packet (TCP Re-Transmission), and then doubles the RTO.

TCP is always striving to optimize the speed of transmission. This is accomplished by keeping the RTO as short as possible. TCP uses an algorithm known as Smoothed Return Trip Time (SRTT) to ‘smooth’ the RTO, lowering it after each quick RTT to keep the RTO as short as possible, which is just a bit longer than the expected RTT. This SRTT algorithm is automatic and cannot be disabled.

The problem with cellular communications with SCADA is that the latency of the RTT behavior is not appropriate for TCP. With cellular communications, the first packet typically takes 2.5 seconds or longer to make a connection. Once the connection is made, the subsequent packets are very quick. However, if the line is quiet for more than 16 seconds, the cellular line goes dormant, and the next packet again requires 2.5 seconds to connect.

The dashed line in Figure 12 represents the RTO. During every poll, the SRTT algorithm shortens the RTT, so that as soon as the next poll is attempted, the longer packet RTT will cause multiple TCP retransmissions.

TCP is not suitable for SCADA communications on a cellular network.

Solution: Use User Datagram Protocol (UDP) instead of TCP. UDP is an alternate protocol used by Ethernet. UDP is judged
to be less reliable than TCP because UDP
does not guarantee delivery of packets.
Instead, UDP sends packets as they
are received, with no further action of
monitoring or retransmission.

When UDP is used with SCADA, the
responsibility for transmission of packets
is no longer taken by the Ethernet
protocol. Instead, the DNP3 protocol is
used to guarantee data delivery.

Conclusions
• M2M data plans can be cost effective,
  but efficient operation requires careful
  attention to details.
• A versatile protocol such as DNP3 is
  needed for best results.
• TCP does not work well with M2M
  SCADA. PLC equipment and protocol
  must be able to guarantee data delivery
  using UDP.

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Figure 10 – Data usage and protocol steps for ideal SCADA communications.

Figure 11 – Data usage and protocol steps: unexpected results.

Figure 12 – Latency of cellular network causing TCP retransmissions.
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Providing the quantity and quality of water necessary to meet present needs, without affecting the needs of future generations, is water sustainability. In order to meet present water needs, proper infrastructure funding must be available. However, water and wastewater infrastructure spending has been reduced due to other financial demands. Funding associated with unemployment, educational needs, public safety, and other services have limited the expenditures available for water and wastewater infrastructure maintenance and upgrades. Other trends negatively affecting water and wastewater infrastructure upgrades are changing weather patterns, unsustainable rate structures, fluctuating industry and residential populations, aged infrastructure, more stringent environmental regulations, and increased water demands.

The Environmental Protection Agency (EPA) estimated a shortfall of $122 and $102 billion dollars for clean and drinking water, respectively, for each year up to 2022. The gap for water and wastewater infrastructure upgrades is predicted to be even wider according to other independent organizations. Alternative finance arrangements such as Energy Savings Performance Contracts (ESPCs) have been used by local, state and federal agencies to assist with needed cash to help with infrastructure upgrades for educational facilities, office buildings, courthouses and others. A good example of the use of ESPC is with the US Department of Energy (DOE). The DOE has reported that 280 ESPC projects worth $2.71 billion dollars have been awarded since 1998, with an estimated $7.18 billion dollars savings in operational expenditures. Better technologies, solutions and processes are now available to reduce energy consumption in water and wastewater treatment plants. This makes ESPCs a very viable financial procurement method for upgrades and reduction in operational expenditures.

An Energy Service Company (ESCO), as defined by the EPA, is a company with energy savings performance contracting as a central part of its business. To be considered an ESCO, the company must implement projects assuming some performance risk during the economic life of the project with a main service offering of energy efficiency. Through an ESPC, ESCOs provide comprehensive energy conservation measures to include energy efficiency, renewable energy and distributed generation opportunities that result in a guaranteed energy savings. The ESCO incorporates system design, construction and commissioning as a turnkey service. The improvements are funded with guaranteed energy or other measurable savings. The ESCO is required to pay the difference if the guaranteed performance is not achieved. Financing of the project is arranged by the ESCO in conjunction with the lender and the customer.

ESPCs are a good fit for the water and wastewater market. Commitment by the municipality to performance improvement, and choosing the right ESCO, are keys to successful implementation of an ESPC. The success of a project will depend on the ESCO’s experience and financial viability. An ESCO must have an environmental focus and experience to be successful. Further, a third party environmental consulting engineering firm should be utilized to assist with process design and implementation.
ability to cross over national and global markets is beneficial in understanding the complete market and allows for an understanding of global and national water sustainability issues.

The first suggested step in working with any ESCO is to conduct a workshop with the decision-makers and utility stakeholders. This will help the ESCO understand the needs of the utility and define how to establish a successful partnership. The workshop will also give the utility an understanding of how the ESPC will be conducted and the value it could bring. The next step is a preliminary energy audit conducted by the ESCO to identify potential savings and energy conservation measures (ECM). A proposal will then be developed by the ESCO for a tailored ESPC that addresses the specific needs for the utility. This could be as simple as adding equipment to existing systems, or as complex as upgrading a complete process to get better quality and quantity of treated water.

Specific procurement steps may have to be followed to qualify the ESCO to move the ESPC to the next phase. Upon completion of the procurement process and agreement with the utility, an investment grade audit (IGA) is conducted. A detailed scope of work statement, the project’s cost information, and the guaranteed energy savings are established. The ESPC is drafted by the audit information and approved by all parties before the installation period begins. Upon completion of the installation of an ESPC, monitoring and verification of the projects deliverables is accomplished with a complete analysis and reporting of the project’s performance, energy use and savings. The monitoring and verification phase can be conducted by the ESPC, or a third party, over the life of the contract or when terminated by the customer. A block diagram of an Energy Savings Performance Contract for a utility is shown in Exhibit 1.

Common energy conservation measures that can be, and have been, implemented in both water and wastewater treatment facilities under an ESPC are as follows:
- Upgrading existing motors with more energy-efficient motors
- Managing heating, ventilation, and air conditioning (HVAC) and lighting loads
- Implementation or upgrading an existing supervisory control and data acquisition (SCADA) system to monitor and control energy usage
- Power monitoring at process levels
- Pump system optimization for operational efficiency
- Demand monitoring, load shedding and cogeneration

Water treatment plant energy usage depends on a number of factors. Some of the factors include type of water used (surface or ground); the quality of the incoming water; the pumping requirements; and the processes used to treat the water. Pumping is typically the largest consumer of energy for a water treatment plant, and ECMs are usually centered on pumping applications. The following are examples of water treatment pumping applications:
- Influent pumping stations for surface water.
- Well pumps for ground water.
- High service pumps for effluent.
- Booster pumps.
- Backwash pumping.

Exhibit 2 shows a sample distribution of water treatment energy usage. As can be seen, around 87% of the energy consumed for most water treatment is for pumping.

Pump optimization should be considered an ECM in water applications. Knowing which pumps to use at the most efficient operating point is key to reducing energy costs. There is also an opportunity to manage energy consumption for specific processes and systems.

Wastewater treatment plants ECMs are mostly developed around aeration, sludge handling, and pumping applications. The following are typical applications that are good candidates for energy reduction:
- Aeration for activated sludge and aerobic digestion
- Return and waste activated sludge pumping
- Lift and influent pump stations
- Any effluent pumping requirements
- Sludge drying
- Plant water pumping
- UV Disinfection

Exhibit 3 shows a distribution of wastewater treatment energy usage. Aeration for activated sludge and nitrification processes are the largest consumers of energy with pumping a distant second. It is estimated that 70% of the energy consumed at wastewater treatment plants is for processes and 16% is for pumping.

Pump and blower optimization should be a consideration in wastewater applications. Pump and blower systems should be evaluated continuously to determine the best efficiency for the hydraulic and biological loading. The use of equalization basins could also assist with pumping as well as treatment energy requirements. This is
accomplished by shifting treatment to low energy demand times to save costs. Solids handling and removal is another opportunity for energy reduction. Applications that can dewater sludge more efficiently will reduce sludge handling costs. Consideration must be given to the many different types of systems developed, or being developed, to use the sludge as a biofuel for cogeneration or demand peak shaving. The methane produced by anaerobic digestion can be used for cogeneration or heating requirements to save energy. Flaming or flaring off the excess gas after the sludge heating process wastes any beneficial use of methane gas and associated reduction in greenhouse gases (GHGs).

ESPCs are a procurement method to assist in development and installation of renewable energy systems. Renewable energy options reduce operational expenditures as well as carbon emissions. The following are examples of renewable energy options for water and wastewater:

- Solar power
- Micro-hydro turbine
- Wind turbines
- Energy producing pressure reducing valves
- Gas turbines using methane

A very detailed study will need to be conducted during the IGA to determine if the life cycle cost for any renewable energy option can be applied to the ESPC. Typically, with enough savings, available incentives, and grants and loans, renewable energy options are more favorable.

As discussed, there are many opportunities to reduce energy costs associated with water and wastewater treatment and infrastructure. To realize those savings, an investment must be made. ESPCs for the water and wastewater market are complex. However, with an experienced and financially strong ESCO, the execution of a successful project can be accomplished. To keep the cash flowing for water sustainability, ESPCs can be the right choice to maintain water needs for future generations.

**About the Author**

Lee E. Ferrell is a registered Professional Engineer in the state of South Carolina, an American Academy of Environmental Engineers Board Certified Environmental Engineer, an Association of Energy Engineers Certified Energy Manager and Green Building Engineer, and a Business Development Manager for Schneider Electric. Mr. Ferrell has more than 25 years of industry experience and currently serves as the Chairman for the AWWA Energy Management Committee. He received a Bachelor of Science degree in electrical engineering and a Masters of Science degree in environmental engineering from Clemson University, Clemson, SC.
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INTRODUCTION

Water For People has enjoyed the support of NC AWWA-WEA for over 15 years and is dedicated to clean drinking water and sanitation for everyone in the communities where we work. As the North Carolina Water For People Committee chair, I would like to take this opportunity to thank the members of NC AWWA-WEA for your contributions, and for your continued support as we move into the future. While the mission remains the same, the approach taken by Water For People has evolved to implement more sustainable practices that provide better long-term results.

WORLD WATER CORPS

Many committee members have participated on our annual in-country work trips in the past through the World Water Corps (WWC) program. These trips have provided a great opportunity for our members to donate their time in a meaningful way, and to share their experiences when they return. Projects over the last four years have focused on specific program areas, namely monitoring, water quality and water resource management, as we have moved to develop our understanding and capacity specifically in these areas. Many of these functions will now be executed by in-country staff responsible for implementing the water safety plans developed in each country, resulting in a reduced demand for WWC trips. This transition in responsibilities is a result of sustainable program development and should be considered a positive milestone.

For now, no WWC trips are planned for 2015; however, specific opportunities will be available in areas such as business planning and modelling, water resource management, evaluations of specific program aspects, and desk studies. Although I understand the disappointment some may feel that our committee will not be as ‘hands-on’ as we have been in the past, it is important we remember that building the capacity for each community to provide for their own sanitation is the only way to attain long-term program success.

In the spirit of sharing program experiences from around the world, I would like to present the efforts that your donations have helped fund and will continue to impact in the future.

PROGRAM APPROACH AND COUNTRY UPDATES

Over the next five years, Water For People will work to address sanitation needs for four million people in nine countries around the world, including Malawi, Rwanda, Uganda, India, Guatemala, Honduras, Nicaragua, Bolivia and Peru. Our goal is to reach 100% coverage in the areas we work, ensuring that the hardest to reach, the poorest, the politically disconnected and the marginalized populations have access to clean water and sanitation.

The Everyone Forever campaign is a unique programmatic effort to provide water and sanitation to everyone in targeted districts and municipalities, forever. It means these districts and communities never need another international water agency to address their water challenges again. At the same time, it provides a model for greater replication, leading to a push for national full water and sanitation coverage. In addition to the broader in-country work performed by Water For People, specific districts are targeted under this program to reach 100% water and sanitation coverage.

BOLIVIA

Water For People-Bolivia operates in the Cochabamba and Santa Cruz regions and has continued to grow the Everyone Forever program through regional coordination, grant funding procurement and implementation, and the arranging of private financing opportunities. The Cochabamba region has been an area of focus where the municipality association (AMDECO) has been engaged to expand program support and technical assistance from 16 to all 47 municipalities in the region. Additionally, a 1.49 million dollar grant provided by the Multi-lateral Investment Fund (a branch of the Inter-American Development Bank) will be implemented over the next three years, focusing on research for life-cycle costing, long-term financing mechanisms for rural water systems, and rural sanitation business models, as well as support for embedded monitoring and replication of water associations across the region.

Sanitation activities in the country include moving forward with ecological sanitation work in Santa Cruz and Riberalta (thanks to a grant from the Swedish government); start-up and operation of treatment facilities in Riberalta, Santa Cruz and Cochabamba; and micro-funding collaboration between local business groups and international funding organizations.
PERU
Water For People-Peru operates in the La Libertad, Cajamarca, and Arequipa regions and has focused primarily on public education and water treatment. Water, sanitation, hygiene and water resource management curriculums have been expanded from six schools to all 80 schools in the Cascas district of La Libertad. Other education activities include engaging water and sanitation committees, curriculum development for post-graduate certification in Integrated Water and Sanitation Management at the National University of Trujillo, and acting as an official advisor role to the Regional Government of La Libertad.

Peru is experiencing water quality issues nationally in rural areas where hypochlorinators are used for water treatment. Unfortunately, the chemicals used in the treatment process are no longer available for sale due to their use in illicit drug manufacturing. Water For People-Peru will be providing matching funds to 40 municipal governments to help convert these systems to a different type of chlorinator.

HONDURAS
The national Everyone Forever movement in Honduras, locally known as “Para Todos Por Siempre”, continues to grow and now includes nine other Non-Governmental Organizations working with 17 municipalities. The goal of these organizations is to share experiences and develop a standardized approach that may be scaled up to a national level.

In collaboration with the Municipal Associations of Water and Sanitation Committees (AJAASM), Water For People-Honduras has begun to issue micro-loans in the district of El Negrito and will be developing pilot lending programs in the Chinda and San Antonio de Cortes districts over the coming year.

Water For People-Honduras is taking a leading role in shaping the national monitoring tool for the water and sanitation sector, the Rural Water and Sanitation Information System (SIASAR), which is funded by the World Bank. Water For People is specifically advocating for improvement of public institution and household level sanitation monitoring in SIASAR, by using Water For People’s Flood Level Operations Watch (FLOW) monitoring indicators as a basis.

NICARAGUA
Water For People-Nicaragua will continue to work in the Jinotega region and build on school and community water and sanitation projects that began in 2013, including the planning, design and community organization necessary for four new community water projects. In 2014, an inventory of surface water sources was completed for the entire district of San Rafael del Norte, with support from World Water Corps volunteers, municipal technicians, and community leaders.

Since 2012 Water For People-Nicaragua has also been working with the agricultural cooperative Aldea Global to offer micro-loans for sanitation improvements, which are now required to connect to the water system. Various sanitation promotion materials have been developed that include radio and TV spots, brochures, and posters, including promotion of low-cost household biodigester which are now available at local hardware stores. Sanitation construction training courses for masons will be offered, in collaboration with a local NGO Cuculmeca and with support from Dutch International Cooperation, to ensure that appropriate skills are locally available.

GUATEMALA
Water For People-Guatemala will continue work in four Everyone Forever districts in the region of Quiche as well as providing technical support in two neighboring districts. A study was completed in 2014 that analyzed the water recharge in six minor watersheds that will help inform the understanding of supply and demand in the region. In the district of San Andres Sajcabaja, Water For People-Guatemala achieved great increases in water system chlorination – rates have gone from 0% to 45%. Rural communities in Guatemala have often been resistant to chlorination, so this represents significant progress.

Water For People-Guatemala promotes chlorination in all water systems it supports and is currently working with the Ministry of Health to support them in assuming their responsibilities for water quality monitoring.

Water For People-Guatemala continues to influence municipal governments partners and the departmental and national water sector, including training of municipal staff on financial sustainability evaluation tools and creation of regional municipal associations.

INDIA
Water for People-India’s Everyone Forever programs are expanding and gaining recognition from key stakeholders. In West Bengal, Water For People-India recently participated in a series of meetings with the state government, as the state sanitation cell is interested in replicating the School WASH program and the varying household sanitation options that we are promoting through the Sanitation as a Business approach. Water For People-India also guided the district engineers in West Bengal in a statewide workshop on the designs of different household toilet models, as well as school sanitation facilities with changing rooms. In Bihar, Water For People-India continues to work with the government to create a roadmap for reaching full water and sanitation coverage across the entire state. In addition, Water For People-India’s Everyone Forever program is expanding to the state of Rajasthan, where Water for People-India is now working in the town of Khairthal to reach over 38,000 inhabitants with improved drinking water and sanitation.

While Water For People-India and local partners are currently working with over 200 communities and over 100 schools...
to increase water and sanitation coverage, emphasis has also been placed on ensuring the systems are sustainable over time. Water For People-India is focusing its efforts on improving the operation and maintenance of water systems and ensuring tariff collection for the use of water by strengthening water and sanitation committees, providing additional training to individuals in the community, and working with the local government to promote monitoring.

**MALAWI**

Water For People–Malawi is working in the low-income areas of Blantyre to establish Water User Associations (WUA) to manage communal water points (water kiosks). Water For People–Malawi helps establish the WUA and provides it with the technical (water point maintenance and repair), financial (tariff development and financial accountability), and human resource skills necessary to manage the water system. Since its start, the program has established eight WUAs in Blantyre, which have been able to pay down the debt owed to the Blantyre Water Board, rehabilitate and repair water kiosks, and extend services to reach more people. In addition, through this initiative, over 330 water kiosks have been built new or rehabilitated and 550 new jobs have been created, primarily for women.

**RWANDA**

In October 2010, Water For People–Rwanda partnered with the Rwandan government on the “Rulindo Challenge,” an initiative to provide full water coverage to the 285,000 people living in Rulindo by 2017. In addition to increasing access to drinking water in the district, the initiative is also tackling sustainability challenges to ensure that systems built today last well into the future. The program focuses on water system management, appropriate tariffs that are affordable and allow for cost recovery, and technical support to ensure the water infrastructure is fixed when needed, and replaced when required.

**UGANDA**

Water For People–Uganda plans to continue testing innovative water and sanitation business models. In Kamwenge, Water For People–Uganda completed a baseline assessment of the district and is now supporting the construction of one-piped water supply systems that will be managed by private operators. In addition, together with the district, Water For People-Uganda is facilitating the rehabilitation of 40 hand pumps with meters and training hand pump mechanics and entrepreneurs to operate and manage these systems. Through Sanitation as a Business programming, Water For People-Uganda will continue to work with sanitation businesses and test new technologies to improve the sanitation supply chain.

**A SINCERE THANK YOU**

Many thanks to everyone who has contributed to the Water For People mission this year through our events and conference fundraisers. With your help, NC AWWA-WEA donated over $20,000 in 2014 to Water For People and we look forward to another successful year in 2015!
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The 2014 midterm election will bring changes large and small, with the biggest change being US Senate control by Republicans, who will appoint new committee chairs and set the legislative agenda. The Senate Committee on Environment and Public Works will now be led by US. Senator James Inhofe (R-OK). After an eight-year hiatus as chairman while Democrats controlled the Senate, Inhofe has overall seniority on the committee and reclaimed the chairmanship as the committee addresses major regulatory differences the Republicans have with the Obama administration.

In the House, Republicans gained 13 seats, increasing their majority to 242 to 174 over Democrats. Both US Rep. Nick Rahall (D-WV) and US Rep. Tim Bishop (D-NY) lost their re-election bids, which vacate the ranking member seats for the House Transportation and Infrastructure Committee and Water Resources & Environment Subcommittee.

US Rep. Peter DeFazio (D-OR) is the new ranking member of the committee, and US Rep. Grace Napolitano (D-CA) is expected to become the new ranking member of the Water Resource Subcommittee. There were no changes for Republican leadership of the full committee or subcommittee.

WEF Government Affairs believes there will be legislative action to restrict the Obama administration’s Waters of the United States (WOTUS) rule, expected to be finalized in Spring 2015.

The annual appropriations bills also will be wholly written by the Republicans. WEF Government Affairs believes these bills likely will reflect the Republican agenda for spending and federal policies, such as possible additional spending cuts to EPA programs and restrictions on implementation of the WOTUS rule and amendments to the Clean Air Act.

Additionally, efforts to move tax reform legislation will likely begin again, which previously have raised concerns over possible changes to tax-exempt municipal bonds. A tax reform bill potentially will include lifting or removing the cap on private capital investments though private activity bonds.

“Legislatively, Republicans will control the process in both congressional bodies and will likely push forward with several significant water-related bills and policies.”
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Now multi-vane Contrablock Plus impellers deliver the same performance in larger hydraulics. Like nothing seen before, they were created with advanced computational fluid dynamics (CFD) for outstanding hydraulic efficiency.

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MAINTENANCE TECHNOLOGIST QUESTIONS

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

1. Which is not a common cause of electronic component failure?
   a) High voltages  b) Low ambient temperatures  c) Static discharges  d) Short circuits due to dust or debris

2. A _________ is an example of a simple machine.
   a) wedge  b) low pressure boiler  c) screwdriver  d) mallet

3. An arrow placed across a symbol on an electrical drawing indicates ___________.
   a) that it operates on DC voltage  b) that it is a subcomponent of a larger system  c) that the component is variable  d) the direction of current flow through the component

4. Under common phase monitoring conditions, which of the following is not usually monitored?
   a) Loss of phase  b) Low voltage  c) Resistance  d) Amperage imbalance

5. Which of the following is not a proper tool for pump packing installation?
   a) Flashlight  b) Screwdriver  c) Mirror  d) Wooden blocks

Answers:
1. b) Source: Industrial Maintenance, third edition – Chapter 5
2. a) Source: Industrial Maintenance, third edition – Chapter 3
3. c) Source: Industrial Maintenance, third edition – Chapter 4
4. d) Source: Electrical Fundamentals for Water and Wastewater – Page 225
5. b) Source: Pumps and Pumping, Skeet Arasmith

The DIRECT® GRIT REMOVAL SYSTEM is another quality engineered product offered by WSG & Solutions, Inc.

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• No moving parts

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Phone: (877) 700-9490
www.premier-water.com
WASTEWATER CERTIFICATION QUESTIONS

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

1. O.R.P. stands for which of the following terms?
   a) Oxygen residual parameter b) Oxidation reduction potential c) Open resistance potential d) Oxidative residual polymerization

2. An exothermic reaction is one that:
   a) occurs externally (location) outside of the reactor vessel b) is a non-chemical change or variation of a reaction c) is a chemical change that produces heat d) is a chemical change that absorbs or takes in heat from an external source

3. A “Doctor Blade” refers to which of the following?
   a) A spatula or depressant blade used to examine internal parts of a solids removal device b) A blade used to detect tolerances between moving metal parts c) A specialized blade used to support a rotating disc d) A blade used to remove any excess solids that may cling to the outside of a rotating screen

4. Ion exchange is a process in which:
   a) ions, held by electrostatic forces to a functional group on a resin are exchanged with other ions in a solution b) ions are lost without any effect on their electrostatic charge c) ions are gained with a noticeable effect on their electrostatic charge d) settleable solids are exchanged for insoluble solids within a column

5. Cyanide destruction takes place:
   a) Quickly b) Slowly in an alkaline solution c) Instantaneously d) In an acidic solution

6. Hexavalent chromium Cr6+ must be _______________ before it can be precipitated into a hydroxide sludge.
   a) oxidized to cr3+ b) reduced by being exposed to a highly alkaline condition c) oxidized by being exposed to a slightly acidic condition d) reduced by exposure to very acidic conditions in the presence of bisulfites

7. The laboratory test used to measure changes in pH is a ___________ procedure called ________.
   a) milliliter by milliliter procedure called neutralization b) millimeter by millimeter procedure called process neutralization c) drop by drop procedure called titration d) reagent targeted procedure called precipitation

8. What two metal groupings are not considered common metals?
   a) Antimony and molybdenum b) Selenium and copper c) Arsenic and nickel d) Aluminum and cadmium

9. A ________ agent is a chemical used to prevent the precipitation of metals:
   a) insoluble b) undissolved c) chelating d) soluble

10. A metal that is deemed to be “amphoteric” means:
    a) it is a metal that can be caused to become magnetic b) it is a metal that is chemically reactive in either an acidic or basic environment c) it is a metal that can conduct high degree of amperage d) it is a metal that can be chemically photo reactive

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: April 17, 2015 and October 30, 2015
Responsible for Professional Engineers and Professional Surveyors

NC Water Treatment Facility Operators Certification Board
919-707-9040
http://www.ncwater.org/pws/
Exam Date: 5/28/15, 8/27/15, 10/29/15
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 Date: 6/11/15, 9/10/15, 12/10/15
Responsible for Wastewater Certifications
(Animal Waste, Biological WW, Physical/Chemical, Land Application, Spray Irrigation, Collections, Subsurface, and OIT)
Question 1: What is a SOUR Test and what is it used for?

Answer: The (SOUR) Specific Oxygen Uptake Rate test measures the rate of oxygen used by the microorganisms in wastewater mixed liquor or sludge.

Microorganisms in wastewater mixed liquor or sludge use oxygen as they consume organic matter. The rate at which these microorganisms consume the oxygen is shown as the (OUR) Oxygen Uptake Rate.

The (OUR) test is expressed in unit-time of mg/l/hr oxygen uptake and reflects the activity of the microorganisms within the basin or aerated digester. For a more accurate depiction of basin oxygen uptake, the (OUR) test is converted to Specific Oxygen Uptake Rate (SOUR) by utilizing the concentration of the microorganisms present.

This is done by dividing the (OUR) with the (MLVSS) Mixed Liquor Suspended Solids. The unit is expressed as mg O2/hr/gram of (VSS) Volatile Suspended Solids.

Calculation:

\[
\text{OUR} = \frac{(\text{Beginning DO} - \text{Ending DO})}{\#\text{Min} \times 60} = \text{mg/l O}_2/\text{hr}.
\]

\[
\text{SOUR} = \frac{\text{mg/l O}_2/\text{hr}}{\text{MLVSS} \times 100} = \text{mg O}_2/\text{hr/g of VSS}
\]

(SOUR) Specific Oxygen Uptake Rate Range

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<td>&gt;20 (mg O2/hr/g of VSS)</td>
<td>High</td>
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<tr>
<td>10-20 (mg O2/hr/g of VSS)</td>
<td>Normal</td>
</tr>
<tr>
<td>&lt;10 (mg O2/hr/g of VSS)</td>
<td>Low</td>
</tr>
</tbody>
</table>

Note that percent solids and temperature also play a role in precise (SOUR) calculations and can be incorporated a correction factor in the calculations.

For more information refer to:
EPA Method 1683
Standard Methods for the Examination of Water and Wastewater 2710 B.

For spreadsheet and instruction visit:
http://portal.ncdenr.org/web/wq/aps/lau/reporting

Question 2: What are the advantages and disadvantages to the privatization of a water or wastewater system?

Answer: Send your response to nbanks@ncsafeewater.org and it may be printed in a future issue of NC Currents.
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Where We Started
First of all, thanks to the NC AWWA-WEA board of trustees active in 2008, led by 2008 Board Chair Steve Shoaf, an Endowment Task Force was appointed to evaluate the feasibility of developing a sustainable funding source for:
• increasing water environment education in schools
• expanding the Association’s support of scholarships for students attending four-year universities and community colleges.

The members of the task force met with many individuals and surveyed the membership. Their findings confirmed that it was feasible and that there was interest in establishing an endowment for the purpose of increasing knowledge and understanding of safe water issues, and preserving and enhancing our water environment. The board of trustees of the NC AWWA-WEA approved the recommendations of the task force in September 2009. These recommendations included:
• Allocation of $25,000 from the NC AWWA-WEA reserve fund for the initial funding of the NC Safewater Fund
• Approval of the Public Education Committee donation of $25,000 to establish the Carol Bond Fund
• Adoption of policies and procedures for the endowment program
• Approval of an Endowment Committee and appointment of the members of the Endowment Task Force as its initial members
• Approval of establishing an agency fund with Triangle Community Foundation

The opening paragraph of the Endowment’s policies and procedures states that the Board of Trustees of NC AWWA-WEA “establishes the NC Safewater Endowment as a permanent board-designated agency fund for the purpose of promoting safe water, increasing knowledge and understanding of safe water, preserving and enhancing the water environment. The primary means for accomplishing this purpose is to provide scholarship funds to individuals who seek assistance in order to complete a course of study emphasizing the protection of public health by providing healthful drinking water and/or protecting the quality and integrity of the water environment. In addition, the NC Safewater Endowment Fund will award funds to assist educators in providing enhanced water environment education to registered students and/or the public.” The board of trustees has continued to support the endowment program from its inception to its present stage of development.

Present State
Recently at the NC AWWA-WEA conference in Winston-Salem, we, along with Ray Cox, past chair, of the Endowment Committee, had the pleasure of presenting to the board the “State of the Endowment Fund.” The news we were able to share was good.
• Operational structure is solid.
• Staff support is fantastic.
• Fundraising is steady.
• Committee work is in line with the strategic plan.
• $12,000 in scholarships is being awarded annually.

Growth of Endowment Program
We have established some guiding principles to create a framework for continued growth of this fund. These include:
• Financial goals must be realistic and achievable
• Base of fundraising must broaden
• Membership ‘ownership’ of philanthropic effort is extremely important
• We will work collaboratively with Water For People according to the following principles:
  ✔ Endowment is to be the “internal” philanthropy, benefitting the profession
  ✔ Water For People is to be the “external” philanthropy, benefitting the environment and wider world-community

As with any endowment, the lifeblood comes from those who are passionate and willing to give toward a common cause or a common interest. When one ponders the subject of water and the challenges that face our industry, we all can agree that we need the best in class of professionals to meet these needs.
Vision for the Future of the NC Safewater Endowment Fund

One of the earliest needs identified by the task force, after reviewing all of the data collected in the initial surveys, was the need to build a philanthropic culture. Characteristics of a philanthropic culture include strong annual commitment of members’ time and resources to causes sponsored by NC AWWA-WEA. Once such a philanthropic culture exists within NC AWWA-WEA, we expect that most of our 3,300 members will contribute time and/or resources to support and help grow the assets of the NC Safewater Endowment Program and/or Water For People.

For example, if each of our 3,300 members contributes $2 per month ($24.00 per year) to the endowment program, we can grow the assets by $79,000 each year. The earnings from this increase in assets would generate over $3,000 to fund scholarships and grants each year in perpetuity. This means that each year, the NC Safewater Endowment Program could increase the number of students and teachers who are awarded scholarships and grants.

We believe that the NC Safewater Endowment Program will continue to improve NC AWWA-WEA’s legacy of providing education to water professionals. As of January 1, 2015 the NC Safewater Endowment Program has received pledges and donations of almost $400,000. If we can sustain a growth of assets of $100,000 per year, the endowment program would have assets totaling over $1,000,000 within the next seven years. With assets at this level, the NC Safewater Endowment Program would become a significant provider of scholarships and grants to students and teachers. We envision that NC AWWA-WEA would receive recognition for its support of the education and training of water professionals from outside entities such as universities, school systems, governmental agencies, and the public.

Conclusion

It is imperative that we embrace the challenges ahead. We must encourage and foster a philanthropic culture. Through gifts of funding, time, and resources, we invite you to join our campaign to help ensure that the next generation of industry professionals will be better educated and ready to face the complexities of the future.

Please go to the website www.ncsafewater.com for a full list of the current funds that are accepting contributions, or contact any of the committee members listed below for additional information on how you can get involved.

Carlos W. Norris (919) 367-2000
Les Hall (919) 614-2285
George Raffels (704) 373-1199
Charlie Willis (704) 377-9844
Linnell Stanhope (919) 367-2033
Mike Osborne (704) 841-2588
Tom Johnson (704) 543-3268
Frank Stephenson (704) 821-1755
Brian Tripp (704) 334-5348
Robert Walters (336) 731-5526

About the Author

Carlos Norris has extensive construction knowledge in field operations and management, with over 30 years of experience in heavy civil, water/wastewater, environmental, and energy projects. As president of Crowder Construction, Carlos provides direction and vision for future endeavors and operational growth. He is responsible for business planning, annual revenues, and organizational structure.

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BUSINESS DEVELOPMENT CONTACTS

Jack C. Harrelson, Jr.
jackh@salmonsdredging.com

Dillard Salmons
salmonsd@salmonsdredging.com

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Welcome New Members!

The following people became members of NC AWWA-WEA in October, November, and December of 2014 by joining AWWA or WEF and choosing NC 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.

We want to learn more about our members! If you are an NC AWWA-WEA member and would like to introduce yourself to our membership, email your photo and the answers to the following three questions to Nicole Banks at nbanks@ncsafewater.org, and you may be featured in an eNews email or on www.ncsafewater.org.

1. Where did you go to school and what did you study?
2. Where do you work, what’s your title, and what is your main job?
3. Why did you join NC AWWA-WEA?

For information on how to join and the membership options available, please visit www.ncsafewater.org/?page=Membership. 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, and click on a committee’s name to learn more about them. To express your interest in learning more about a committee, contact the committee chair directly or contact the NC AWWA-WEA office.

Next to some new members names, you may see the name of their endorser or sponsor that recruited them to become a member. The endorser/sponsor who recruits the greatest number of members may be recognized at the NC AWWA-WEA Annual Conference with one of the following awards.

The Maffitt Membership Cup honors Mr. McKean Maffitt and is given annually to the member of the NC Section AWWA who secures the greatest number of new members.

The William M. Piatt Membership Award honors Mr. William M. Piatt and is given annually to the member of the NC WEF Member Association who secures the greatest number of new members.

American Water Works Association (AWWA)
Jenine Abbassi, NC State University
Shams Al-Amin, NCSU Dept. of Civil Engineering
Huseyin Aybar, Schneider Electric
Mary Ellon Balance, RD SUPPLY LLC
John Bang, North Carolina Central University
Sarat Bantupalli, NC State University
Lee Beard, UNC Charlotte
Kelsey Bennett, Entex Tech Inc.
William Boivin, Union County Public Works
Randall Boyd, SEPI Engineering & Construction
Josh Brooks, Union County Public Works
Keri Cantrell, NC DENR
Josh Carpenter, Union County Public Works
Tim Carpenter, LKC Engineering PLLC
Julia Cavalier, NC DENR
Haniyiah Chapman
Kristin Connors, NC State University
Ruben Contreras, Old North Utility Services
Larry Crouch, Max Flow Media
Mona Ellum, Ellum Engineering
Matthew Estby, UNC Charlotte
Mary Fontana
Dave Fox, Raffelis
Laura Garcia-Cuerva, NC State University
Amber Greune, SEPI Engineering & Construction
Nathan Griffin
Zisu Hao, NC State University
Allen Hardy, NC DENR/DWR/PWSS
Dan Harris, Sensus
Zachary Hopkins
Obatayo Hounwanou
Randy Huffman, UNC Charlotte
Micah Jasper, NC State University
Roger Jones, City of Lexington
Chris Keiger
Chuck King
Kevin Koryto
Michelle Kovacs, NC State University
Catalina Lopez
Victoria Lopez, NC State University
Peachie Maher-Hytowitz, Amiad Water Systems
John Maness, Hazen and Sawyer, PC
Lindsay Matthy, UNC Charlotte
Amirhossein Mazrooei, NC State University
Alex McMillan
Catherine McMillan, NC State University
John Merrill
Jonathan Moreno Barbosa
Mark Muria Burkert, Fluid Control Systems
Kendra Nettles, Greenville Utilities Commission
Robert Ortega, Old North Utility Services
Daniel Page, Max Flow Media
Karen Peeden, Town of Fremont
Eric Polli
Elizabeth Ramsey
Brittany Reeves, Entex Tech Inc.
Ryan Roberts, Sensus
Lydia Seabrook
Della Shaw, NC State University
Ivana Shukla
Adam Steurer, NC State University
Mei Sun, NC State University
Joel Townsend, Matchpoint Inc.
Dyon Vega
Qian Wang, NC State University
Xiaoming Wang, NC State University
New Members

Danny Warrick, Xylem
Randy Watson, Bellwether Management Solutions
Bristol Weekly, UNC Charlotte
Austin Willoughby, UNC Charlotte
Jackie Yeh
Vivienne Yi, NC State University
Jian Zhang, NC State University
Hoke County Utilities
   (organizational member)
Max Flow Media (organizational member)
UNC Charlotte (organizational member)

Water Environment Federation (WEF)
Brian Dey, Dewberry
Don Dickinson, Phoenix Contact
Matthew Edds, Veolia
Clare Griffith

Anna Griggs, Deangelo Brothers Inc.
Erin Mallie, NC AWWA-WEA
Tom Williams, City of Brevard

NC SLAM
Seth Black, Two Rivers Utilities
   – City of Gastonia
Sarah Braman, CH2MILL
Jerry Brannon, United Water
Matthew Burt, City of Winston-Salem
Jordan Davenport, City of Kinston
Tony Dennis, City of High Point
Joey Eads, City of High Point
Zack Foreman, Two River Utilities
   – City of Gastonia
Mike Garver, Durham County
   – Utility Division
Jackie Grunden, City of Salisbury

John Hahn, Jr., Union County Public Works
Rachel Harris, Cavanaugh & Associates PA
Donna Hood, NC DENR
Stephanie Johnson, TRU
   – City of Gastonia
Nikole Kennerly, Kennerly Engineering & Design Inc.
Cody Mangano, Kimley-Horn & Associates Inc.
David McKeel, Greenville Utilities
Richard Morris, City of Durham
Jim Murray, City of Durham
Jerry Perkins
David Sabol, Town of Morehead City
Grant Sharpe, Brown & Caldwell
Kyle Thompson, Hazen and Sawyer P.C.
NC AWWA-WEA members work every day to protect the public health and the environment. The Association’s awards program is designed to recognize individuals and organizations that go above and beyond expectations. The following are recipients who received awards from NC AWWA-WEA at the Annual Conference in November 2014. Please note that the information listed with each award was current as of November 2014.

**Awards with Open Nominations**

With over 3,000 members across North Carolina it is difficult for awards committees to know about the great work of every individual and organization. Many of NC AWWA-WEA’s awards committees depend on members to step forward and nominate co-workers and facilities that deserve recognition. If you are aware of someone who fits the criteria of one or more Association awards, please visit the awards page of www.ncsafeSubtitlewater.org to download the 2015 Award Nomination Packet and learn how to submit a nomination. The packet includes award applications, deadlines, and submission information. Please be aware that most award application deadlines fall on or before July 1, 2015.

**Golden Manhole Award**

Recognizes individuals who are significant contributors to the advancement of systems design, education, training, certification, construction, operations, maintenance, and management of water distribution systems or wastewater collection systems. **Open nominations are accepted for this award.** Nomination forms must be submitted by July 1, 2015.

**Jeff Cruickshank, Hazen & Sawyer**

Mr. Cruickshank leads Hazen and Sawyer’s distribution system modeling team in the Greensboro office. He has more than 35 years of experience in all aspects of water distribution studies, including field testing, hydraulic modeling, calibrating models, evaluating water system improvements, water quality modeling, and master planning. His experience includes modeling studies for more than 70 water systems, a number of which were during his many years with Pitometer Associates. He is a life member of the American Water Works Association (AWWA) and was a contributing author of AWWA’s Manual of Practice M32 Distribution System Modeling. His work has been published in AWWA's Opflow magazine and NC Currents. He has advised and fostered many engineers in his career, including teaching and training for NC AWWA-WEA. His colleagues appreciate his wisdom and thoughtfulness.

**Robert H. Bald, Jr., City of Greensboro**

Robbie Bald has been involved with committee work for NC AWWA-WEA Collections and Distribution Schools, serving as committee coordinator and instructor. Robbie has also prepared and presented many collection system topics at NC AWWA-WEA events. Currently Robbie teaches in Senior Design Classes at NC State, sharing real-world problems of work that students are likely to encounter in practice. Robbie is also the author of papers that have been published in the national industry Trenchless Technologies magazine and for presentation at national conferences such as AWWA, the Water Environment Federation Technical Exhibition and Conference (WEFTEC) and the American Society of Civil Engineers (ASCE).

**Wastewater Collection System of the Year Awards**

Recognizes municipalities that protect the public health and the environment through proactive practices of management, operations, and maintenance beyond what is required of its North Carolina Department of Environment and Natural Resources (NC DENR) collection system permit. **Open nominations are accepted for this award. Nomination forms must be submitted by August 15, 2015.**

**Large System:**

**Charlotte Mecklenburg Utility Department (CMUD)**

CMUD has more than 230,000 wastewater connections, over 4,200 miles of collection mains, 75 lift stations and is the largest public water and wastewater utility in the Carolinas.
Medium System:  
City of Concord  
Established in 1900, Concord maintains 530 miles of sanitary sewer line, 24 pump stations, and 12,980 manholes and serves 30,972 customers. There are 11 crews responsible for maintaining the wastewater system in Concord.

Christie Putnam and Mark Varnadore accept the award from Mike Osborne and Christine Nesbit. NOTE: NC AWWA-WEA apologizes that Ms. Putnam’s name was omitted when this photo was originally published on page 39 of the Winter 2015 issue of NC Currents.

Micro System:  
Durham County  
Durham County serves 58,000 citizens and operates and maintains 84 miles of sanitary sewer and 12 pump stations. Their performance data was exemplary and the staff at Durham County takes great pride in delivering great service.

Paul Langfield and Alvist Richardson, Jr. NOTE: NC AWWA-WEA apologizes that Mr Richardson’s name was omitted when this photo was originally published on page 39 of the Winter 2015 issue of NC Currents.

Water Distribution System of the Year Awards  
Recognizes municipalities that protect the public health through proactive practices of management, operations, and maintenance of their water distribution system beyond minimum standards. Open nominations are accepted for this award. Nomination forms must be submitted by August 15, 2015.

Large System:  
Brunswick County  
Brunswick County is the fifth largest county by land area, and Brunswick County Utilities Department provides potable water to 80% of the county. In addition, Brunswick County Utilities Department serves 11 other utilities through wholesale contracts, and maintains over 1,030 miles of water mains.

Jerry Pierce, Brunswick County  
Paul Langfield and Alvist Richardson, Jr.

Medium System:  
Town of Mooresville  
An average of 4.5 million gallons of Lake Norman water is distributed per day. The system has 265 miles of drinking water lines serving 13,500 customers. The Town of

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Daparak, Inc. (704.323.7034)  
www.ncsafewater.org | 71
Mooresville is currently doing projects to replace its old 2-inch galvanized water lines with 8-inch PVC lines, they are averaging 4,500 feet per year will provide better water quality and fire protection to areas that did not have adequate protection.

**Wastewater Collections Operator of the Year Award**

Given to an individual who has contributed to the successful operation and maintenance of a sewage collection system. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

**Ben Reeves, MSD Buncombe County**

Ben is a construction crew leader and supervisor and has been a valuable employee at MSD Buncombe County for 28 years. Ben has taken advantage of many training opportunities, earning his Grade IV wastewater collection system certification in 2002. He also has attended numerous effective management and leadership classes, safety classes, and construction/trenchless technology classes to keep his own skills sharp. He shares his knowledge with the employees he leads, so that they can also grow and learn in their careers.

Ben takes pride in his workmanship, doing his very best in making repairs to the collection system and in undertaking sewer rehabilitation projects. Ben takes the time to meet with property owners to make sure they know what to expect and why the work being done matters to them.

He is a dedicated employee who serves the best interests of MSD Buncombe County, protecting public health while maintaining, repairing and improving the MSD wastewater collection system.

**Industrial WWTP Operator of the Year Award, Pretreatment**

Recognizes outstanding ability, devotion, and technical expertise in the operation of an industrial wastewater treatment facility. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

**Dwayne Russ, Smithfield Farmland Corp - Tar Heel**

When Smithfield Farmland Clinton Plant lost its wastewater system operator in responsible charge (ORC) in October 2013, Dwayne Russ volunteered to run the system, driving many miles to the plant and typically working 16-hour days, seven days a week until February 2014. During that time Dwayne worked tirelessly to advance and stabilize the treatment system, correct maintenance issues, refine process control strategies, and foster a more professional and efficient operations system, working out the bugs and assisting the operators in the training and proper operations of the new system. His dedication and commitment make him a worthy recipient of the Industrial Operator Award for 2014.

**Disaster Preparedness Award, Large Utility**

Presented to utilities in acknowledgment of outstanding achievement in advancing disaster preparedness initiatives, thereby strengthening our preparedness. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

**Cape Fear Public Utility Authority (CFPUA)**

Here are the highlights of the CFPUA efforts in working with the Department of Homeland Security (DHS) to do voluntary inspection for enhanced critical infrastructure protection for water and wastewater facilities:

- In 2012 the emergency management coordinator revisited results of 2003 vulnerability assessment and aggressive efforts were made to ensure full compliance.
- The emergency response plan is complete, and is a living document constantly being updated and revised.
- Water quality monitoring stations are being installed in the distribution system to monitor real-time data for key parameters of concern.
- The video surveillance system at Sweeny has been upgraded for inside and outside video.
- Fast action binders and quick water security guides have been distributed.
- Tailored documents with emergency contact data, vendor information, and incident action plans have been distributed to key personnel.
- Training on the emergency response plan is being given to new hires and existing personnel.
Trust CMT to repair and protect your steel and concrete. With CMT, quality is built into the job, not just painted on.
**WWTP Operations & Maintenance Excellence Award**

Awarded for outstanding plant operation and maintenance efforts, according to the best use of the resources available to that facility. Open nominations are accepted for this award. **Nomination forms must be submitted by July 1, 2015.**

**Eastern Region: City of Wilson WWTP**

This facility has demonstrated a consistent high level of professionalism and dedication to the environment.

The Water Reclamation Division operates the City’s 14-MGD Water Reclamation Facility using tertiary treatment to discharge clean water into Contentnea Creek. This division is responsible for enforcement of wastewater ordinances including permitting and pretreatment programs for industrial users.

- Construction of a new solids handling facilities at the Hominy Creek Water Reclamation Facility has been completed, including:
  - Dewatering facilities - to reduce the volume of biosolids for disposal
  - Covered concrete storage pad for dewatered biosolids - to provide storage during wet weather conditions when biosolids cannot be applied to farm land
  - Refurbished anaerobic digesters - to provide biological stabilization of biosolids
  - In-vessel pasteurization process - to provide advanced stabilization of biosolids
  - Septage handling station - to provide local haulers with another option for septage disposal
  - Biological nutrient removal basin - to provide compliance with National Pollutant Discharge Elimination System (NPDES) permit
  - Expansion of state-certified laboratory and offices

The City applies biosolids to agricultural land. This is an excellent and profitable alternative to landfill disposal, utilizing the recyclable components of wastewater for the production of crops. Land application of biosolids is a beneficial recycling process with economic and environmental benefits to citizens and area farmers, completing a natural cycle in the environment.

Area farmers enter into an agreement with the City of Wilson to participate in the beneficial reuse of biosolids program.

The City has been required to reduce total nitrogen (TN) being discharged to Contentnea Creek by 30%. The reclaimed water system will help achieve this goal. The City of Wilson’s reclaimed water system currently produces water to irrigate Wedgewood Public Golf Course and the public Rose Garden. Reclaimed water is also available at some of the industrial parks in the area.

**Central Region: North Durham WWTP**

This facility has demonstrated a consistent high level of professionalism and dedication to its customers and the environment.

Congratulations to the ORC, John Dodson and the outstanding staff.

The facility has undergone several upgrades to keep the plant operating at its optimum level and to comply with the first stage of the Falls Lake rules. Nutrient and solids analyzers have been added at several locations in the plant to help optimize the biological nutrient removal (BNR) process. New bar screens and a grit washer have also been added to improve the efficiency of rag and grit removal. For maintenance concerns, quick response (QR) codes have been added to all of the equipment. This provides staff with quick access by smart phone or tablet to all the maintenance information to help troubleshoot mechanical problems and keep preventative maintenance up to date.

**Involvement in the profession (outside plant):**

The North Durham staff exemplifies the spirit of the Professional Wastewater Operators Committee in their approach to education, participation, environmentalism and public service. The staff is very involved with several professional organizations outside of the plant and all are members of NC AWWA-WEA. Staff volunteer involvement includes:

- Maintenance Technologist School coordination
- Biological Wastewater School Committee
- Wastewater School Instructor
- Presenter at Annual Conference
- Presenter at Advanced Topics Seminar

The North Durham staff continues to be dedicated to public education, offering tours to different interested groups, throughout the year.

**Western Region: City of Cherryville WWTP**

Cherryville may be a small plant, but ORC Larry Wright and the four staff members there certainly have big ideas and have achieved many goals.

The four staff members’ responsibilities include plant operation, maintenance and laboratory, as well as operation and maintenance of five lift stations. The management team is leveraging technology to help get the job done.

SCADA control has been incrementally added over the course of a number of years, with the most recent addition being the latest software. The SCADA system and the video plant surveillance system can be accessed remotely, resulting in a flexible operation. Staff is reviewing options for new maintenance software, with the intention of using mobile phones or tablets to cut down on paperwork and streamline the record-keeping process.

The staff approaches projects with the goal of keeping costs low, while striving for excellent results. An example of this is a simple floating dewatering system, made in-house for decanting off the aerobic digester. This means that one person can now install the system and begin dewatering, whereas the previous system required multiple staff members and a rented crane to install and remove.
Wastewater Laboratory Analyst Excellence Award

Recognizes an individual for outstanding performance, professionalism and contributions to the water quality analysis profession. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

City of Asheville

The City of Asheville Water Resources Department has safety programs in place that include, but are not limited to, accident prevention, electrical safety, an emergency action plan, hazardous waste operations and emergency response, and a risk management program. The Water Resources Department has a philosophy to use established criteria for review of accidents and incidents and, at the end of the workday, to send all employees safely home to their families. In addition, each division has a safety budget for training and equipment, SOPs are reviewed annually, tailgate safety meetings are held weekly, and every jobsite must pass a worksite safety check to identify hazards.

George Warren Fuller Award

Presented to a member of AWWA for distinguished service to the water supply field in commemoration of sound engineering skill, brilliant diplomatic talent, and the constructive leadership that characterized the life of George Warren Fuller. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

Angela Lee, Charlotte-Mecklenburg Utility Department

Angela’s first assignment was supervising 12 field crews responsible for maintaining and repairing Charlotte’s storm water system. In that role, she successfully faced the challenges of cleaning up damage in North Carolina’s largest city from the ravages of Hurricane Hugo, the most devastating storm to ever hit Charlotte. Angela moved to the Charlotte-Mecklenburg Utility Department (CMUD) in 1990 to support the assistant director with wastewater treatment and collection responsibilities. Two years later, her great work and initiative was recognized when CMUD Director Joe Stowe promoted her to water distribution superintendent where she led a staff of 148 employees charged with all aspects of maintaining and repairing Charlotte’s water distribution system.

Angela earned her masters of public administration degree from UNCC in 1995. Angela was instrumental in planning a major reorganization within CMUD which, in 2004, led to her promotion to field operations division manager. The Field Operations Division combined the functions of the Water Distribution Division with those of the Wastewater Collection Division, creating a workforce of 280 people responsible for more than 8,000 miles of pipe and more than 70 lift stations serving nearly 600 square miles and almost a million people. Angela’s ability to relate to and earn the respect of her staff and customers is incredible. She truly cares about every one of her employees and every one of her customers.

Angela organized and led efforts to ensure all public works operations went smoothly at the city level when the Democratic National Convention came to Charlotte in 2012. Angela’s work on and in the Public Works Operation Center (PWOC) was masterful and allowed the City to fully and seamlessly ensure streets were clean, sanitation service was provided, water and sewer service was not interrupted, and that many other very essential but “behind the scenes” services were provided perfectly while Charlotte was in the international spotlight and under extraordinary security measures. More recently, Angela is part of an ongoing consolidation of CMUD’s water, wastewater, collection/distribution, and engineering divisions into a more tightly integrated operating group. One of the main drivers for this consolidation is for the entire CMUD organization to share in and benefit from the experience and skills Angela and others at CMUD possess.

Angela is passionate about the water and wastewater profession. She gives expertise to employees, and to water and wastewater professionals across the state.

Walter J. Courmon Safety Award

Encourages an active and effective safety program in municipal and industrial wastewater facilities, and stimulates the collecting and reporting of injury data. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

Jason Parker, Town of Cary

In the four years that Jason has worked with the Town of Cary, he has played a key role in the following: a laboratory renovation, implementing the recent MUR, taking a lead role in laboratory certification proficiency testing, and creating and implementing dissolved organic carbon (DOC) analysis, while obtaining all four wastewater laboratory analyst certifications. He has participated in an internal promotion system in which he has obtained a leadership role over the laboratory and is fully capable of managing the laboratory in the supervisor’s absence. Jason’s strongest asset is his logic. He does not simply memorize the steps of a standard operating procedure (SOP); he strives to understand the purpose of each step. He focuses on an analysis and discovers the weak points in a method, and then, step-by-step, fine-tuning the analysis until he routinely produces highly precise, accurate results. Jason is regarded as a go-to analyst for the Town of Cary, so much so that he recently was asked to train analysts from another facility in biochemical oxygen demand (BOD), total Kjeldahl nitrogen (TKN) and inductively coupled plasma mass spectrometry (ICPMS) analysis, which resulted in Jason receiving an award from the Town utility director.

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Angela is passionate about the water and wastewater profession. She gives expertise to employees, and to water and wastewater professionals across the state.
through her dedication to the Distribution and Collection Schools and service on the Water Board of Educators and Examiners (WBOEE). She is an inspiration and a motivator for the hundreds of workers who attend schools each year.

In 2007, Angela was elected to represent our state on the Water Environment Federation's National House of Delegates for a three-year term. This year, Angela returns to the NC AWWA-WEA board as vice chair and will become chair of the board in 2017.

She is a 5-S member, a recipient of the Golden Manhole Award, the 2012 recipient of the prestigious Raymond E. “Red” Ebert Award. Under her leadership, CMUD’s wastewater system received the Collection System of the Year Award in 2013 and 2014.

The very prestigious George Warren Fuller Award represents unselfish devotion to the principles of operation training and to the protection of the public health through proper operation and maintenance of public utilities. Angela C. Lee is most deserving to stand among the Fuller Award recipients from across the US who share these highest values and aspirations for our industry.

**Raymond E. “Red” Ebert Award**

Presented to the member who has made significant contributions to the practice of operating a water distribution or wastewater collection system. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

**Troy Perkins, Greenville Utilities Commission**

Mr. Troy Perkins was selected for the Red Ebert Award because of his significant contributions to the practice of operating a water distribution or wastewater collection system. Troy has been the superintendent of Greenville Utilities Water/Sewer systems since 2003. He has instituted great maintenance practices in Greenville and has been a strong advocate of ensuring that his employees are given the proper tools and materials for sound system management.

One example is that Troy was very instrumental in getting the mapping system designed for iPad use modified and more user-friendly for field employee use. Troy is very respected by his peers, and is very active in the Collection and Distribution schools, and coordinates the Grade IV collection systems class. Previously he has been awarded the Wastewater Collection System Operator of the Year and the Golden Manhole Award. Troy is an active member of St. James United Methodist Church and has coached volleyball and softball to support his girls. Troy constantly does an outstanding and consistent job and he does his job for right reasons.

**Safewater Maintenance Technologist of the Year Excellence Award**

Recognizes the hard working maintenance professionals involved in the day-to-day maintenance and upkeep of our state’s plant assets. Open nominations are accepted for this award. Nomination forms must be submitted by July 1, 2015.

**Barry Thornton, City of Raleigh**

Barry Thornton excels at what he does, leads by example, mentors others, and is well respected and regarded because of it. He exemplifies the ideal professional.

As a senior mechanic with experience in both treatment plant and pumping station maintenance, Mr. Thornton, through his invaluable experience, knowledge, and teaching skills, serves as a mentor and guide to many junior mechanics and new employees, guiding them to proper safe maintenance practices. This includes his recent guidance of a junior mechanic and teaching a summer helper in the preventive and corrective maintenance of a 120-MGD headworks facility.

Barry’s abilities range from repairing drywall, to rebuilding a pump or conveyance system, to developing asset maintenance activities for the computerized maintenance management system (CMMS). The end result of any task will always be a professional finished product that inspires others.

Barry began his career with the City of Raleigh in the plant operations department in 1989. He proved himself an accomplished mechanic, worked hard and earned a promotion to his current position of senior plant maintenance mechanic in 2000. He acquired NC AWWA-WEA maintenance technologist certification, NCDENR collections system operator certification and other certifications.

Barry has been instrumental in organizing many of the preventive maintenance schedules that are currently being used by the plant and remote sites maintenance staff. He has researched and created proactive and preventive maintenance activities for a variety of assets for the development of new CMMS preventative maintenance (PM) routines. He invested a lot of time into turning a room full of equipment service operations and maintenance (O&M) manuals into a usable organized library. He is able to see what needs to be done and moves forward inspiring others to follow his example. Barry exemplifies the maintenance professional that our industry strives to develop. He is the model.

**Select Society of Sanitary Sludge Shovelers (5S)**

Recognizes long and faithful service to the Association.

**Carolyn Ross, Charlotte-Mecklenburg Utility Department**

Quiet and unassuming, but ready to help with anything, Carolyn Ross has been the leader in recruiting a team and providing the support component that makes for a smooth conference registration process. Having served as the registration coordinator for many years, she has also served two years on the Nominating Committee, helping to ensure that the baton of leadership passes into capable hands. Now, she’s a 5-S inductee!
Chuck Shue, McKim & Creed
Active for many years, he has spent the past two years as chair of the Program Committee, helping to coordinate the excellent training available at conferences, which fulfills the fundamental mission and vision of NC AWWA-WEA. Chuck has also served as signs chair for the 2011 Conference, has been a Local Arrangements Committee (LAC) member for many years and is the incoming Conference Council chair in 2014.

David Saunders, HDR Engineering
David Saunders has provided a lifetime’s commitment to the water industry through his service as the former director of utilities for Winston-Salem, and to NC AWWA-WEA for his support of educational excellence – helping to craft the Career Ladder Academy Program which will start in 2015. He has been an indispensable asset as a member of the board of trustees, participating in the development of a strong strategic plan, and the data dashboard and tracking mechanisms that will ensure we meet our goals.

Tom Bach, City of Concord
A long-time member and then chair of the Communication Committee, Tom Bach has helped shape the quality and excellence of NC Currents and the NC AWWA-WEA website. Through his leadership, the Communication Committee has expanded and grown and has developed long-term plans and a sustainability plan. His generosity in sharing his knowledge, skills, and his praise have helped foster great loyalty and commitment from those he has helped mentor.

George Simon, McKim & Creed
George Simon answers “yes” to all that NC AWWA-WEA has asked of him – and then fulfills commitments with excellence! Chair of the Public Education Committee, where he has been a strong advocate for the Stockholm Jr. Water Prize, he has also been involved with the SONAR Task Force and the Joint Public Education video project. He serves as secretary of the board of trustees and was the recipient of the Kasey Monroe Outstanding Service Award in 2012.

Nicole Banks, NC AWWA-WEA
Nici Banks is another person who has answered “yes” to the needs of NC AWWA-WEA. She’s given a total of 13 years of excellence, first as an employee, and then after moving to Texas, and after that to Florida, as a contractor, supporting the work of the rest of the staff and volunteers in awards, membership, communications, eLearning, branding, web design, NC Currents, sponsorship, and board policy development. There is hardly any aspect of administrative responsibility at NC AWWA-WEA she hasn’t had a hand in. She left husband and home in Texas and spent three months in the office during the transition in the executive director position. Nici is loyal, generous, passionate, and all about excellence.

Kasey Monroe Outstanding Service Award
Given to a member of NC AWWA-WEA whose efforts and contribution have demonstrated outstanding service to NC AWWA-WEA

Tyler Highfill, Highfill Infrastructure Engineering
Tyler Highfill is the founding manager of Highfill Infrastructure Engineering. He is responsible for the planning, design, and project management of major water and wastewater facilities including water supply, treatment, and distribution systems, wastewater treatment plants, and wastewater collection systems. Tyler also manages the funding, permitting, and environmental studies that accompany these major infrastructure projects. With 20 years of experience, Tyler possesses
unique and proven skills to manage resources and lead project teams through complex technical and political issues.

Tyler is also a past Water Environment Federation (WEF) delegate and was a member of the board of trustees for NC AWWA-WEA from 2009 to 2012. On behalf of Highfill Infrastructures, he made the first corporate contribution to the Endowment Fund. This year, Tyler took on the role as chair of the Career Ladder Task Force, spearheading the effort to design training delivery for the future through the development of the academy. It is the largest single change in educational formatting in the association’s history. Tyler’s work truly reflects the devotion and extraordinary commitment that Kasey Monroe established as a benchmark and he is a worthy recipient of the award, keeping the tradition of exceptional volunteer effort very much alive.

William D. Hatfield Award

Recognizes an individual who pursues the advancement of the art and knowledge of wastewater treatment.

Michael Wiseman, City of Asheboro

He is the wastewater plant manager for Asheboro, North Carolina. Using existing equipment, he was instrumental in the creative implementation of a BNR system for his plant. This saved the City of Asheboro millions of dollars in construction and chemical feed costs while significantly reducing phosphorous and nitrogen their effluent discharge. Michael has also worked on a ‘waste to energy’ project in which he successfully converted his digestion process from mesophilic to thermophilic digestion. In the next phase, methane from the digesters will be used with methane generators capable of providing power to the entire plant. Mike is committed to the wastewater profession. He actively promotes tours of the plant with school groups, local civic groups and industries to help educate the public on the wastewater industry. He also goes to the local schools to help teach the wastewater curriculum and currently serves as vice chair of the Professional Wastewater Operators Committee. Michael is an asset to the City of Asheboro, the State of North Carolina, and the wastewater industry.

Arthur Sidney Bedell Award

Acknowledges extraordinary personal service to the WEF member association based on organizational leadership, administrative service, membership activity, and simulation of technical functions or similar participation.

Jackie Jarrell, Charlotte-Mecklenburg Utility Department

Jackie’s career has grown progressively with Charlotte-Mecklenburg Utility Department (CMUD) since 1984. Starting as a civil engineer, Jackie has moved up through the ranks and has provided exemplary leadership of CMUD’s five wastewater plants since 2000. She has been an active member of NC AWWA-WEA, serving on and chairing numerous committees and as a trustee. She chaired NC AWWA-WEA in 2013. Nationally, Jackie serves as a WEF trustee, has chaired the Utility Management Symposia Program Committee, and has a leadership role on the Utility Management Committee. Jackie has been recognized with the Outstanding Service Award, 5-S Membership, and many other honors.

Kenneth J. Miller Water For People Award

Honors an individual for outstanding service to Water For People.

Albert E. Gallaher, III, Charlotte-Mecklenburg Utility Department

Bert Gallaher is a longtime, active member of the NC Water For People Committee. He was instrumental in initiating the golf tournament, which is in its 18th year. He continues to attend the event, volunteering his time to this important activity of the committee. Additionally, Bert has offered his information technology (IT) expertise in updating and navigating the challenging NC tap portal, the official NC Water For People website. Bert is overdue for recognition of his efforts to the NC Water For People committee.

Donald E. Francisco Educator of the Year Award

Given annually to a member who demonstrates outstanding service to the Association and industry through education and training of water and wastewater professionals.

Helene Hilger, UNC Charlotte – retired

Her work as an education and mentor has led Dr. Hilger to give her time generously, writing letters of recommendation for her students to help ensure that they received scholarship needed to fund their studies, as well as opportunities to serve as interns that helped open doors with companies or agencies where they would eventually join the workforce. Dr. Hilger’s model of mentorship has also helped turn many of her former students into mentors themselves as they ‘give something back’ for the gift she gave to them.

Dr. Hilger has remained involved with Water For People because she is proud of the work they do, and believes that her students are inspired by Water For People’s work as well.

She has been excited by the theory and practice of sustainable design. She believes that this is part of the way that students of engineering can go about helping to solve the pressing environmental problems that exist everywhere in the world today.

Whether she is teaching, mentoring, speaking at conferences, chairing or serving on committees, directing research, or writing, Dr. Hilger is giving of herself, her knowledge, her experience, and her vision, shaping the profession and those who will work in it for the benefit of the people of North Carolina and the wider world beyond it.
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The Students and Young Professionals Committee (SYP) are constantly working to revitalize the student and young professional interaction in Raleigh. However, this year one of the main missions for the SYP committee is to increase young professional and student involvement within other NC-AWWA-WEA committees. As such, on February 3, the SYP committee hosted a networking event to connect the chairs and vice chairs of various committees with the students and young professionals group at Backyard Bistro in Raleigh, NC. This event had members from the Education Committee, Wastewater Schools Committee, Automation Committee, Climb For Water/Water For People Committee, and even board members and NC-AWWA-WEA staff. This event also offered an opportunity to raise money for future SYP events and needs, including funding travel for student design teams. Door prizes consisting of donated prizes and gift cards were awarded based on tickets given out during the event to raise over $200!

Over 30 students and professionals attended the networking event from a wide variety of consulting firms and utilities. Undergraduate and graduate students from North Carolina made up the bulk of students present at the event. Firms represented included HDR, Hazen and Sawyer, Highfill Infrastructure Engineering, Arcadis, Withers and Ravenel, Schneider Electric, and CDM Smith. Additionally we also had water professionals from the City of Raleigh and Town of Cary. The group enjoyed networking, food, and drinks from Backyard Bistro, and the door prize drawings!

In the upcoming months the Raleigh SYP group plans to hold a “Financials 101” seminar for new engineers and water professionals just entering the work force as well as hosting a professional networking dinner at the North Carolina State University Club or a local brewery. Look for updates about our growing SYP chapter in upcoming issues of NC Currents!

If you are interested in learning more about the Raleigh SYP Committee please contact the chair, Derek Dussek at derek.dussek@hdrin.com, or the vice chair, Allison Reinert at areinert@hazenandsawyer.com.

After more than four years as the City of Raleigh Public Utilities Director, John Carman will be taking the position of water department director for the City of Forth Worth, Texas in April 2015. Thomas Bach, PE, former utility systems engineer with the Water & Sewer Authority of Cabarrus County is now with the City of Concord as engineering manager - Water Resources.
Sila Vlachou, formerly project compliance coordinator for Stanly County Utilities is now compliance liaison, E&PM, Business Services Division for Charlotte Water.

**Release of George Raftelis’ Water and Wastewater Finance and Pricing Book**

The fourth edition of the industry guidebook *Water and Wastewater Finance and Pricing: The Changing Landscape* was released in September 2014. This book was edited and authored by NC AWWA-WEA member George Raftelis from Raftelis Financial Consultants with contributions from other leading industry experts including several NC AWWA-WEA members and AWWA Executive Director David LaFrance. The book is a guide to financial management and pricing practices for water, wastewater, and stormwater utilities. It is geared toward professionals assigned to develop water and wastewater financial plans and rates, senior managers with the responsibility for the long-term financial sustainability of the utility, investors evaluating the financial strength of utilities, engineers/consultants planning water and wastewater facilities, academics teaching financial and pricing principles as a part of public policy curriculum, regulators needing to understand the financial viability of utilities under their purview, and policy makers desiring to support effective financial and rate plans for their constituencies. The fourth edition is not to be a competitor of the American Water Works Association’s *M1 Manual or the Manual of Practice 27, Financing and Charges for Wastewater Systems*. The intent is to expand, in a complimentary fashion, many of the concepts presented in these manuals, and share additional real-world thinking and examples with the reader.

**Condolences**

Robert (Bob) M. Wilkinson passed away November 28, 2014. He joined AWWA in January 1967 and was a Life Member. He was awarded the NC AWWA-WEA Chair’s Outstanding Service Award (now called the Kasey Monroe Outstanding Service Award) in 1973.

John Wesley Greene was a faithful and dedicated member of NC AWWA-WEA who died January 4, 2015. Mr. Greene spent 32 years of his professional career working for the Orange Water and Sewer Authority, from which he retired as General Manager of Operations in 2013. He generously shared his professional expertise with water professionals, serving as a leader and teacher for NC AWWA-WEA Collection and Distribution School and Wastewater Operators School. He contributed his loyalty and service to the NC AWWA-WEA as a member of the board of trustees. John Greene was, in 2008, the 21st recipient of the NC AWWA-WEA Raymond E. ‘Red’ Ebert Award for excellence in water and wastewater engineering and management. He was respected and loved by his friends at NC AWWA-WEA who recognize the loss of a valued and trusted friend.

**NC AWWA-WEA Welcomes Erin Mallis**

In October, right before the Annual Conference, Erin Mallis joined the NC AWWA-WEA staff as the new external committee services coordinator. Erin’s responsibilities include working with the Public Education, Students & Young Professionals, and Water For People committees and providing support for membership committee activities. Originally from Boise, Idaho, Erin made the big move to Boston for school and graduated from Emerson College in 2010. She experienced the big city life in New York City for three years, working at exciting locations including Times Square and the Statue of Liberty before heading to the Raleigh area to seek a different atmosphere closer to family. Erin is excited to be part of the NC AWWA-WEA staff and looks forward to contributing toward organization’s mission.

**Barry Thornton Award Re-presentation**

“On Tuesday, February 3, 2015, NC AWWA-WEA chair represented the 2014 Safewater Maintenance Technologist of the Year Excellence Award to recipient Barry Thornton at a City of Raleigh event.”

**AWWA & WEF Life Members in the 2015 Annual Membership Directory**

NC AWWA-WEA apologizes that due to data sorting errors, several Life Members were not listed as such in the 2015 Annual Membership Directory. The members themselves are listed, but without their Life Member designation. Below is a complete list of AWWA Life Members and WEF Life Members.
McKim & Creed Announces New CEO

The board of directors of McKim & Creed announced that John T. Lucey, Jr., PE, has been named the company’s next president and chief executive officer, effective November 2014.

Lucey was previously the executive vice president of engineering and business development at Heckmann Water Resources (now Nuverra Environmental Solutions), an oil/gas water management company that is also one of the largest environmental solutions firms in the US.

Lucey will succeed Michael W. Creed, PhD, PE, who will continue serving as McKim & Creed’s chairman of the board. Herbert P. McKim, Jr., PE, PLS, will remain on the board of directors and will continue full-time work assisting with major client retention, business development and special projects.

“John is a proven leader and industry veteran who brings a strong engineering and technology background and impressive communication and management skills. I am excited about the future of McKim & Creed and am pleased to have the opportunity to continue serving our employees, clients and shareholders as chairman of the board,” said Creed. Added McKim, “John Lucey was selected from several very qualified candidates because of his experience leading a similarly sized firm through a successful period of growth, because of his experience in synergistic markets that we can enter, and most importantly, because of his leadership ability, his business skills, and his cultural fit with McKim & Creed.”

“McKim & Creed is one of the most innovative and respected companies in the engineering and geomatics industry, and I am honored to have been chosen to lead the organization,” said Lucey. “I look forward to working with the great team at McKim & Creed and to build from its strong foundation an organization that grows consistently by providing value to our customers with high-quality, innovative solutions.”

McKim & Creed Announces Promotion

McKim & Creed, Inc. has announced that Christopher H. Seamster, RLA has been promoted to a regional manager of the 350-person Raleigh-based firm.

As regional manager, Seamster will lead all planning and land development services provided by McKim & Creed’s Raleigh office. Prior to the promotion, he served as landscape architect/project manager for numerous projects in his 13 years with the firm.

“Chris’s attention to detail and his leadership of people have been an important part of McKim & Creed’s success in the planning and land development arena. He takes pride in his work, has created great relationships with his clients over the years, and will excel with this new responsibility,” said Grant Livengood, PE, business unit leader with McKim & Creed, in announcing the promotion.

Seamster joined McKim & Creed in 2001 as a landscape architect specializing in residential, commercial, and campus design projects, with previous experience working for a golf course architect. Since joining McKim & Creed he has

AWWA Life Members
Gary Amy
Michael Bell
Stanley Boyd
Timothy Broome
Gene Cobb
Donald Cordell
Jeff Cruickshank
Joseph DeBruhl
Alvin Derr
Francis DiGiano
David Doss
Garey Edwards
James Farrell
Arthur Fowler
Gary Frick
Robert Gidney
Henry Forrest
Thomas Griffin
William Hall
Edward Herndon
David Hiltebrand
Jimmie Jenkins
Gary Jones
Harold Kennedy
Donald Knibb
William Lapsley
William McDowell
James Moorefield
William Mull
David Pond
Richard Rafanovic
George Raffelis
G. Reavis
Alfred Richardson
William Riddick
Alan Rimer
Anthony Rolan
Philip Singer
Ronald Singleton
Robert Stein
Dale Stewart
Joe Stowe
Bobby Teague
Benjamin Thompson
Linda Vaughn
John Vest
Lawrence Whalen
John Wray
Michael Zihal

WEF Life Members
Stanley Boyd
James Chitty
J. De Bruhl
Gary Frick
William Hall, Jr.
Barry Harms
Anthony Izzo
A. Kornegay
J. Lanning, Jr.
Linda Little
T. Lyons, Jr.
Edward Morris, Sr.
William Mull
Richard Pehrson
Eric Rogers
Gordon Ruggles
Charles Rundgren
Ray Shaw, Jr.
Ronald Soltis
Joe Stowe, Jr.
F. Swartz
Arthur White
Charles Willis, Sr.
George Wong-Chong
been involved in numerous Triangle-area projects, including the Beaver Creek retail projects in Apex, the residential community of Briar Chapel in Chapel Hill, NCCAR in Garysburg, the Wendell Falls community, and site design projects at NC State University and UNC Chapel Hill.

Seamster is a graduate of Virginia Tech with a bachelor of landscape architecture degree.

About McKim & Creed: McKim & Creed is an employee-owned firm with more than 350 staff members in offices throughout the South, including North Carolina, Florida, Virginia, Georgia and Texas. The company, which is headquartered in Raleigh, offers civil, structural, mechanical, electrical and plumbing engineering services, as well as airborne and mobile LiDAR, subsurface utility engineering, hydrographic and conventional surveying services for the municipal, energy, development and institutional markets. For more information about McKim & Creed, visit www.mckimcreed.com.

Allen Cadden Inducted as President of ASCE Geo-Institute
Schnabel Engineering, Inc. is pleased to announce that Allen Cadden, PE, D.GE, F.ASCE, Director of Strategic Development, was inducted as the president of the American Society of Civil Engineers (ASCE) Geo-Institute (G-I) on Friday, October 17 in Reston, Virginia, at the conclusion of the fall board meeting.

As an active member of ASCE, the Association for Foundation Drilling (ADSC), and Deep Foundations Institute (DFI), Allen maintains awareness of the state of practice in these specialty areas and is a regularly-invited speaker to these societies. In addition to serving as President of the ASCE G-I Board of Governors, he is also Past-Chairman of the International Society for Micropiles, a member of the Board of Directors for the International Conference Organization for Grouting (ICOG), and recently completed two terms on the Board of Directors for ADSC. He also serves on the ADSC/DFI Micropile Committee, as well as the ASCE G-I Grouting Committee.

After working for his father’s deli all through high school and college (along with a few other ventures), Allen joined Schnabel Engineering as a co-op student after his junior year at Virginia Tech. While at Schnabel, he has held nearly every position, from field inspector through project engineer and manager, to branch leader of the West Chester, PA, office. Since the late 90s, he has served in Corporate Director roles overseeing engineering, and in his current position of director of strategic development, he oversees strategic direction and training and development for Schnabel.

Allen can be reached at acadden@schnabel-eng.com or at (610) 696-6066. To learn more about G-I and its committees, visit http://www.asce.org/geo/About-Geo-Institute/.

NC AWWA-WEA
The North Carolina Section of the American Water Works Association (NC AWWA) & The North Carolina Member Association of the Water Environment Federation (NC WEA)

2015 NC Water For People 5K Fun Runs
This year the NC AWWA-WEA Water For People committee is sponsoring 2 Water For People 5K Runs on May 16, 2015. One run will take place at the Wake Med Soccer Park in Cary, NC and the other will be held at Midtown Park/ Little Sugar Creek Greenway in Charlotte. All net proceeds will be donated to Water For People, a non-profit organization with a mission to bring safe drinking water and adequate sanitation to everyone.

Visit ncsafewater.site-ym.com/group/WFPCmte for the latest information.
Rob Indri, PE Promoted to Associate

Schnabel Engineering, Inc. is pleased to announce the recent promotion of Robert Indri, PE, to associate. Rob joined Schnabel’s Greensboro, NC office nearly 10 years ago as a senior staff engineer and holds a BS in Civil Engineering from the New Jersey Institute of Technology.

Rob specializes in the structural evaluation and design of hydraulic structures including spillways, intake towers, energy dissipators, radial gates, and bulkheads. He is well-versed in the various codes and technical approaches to the design and construction of these unique structures.

Rob has been the lead design engineer for a variety of dam rehabilitations, new dams, and dam construction projects and has performed the inspection, evaluation, design, and rehabilitation of dams with various deficiencies. He has performed structural analysis, and reinforced concrete and steel design on several large dam and bulkhead projects. His expertise includes finite element modeling and structural analysis.

Rob is a registered professional engineer in North Carolina, Virginia, Arizona, Kentucky, Michigan and Indiana. He can be reached at rindri@schnabel-eng.com.

About Schnabel Engineering:
Schnabel, an employee-owned company, is an ENR Top 250 engineering firm, employing over 300 professionals in 18 nationwide offices. Schnabel specializes in geotechnical, geospatial, dam, and tunnel engineering, as well as environmental, geosciences, construction monitoring, and resident engineering services. For more information, please visit us at schnabel-eng.com.

Robert Vinay Joins Freese and Nichols’ Water/Wastewater Team

Robert Vinay, PE, has joined Freese and Nichols as a water/wastewater senior project manager in their Raleigh, NC office. Vinay is a hands-on project manager with 35 years of experience working on large, complex water/wastewater projects throughout North Carolina, complementing Freese and Nichols’ growing team in the region. A North Carolina native, Vinay offers significant expertise in the planning, detailed design, and construction of water/wastewater treatment, utilities and pump station projects. He also has a wealth of experience in funding and regulatory compliance in the State of North Carolina.

Vinay earned his bachelor’s degree in civil engineering from North Carolina State University and is a registered professional engineer in North Carolina and South Carolina.

About Freese and Nichols:
Freese and Nichols, Inc. is a full service professional consulting firm and the first engineering/architecture firm to receive the Malcolm Baldrige National Quality Award. With offices in North Carolina and Texas, the firm provides engineering, architecture, environmental science, planning, energy, construction and program management services. For more information, visit www.freese.com.

Register by March 27, for the Best Rates!

ACE15 provides an environment for all water professionals to present and discuss solutions for the most pressing water utility challenges. Nowhere else can you find a similar experience where experts from around the world provide leadership and guidance for the future of our water.

For a full agenda, visit www.awwa.org/ace15
The Academy for Water Professional Development is a new initiative of the Association to fill an industry training gap and advance the careers of participants. The program includes multi-year technical and soft-skill training courses, which have been developed based on input from industry leaders across North Carolina. The Association's goal is to release the first phase of the program in July 2015.

Frequently Asked Questions

What is The Academy for Water Professional Development (The Academy)?
The Academy is a specialized training and certification program for current or prospective water industry employees seeking to advance their careers.

Why should I enroll?
The Academy has been built for professionals who look at the water industry not just as a job, but as a career. The Association consulted with industry leaders to determine the most highly desired skillsets for upper level employees. Our courses have been designed to incorporate that feedback and position participants for supervisory and upper level management positions. Any individual who is serious about advancing his or her career and is willing to invest time into training is encouraged to enroll.

How is The Academy structured?
The courses for each discipline in our program have been organized into four certifiable levels: Apprentice, Journeyman 1, Journeyman 2, and Master. Certification will require completion of all courses within each level (or equivalent) and passing a comprehensive exam.

Can I receive credit for prior training or years in the workforce?
Credit for previous training courses and/or work experience will be determined on a case-by-case basis. Participants will be given an opportunity to submit these items for review upon registration.

When does it start?
The Association's goal is to release the first phase of the program in July 2015.

What is the cost?
While exact pricing has not yet been determined, The Academy's cost will be consistent with other comparable trainings and seminars currently being offered by the association.

Is this training required by the State?
No. Most training will result in voluntary certificates.

Will I receive a degree or college credit?
The Academy is not currently affiliated with any college or outside degree program. All certifications will be from NC AWWA-WEA only.

Where will the training be held?
Training sessions will be held at venues throughout North Carolina and on the web.

What disciplines are currently available for certification?
We are currently offering courses in Collection System Technician and Distribution System Technician programs; however, more disciplines are currently under development.

How long will it take me to complete each level of a discipline?
The timeframe for completing each level will vary depending on the number of hours the participant can devote to the training.

Will CEUs be required to maintain certification?
Yes. To maintain the value and credibility of the certificates, continuing education will be necessary.

How can I become an instructor or volunteer to help with The Academy?
Volunteer opportunities with The Academy are numerous and include behind the scenes administrative work, course and curriculum development, marketing, and instruction. Individuals who are interested in volunteering or becoming an instructor should contact Catrice Jones at CJones@ncsafewater.org.
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- WASTEWATER & WATER SYSTEM ASSESSMENT

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NC Currents future themes & submission deadlines

NC Currents is the official publication of NC AWWA-WEA. Members, individuals, and committees are encouraged to submit content for the magazine. If you would like to submit an article to be considered for publication in NC Currents please complete the Submission Form & Publication Agreement (available at www.ncsafewater.org) and email both the completed form and your article to Nicole Banks at nbanks@ncsafewater.org. Articles must be received by 5:00pm EST on the listed submission deadline.

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.

FALL 2015  Trenchless Technology: Not a Boring Subject (Submission Deadline July 6, 2015)

When the conventional method of trenched pipe installation or rehabilitation fails or is just not feasible, trenchless construction can sometimes provide the solution. Whether it is dry bore, pipe jacking, horizontal directional drilling, directional bore, micro-tunneling, tunneling, moling, sliplining, pipe bursting, and other such methods of trenchless installation, this technology is developing and solving tough installation problems with ground-breaking advances. In this issue of NC Currents, trenchless technology will feature projects, methodologies, and the application of trenchless installations and innovations.

Theme Leaders: Steve Hilderhoff, Marco Menendez, Sherri Moore, Kelly Boone

WINTER 2016  How We Protect Your Water (Submission Deadline October 5, 2015)

According to mywatermatters.org “...the value of water is immeasurable. It is a vital resource in every form of nourishment we need for our bodies to survive and in every commodity we use...” Every person living in North Carolina benefits from clean safe water every day. However, the general public may not be aware of the resources, technology, and professionals who protect their water, treat it to drinking water standards, deliver it to homes and businesses, collect it after use, and treat it prior to returning it to the environment. This issue of NC Currents will explore the many ways that water industry professionals protect the general public. Potential topics include:

- Protection of source waters
- Water forecasting, management, and regional master planning
- Advances in treatment technology
- Best practices in storage, distribution, pumping, and collection
- Improvements in water quality through monitoring

Theme Leaders: Wade Shaw, Mike Shelton, Nathan Howell, Thomas Hahn

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## 2015 Schedule of Events

The following schedule is current as of March 2015. 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.ncsafewater.org or contact the NC AWWA-WEA office directly at (919) 784-9030.

### May

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>5</td>
<td>Lab Tech Day</td>
<td>Raleigh, NC, NCWOA</td>
<td>(252) 764-2094</td>
</tr>
<tr>
<td>18-20</td>
<td>Basic Utility Management Institute</td>
<td>Carrboro, NC, Chuck Christiansen</td>
<td>(801) 281-0107</td>
</tr>
<tr>
<td>19</td>
<td>NC AWWA-WEA Cape Fear Public Utility Authority Institute</td>
<td>Wilmington, NC</td>
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<tr>
<td>21</td>
<td>Board of Trustees &amp; Committee Chair Workshop</td>
<td>Greensboro, NC</td>
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<tr>
<td>21</td>
<td>RCAP Regional Training</td>
<td>Washington, NC</td>
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<tr>
<td>28</td>
<td>Growing Relationships &amp; Opportunities through Water Resources (GROW)</td>
<td>Greensboro, NC</td>
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<tr>
<td>28</td>
<td>NCWTFOCB Exams (application deadline 30 days prior)</td>
<td>Kinston, Morganton, and Raleigh</td>
<td>(919) 707-9040</td>
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### June

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<td>1-4</td>
<td>Customer Service</td>
<td>Location TBA</td>
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<tr>
<td>7-10</td>
<td>AWWA ACE</td>
<td>Anaheim, CA, AWWA</td>
<td>(800) 926-7337, <a href="http://www.awwa.org">www.awwa.org</a></td>
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<tr>
<td>11</td>
<td>NCWPCS0CC Exams</td>
<td>Kenansville, Morganton, Raleigh, Salisbury, and Williamston</td>
<td>(919) 807-6535</td>
</tr>
<tr>
<td>15-18</td>
<td>Western Maintenance Technologist School</td>
<td>Morganton, NC</td>
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<tr>
<td>15-19</td>
<td>Western Biological Wastewater Operators School</td>
<td>Morganton, NC</td>
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<tr>
<td>22-25</td>
<td>Customer Service</td>
<td>Lillington, NC</td>
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<tr>
<td>24</td>
<td>Raleigh Institute</td>
<td>Raleigh, NC</td>
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<tr>
<td>25</td>
<td>Raleigh Institute</td>
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### July

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<tbody>
<tr>
<td>13-14</td>
<td>The Academy for Water Professional Development - Initial Courses</td>
<td>Morganton, NC</td>
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<tr>
<td>13-17</td>
<td>Western Collection &amp; Distribution School</td>
<td>Morganton, NC</td>
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<tr>
<td>16</td>
<td>Growing Relationships &amp; Opportunities through Water Resources (GROW)</td>
<td>Asheville, NC</td>
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<tr>
<td>30</td>
<td>NC AWWA-WEA Drinking Water Rules &amp; Regulations Seminar</td>
<td>Raleigh, NC</td>
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### August

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<tr>
<td>3-5</td>
<td>Advanced Utility Management Institute</td>
<td>Greensboro, NC, Chuck Christiansen</td>
<td>(801) 281-0107</td>
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<tr>
<td>20</td>
<td>RCAP Regional Training</td>
<td>Washington, NC</td>
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<tr>
<td>24-28</td>
<td>Eastern Biological Wastewater School (Rescheduled from February)</td>
<td>Raleigh, NC</td>
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<tr>
<td>25-28</td>
<td>Physical/Chemical Wastewater Operators School (Rescheduled from February)</td>
<td>Raleigh, NC</td>
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<tr>
<td>27</td>
<td>NCWTFOCB Exams (application deadline 30 days prior)</td>
<td>Kinston, Morganton, and Raleigh</td>
<td>(919) 707-9040</td>
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<tr>
<td>10</td>
<td>NCWPCS0CC Exams</td>
<td>Kenansville, Morganton, Raleigh, Salisbury, &amp; Williamston</td>
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<tr>
<td>14-18</td>
<td>Eastern Collection &amp; Distribution School</td>
<td>Durham, NC</td>
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<td>17</td>
<td>RCAP Regional Training</td>
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<td>21-24</td>
<td>Customer Service Training</td>
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<td>24</td>
<td>Growing Relationships &amp; Opportunities through Water Resources (GROW)</td>
<td>Charlotte, NC</td>
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<tr>
<td>26-30</td>
<td>WEFTEC</td>
<td>Chicago, IL, WEF,</td>
<td>(800) 666-0206, <a href="http://www.wef.org">www.wef.org</a></td>
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### October

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<tr>
<td>29</td>
<td>Growing Relationships &amp; Opportunities through Water Resources (GROW)</td>
<td>Wilmington, NC</td>
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<td>NCWTFOCB Exams (application deadline 30 days prior)</td>
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<tr>
<td>15-18</td>
<td>NC AWWA-WEA Annual Conference</td>
<td>Raleigh, NC</td>
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### December

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<td>Carolina Management Team</td>
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<td><a href="http://www.CMTcoatings.com">www.CMTcoatings.com</a></td>
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<td>Carolina Pumpworks, LLC</td>
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<td>CB&amp;I Constructors, Inc.</td>
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<td>CDM Smith</td>
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<td>CH2M Hill</td>
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<td>704-544-4040 or 919-875-4311</td>
<td><a href="http://www.ch2m.com">www.ch2m.com</a></td>
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<td>Charles R. Underwood, Inc.</td>
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<td>800-729-2463</td>
<td><a href="http://www.crupumps.com">www.crupumps.com</a></td>
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<td>Crumpler Plastic Pipe, Inc.</td>
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<td>800-334-5071</td>
<td><a href="http://www.cpp-pipe.com">www.cpp-pipe.com</a></td>
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<td>Dixie Electro Mechanical Services Inc.</td>
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<td>704-332-1116</td>
<td><a href="http://www.dixieemi.com">www.dixieemi.com</a></td>
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<td><a href="http://www.evqua.com">www.evqua.com</a></td>
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<tr>
<td>Ferguson Waterworks</td>
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