Buckeye Bulletin

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Ohio Water Environment Association

Preserving & Enhancing Ohio's Water Environment

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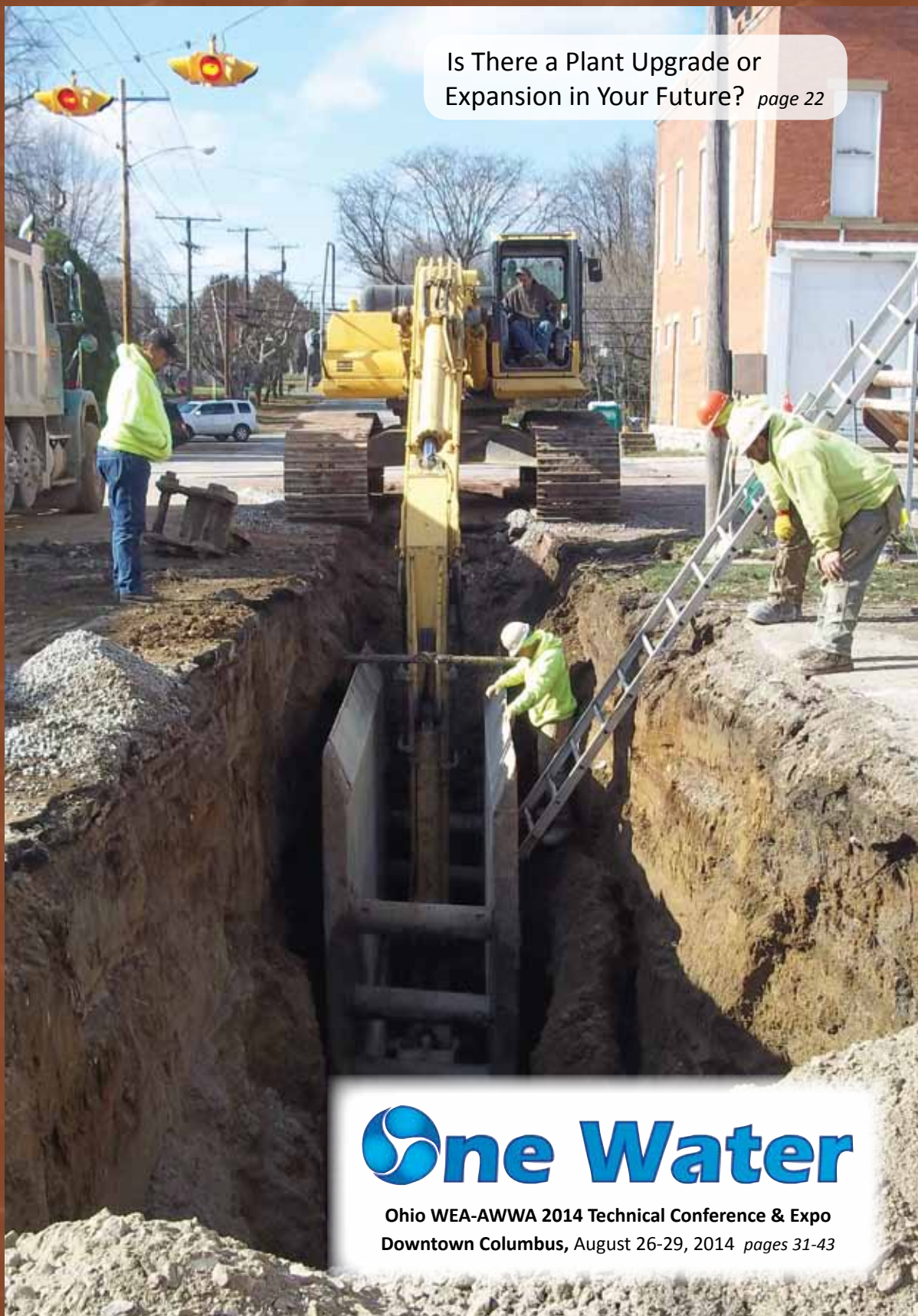

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One Water

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For further information on submitting articles or advertising, please contact our organization at:

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Contact Hour Information: OWEA training is submitted for contact hour approval. Free Webinars are not submitted for contact hour approval at this time.

Check out OWEA's website, *ohiowea.org,* for a complete listing of OWEA approved training.

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Get Involved - Join a Committee Today

The Ohio Water Environment Association has 25 committees which focus on various aspects of the water quality field and association operations.

Contact OWEA at ***info@ohiowea.org*** or the chair of a committee that interests you for more information.

OWEA NEWS

New OWEA Shirts in Stock

Just arrived - a shipment of new OWEA shirts, in both men's and ladies' styles. You can order a new shirt via OWEA's Online Store at *www.ohiowea.org*. Shirts cost $30 if purchased at an OWEA event. (Add $6 S/H if you would like it mailed to you)

(As shown by OWEA intern and new OWEA member Sam Hollyer.)

Visit the OWEA Booth at the One Water Conference

Stop by the OWEA Booth (#720 & #722) to learn more about joining an OWEA Committee, member benefits, upcoming workshops, and more.

Volunteering Is the Best Way to Network

It takes many volunteers to put on a conference for a not-for-profit association. The August 2014 One Water Conference is bigger than ever. Take a few hours of your conference experience and sign up to volunteer. We need helpers in many areas so you'll be sure to find a volunteer opportunity that would interest you.

Visit *www.onewaterohio.org* for more information or call us at 614.488.5800

Career Opportunities

The **"Careers"** page is the most visited page on OWEA's website.

- **No charge for job seekers.**
- **No charge to post a position** if you or a fellow employee are an OWEA/WEF member.
- **$128 for a 30 day posting** if not a member.
- **$128 for a Professional Membership**
  We encourage you to join OWEA and reap all the benefits of membership. Same price as a posting!

Click on the Careers tab at www.ohiowea.org or contact OWEA *(614.488.5800 or info@ohiowea.org).*

August 2014

1	NWOWEA Section Meeting
1	SEOWEA Friends and Family Night
26-29	One Water - Ohio WEA/AWWA Joint Conference
26-27	OWEA Operations Challenge Invitational
28	OWEA Membership Meeting at One Water
29	OWEA Executive Committee Meeting

September 2014

13	NESOWEA Clambake
18	SWOWEA Section Meeting
19	Wastewater LAC Exam App Deadline
27-10/1	WEFTEC | New Orleans

October 2014

1	Articles and Ads for November Buckeye Bulletin
16	OWEA Mega Meeting
24	Wastewater LAC Fall Exam
30	OWEA Watershed Workshop

November 2014

19	OWEA Executive Committee Meeting

December 2014

11	Biosolids Workshop

January 2015

5	Articles and Ads for February Buckeye Bulletin
7	OWEA Executive Committee Meeting

March 2015

5	Government and Regulatory Affairs Workshop
11	OWEA Executive Committee Meeting

April 2015

5	Articles and Ads for May Buckeye Bulletin
19-22	WEF Collections Conference - Cincinnati

2014 Membership Rates

Rates include membership in the Ohio Water Environment Association and the Water Environment Federation.

- Professional & Academic.....$128
- Operations.....$73
- Young Professional $61
- Student.....$25
- Executive.....$322
- Corporate $400

Membership information may be found at:
http://www.ohiowea.org/memberships.php

President's Message

I hope this issue of the Buckeye Bulletin finds you and your family well and enjoying the summertime fun Ohio has to offer. As usual, my family and I are having a busy summer, but mine became even more exciting when Dan Sullivan passed me the OWEA president's gavel on June 26th at the Mohican State Park during our annual business meeting. This low-key transition was absent of the traditional annual conference fanfare and done to give Dan and me a 50/50 split on presidential time and allow our annual conference to slide into August as a joint OWEA/AWWA - One Water Conference (more to follow on this great event). Even though many of you didn't see it in person, I promise I am officially President of OWEA as this issue of the Buckeye Bulletin hits your doorstep!

Mike Frommer
OWEA President

First, I would like to thank Dan Sullivan for his leadership over the last year. He is definitely leaving things in a very good place and on an upswing. Actually momentum has been building steadily over the last couple years and past presidents Tom Angelo, Doug Clark, Dale Kocarek, Mark Livengood and Dianne Sumego have had a lot to do with steadily increasing the height of the bar. Thanks guys, I appreciate the added pressure. This motley crew (me included) consists of 3 public utility managers, 3 engineering consultants and 1 manufacturers rep. Either a recipe for OWEA goodness or a poor wastewater themed Christmas jingle if you ask me! If you are starting to wonder about my term as president, don't worry. We have a regulator up next in the batting order and Elizabeth (Wick) will most certainly get things back on track if necessary.

Second (and in parallel importance as first above), I would like to thank Judi Henrich and Amy Davis for their outstanding service to our membership, including their high quality event planning and execution skills that are frequently on display, and the consistently high level of customer service they provide to our members. I am continually amazed at the unsolicited comments I get from members and section officers. Please note that Judi's tenure coincidentally has spanned that of the Presidents listed above and was no doubt a big part of that bar's vertical ascension.

Michael A. Frommer, P.E., is currently a Vice President and the Operations Manager for the Columbus office of URS Corporation. The Columbus office currently has over 170 professionals in the areas of Water/Wastewater, Facilities, and Transportation. In addition to being a Professional Engineer in the State of Ohio, Michael holds Class 3 water supply and Class 3 wastewater operator licenses. He has a Bachelor of Science Degree in Civil Engineering from Ohio Northern University. Michael is also a member of the Select Society of Sanitary Sludge Shovelers (5S).

Michael resides in Powell, Ohio with wife, Jennifer, and their two sons, Matthew (14) and Nicholas (11). Jennifer is a Vice President with HDR in Columbus and also practices in the wastewater industry. In his spare time, Michael enjoys spending time with his boys, whether on the golf course, a fishing pole in his hand, or trying to relive his glory days on the basketball court.

I have had the pleasure (for a decade and half) to be involved in the association at the State, Section, and Committee levels, and am really excited about the the opportunity to lead this wonderful organization. YES COACH . . . I AM READY . . . PUT ME IN! Some of you may know me very little, and others may know me too well. For those of you that fall in the former category (and are interested to know more) please see the bottom left part of the page. The key thing to note if you are not that interested to read the entire bio is that I am an ENGINEER.

My thoughts on the current status of all things OWEA: In 2013, we completed a membership survey and received a high level of participation in the process. After crunching the numbers, looking at trends, calculating averages (the engineer thing), our overall rating would be about an 8 out of 10. As a side note, my youngest son would be doing cartwheels over a B and my oldest son would be devastated that his 4.0 got ruined by a B with a minus no less.

The members were very clear on what they wanted out of their membership (and they are currently getting a majority of it) and feel that they are getting very good value from their current OWEA membership. In the first half of 2014, we had record-breaking attendance at the Government and Regulatory Affairs and Collection Systems Specialty Workshops. Yet another indicator that Dan is passing things to me on the upswing. All in all, it appears that we are doing many things right as an association. But like everything in life there is always room for improvement, albeit small in some cases. We are talking tweaking and minor additions and not drastic changes.

My plan for 2014/2015 (I know you were starting to wonder if I had one) is to begin preparing a strategic plan that establishes benchmarks for success based on the results of the membership survey and member feedback. Sounds complicated but it will be much easier than a Long Term Control Plan Addendum to switch a community from sewer separation to pump, store and treat. Essentially, we will determine how high we want to set the bar, and develop a road map on how to get there.

The strategic plan will identify and benchmark success for the following areas: membership size and demographics, membership value/satisfaction, association resources, and image/brand. Our first strategic planning meeting was held on June 25th and there will be much more to follow on the progress of this adventure in upcoming articles.

The desired outcome of the plan is very simple: to maintain our B average in the short term and make a run at an A grade in the upcoming years. If you are suddenly inspired to share feedback regarding an important topic that you feel should be considered in this plan please email me at *mike.frommer@urs.com*. Remember, member feedback is as critical to a strategic plan as flow metering data is to an LTCP!

continued on page 7

Minutes of the 2014 OWEA Annual Business Meeting

The 89th Annual Meeting
June 26, 2014 , Mohican Lodge and Conference Center, Perrysburg, Ohio

President Sullivan called the meeting to order at 11:00 am. A quorum was established. A moment of silence was held for our deceased members.

Items for approval were the 2013 Annual Business Meeting minutes. Jane Winkler, Secretary-Treasurer, reported that the minutes were published in the Fall 2013 issue of the Buckeye Bulletin. Copies of the minutes and Treasurer's report were distributed. Dan Sullivan made a motion to approve the minutes, with a second by Mark Livengood. Motion carried. Jane Winkler gave the Treasurer's report. A motion to approve the report was made by Dan Sullivan and seconded by Ted Baker. The motion passed.

Section reports were given. Mary Ann Driscoll gave the Northeast Section report; Josh Wehring reported for the Northwest Section; Matt Boone represented the Southeast Section and Jamie Gellner, representing Bob Beyer, gave the Southwest Section report. Each outgoing section President was presented a certificate of appreciation for their service by President Sullivan.

Standing/Ad hoc committee reports - Committee chairs were permitted to give brief updates on their committee's activities. Written reports were submitted for the minutes.

The WEF delegate report was given by outgoing senior delegate Mark Livengood.

Items for Voting - Nominations and elections:

- Dale Kocarek presented Jane Winkler for Secretary/Treasurer. The motion was made by Gary Johnson and seconded by Mark Livengood to elect Jane. Motion carried.
- Dale Kocarek made a motion to elect Ted Baker to the Vice President position. A second was made by Tom Angelo. Motion carried.
- The following names are for the remaining for the 2014-2015 officer positions: President - Mike Frommer; President Elect - Elizabeth Wick; and Dan Sullivan - Past President.

OWEA had received letters of support from the Northeast Section for the appointment of Mike Welke as the NW delegate to OWEA.

Announcements - none received

President Sullivan passed the gavel to Mike Frommer as the new OWEA President. A plaque of recognition was given to Dan Sullivan for his Presidency by Mike Frommer.

President Frommer adjourned the meeting at 12:29 pm.

Submitted by Jane Winkler, Secretary-Treasurer *(For publishing in the Fall 2014 Buckeye Bulletin)*

Josh Wehring
2013-2014 NWOWEA President

Mary Ann Driscoll
2013-2014 NESOWEA President

Bob Beyer
2013-2014 SWOWEA President
(accepted by Jamie Gellner)

Matt Boone
2013-2014 SEOWEA President

President's Message continued from page 6

Lastly, I am really looking forward to the One Water Conference that is scheduled for the last week in August and hope to see you there. If you commonly "super-size" your value meal then this event is right up your alley. It has everything you need in larger quantities and at a lower price than if you bought them separately. Contact hours available on 4 days, exhibit hall for 2 days, over 130 technical presentations, 3 evening networking events, over 200 exhibitors and much, much more.

Wow! This president gig doesn't seem too hard and writing this article was much more fun than I imaged it would be. Maybe when this year is up, I can lobby for a new spot in the Buckeye Bulletin called the "Frommer Forum" and compete against the Kocarek Korner. Probably wishful thinking on my part, because I can't remember the exact date or even the year I joined OWEA. My youngest son gets his academic prowess from his Dad and History was not a strength of mine.

Mike Frommer, OWEA President
mike.frommer@urs.com

PAYING FORWARD

by Dale E. Kocarek, P.E., BCEE, OWEA Past President 2010-2011

Coach "Woody" Hayes, 1913-1987
OSU Football Coach 1951-1978

You "Win With People"

One of the most interesting people that I have met was the late Wayne Woodrow "Woody" Hayes, the head football coach of the Ohio State Buckeyes from 1951-1978. I attended the Ohio State University (OSU) between 1975 and 1982 and "Woody" was the football coach when I was an undergraduate student. At just under 6 feet tall with a barrel chest, Woody was an imposing figure as he strolled on campus, always dressed in a sport coat and tie. His stride was always with a purpose as I often saw him on the OSU Oval. He smiled easily which bespoke of a kindly demeanor, revealing how much he liked people. It was also clear that he was well liked in return.

His book ***You Win with People*** tells his story. Woody was fond of remembering and acknowledging those who helped him along the way, from his youth in Newcomerstown, Ohio during the Great Depression, through World War II, to Columbus, Ohio and Ohio State University. He did this with great reverence. The McDonald's restaurant on US 36 at I-77 is virtually a shrine to the late coach and his father, School Superintendent Wayne B. Hayes (1880-1938). One of Woody's favorite expressions was ***"You can never pay back; you can only pay forward!"***

I had the opportunity to speak briefly with Woody several times. Most would agree that Woody was a commanding father figure with deep beliefs, an amazing work ethic, an immense loyalty to Ohio State University, and, above all else, a love of teaching.

Opportunity

I believe that access to opportunity is a basic human desire. We all want opportunity, and if we do not receive it, we feel deprived.

I believe that there are important roles for factions of government, along with professional organizations like the Ohio Water Environment Association (OWEA) and the Water Environment Federation (WEF), to be leaders when it comes to teaching, training, and creating opportunities for future generations of Americans. This concept is not new. The artful leveraging of government to encourage the creation of programs and initiatives that invested wisely in future generations crossed political party lines many times in the past. This leveraging contributed to the betterment of human kind and our nation.

We all know that infrastructure projects have a great potential to create jobs in multiple sectors of the economy. Unfortunately, we have all heard reports of the United States Environmental Protection Agency (USEPA) Needs Gap or the American Society of Civil Engineers (ACSE) Infrastructure Report Card, which gave water infrastructure a grade of D-. Alas, our plight to promote the importance of infrastructure will probably not become "newsworthy" until someone dies of a waterborne disease due to a failure of a water line or sewer line. Then it will be front page news!

Fortunately, some progress is being made, in part through our efforts, as President Obama signed House Resolution 3080: Water Resources Reform and Development Act of 2014 on June 10, 2014. HR 3080 includes a Water Infrastructure Finance and Innovation Authority (WIFIA) Pilot Program, which has been a topic of our focus at the DC Fly Ins and subsequent discussions for the past three years. I am pleased that OWEA played a role in its passage.

The Serviceman's Readjustment Act of 1944

While we often limit our discussion on investment to physical assets, but there is another type of investment - human capital, which can also pay huge dividends. We all know that we can build newer and more complex water and wastewater treatment plants. But if we do not have qualified personnel to operate and maintain them, the public's investment of potentially millions will not be fully realized. Therefore, it is important to include discussion on human capital in conjunction with those on physical infrastructure.

Perhaps the best example of our national investment in human capital was the Servicemen's Readjustment Act of 1944, which is commonly known as the GI Bill. The story of the writing and passage of the GI Bill is good reading for anyone interested in the way that our legislative branch of government should work to pass legislation when united behind a common cause.

Georgia Congressman
John S. Gibson (1893-1960)

In doing background research for this article, I read a January 1969 article from the *American Legion Magazine*, marking the 25th anniversary of the passage of the GI Bill. The article is, entitled ***"How the First GI Bill Was Written"*** by R.B Pitkin. The most fascinating part of the story recounted how the Bill was saved from defeat by Representative John Gibson on June 8, 1944. The story of the journey describes how Congressman Gibson was awakened in the middle of the night in his home in Central Georgia and drove during a blinding rain storm to a waiting plane in Jacksonville, Florida, which would transport him to Washington DC by 10 a.m. the next morning for a critical vote on the Bill.

The rest is history. The GI Bill was signed into law by President Roosevelt on June 22, 1944. The lasting positive impacts of this Bill and its ongoing versions have benefited US service men and women greatly to this day.

The GI Bill exceeded all initial expectations. The primary purpose was simple. It was to help make up for the time and sacrifice of men and women who put their lives on hold for a period of years to defend our country. Initially, the Bill was intended to provide only a "bridge" period of one year to get returning GIs on their feet and pay for basic necessities through a subsidy of $20 a week until they found work. This subsidy was intended to avoid what happened after World War I, where many veterans returned from the war as heroes but were soon forgotten and virtually left to beg.

Primarily due to the efforts of the American Legion, the Bill was expanded to provide a host of other benefits, including education and low interest loans to purchase housing.

Ultimately, the educational opportunities created by the Bill transcended generations. Numbers of persons attending and graduating from college with four year degrees greatly surpassed those attending college prior to the war. Those that earned degrees had the benefit of higher earning potential above those that did not attend college. This new era of "affluence" by a more highly educated workforce helped drive the US economy for four decades of unprecedented growth. I bore witness of this many times in my parents' generation, including an uncle and former co-worker years ago when my firm was called R. D. Zande and Associates.

Operators Recruitment, Training, and Retention

Based on what I have learned through the Water Environment Federation (WEF), our industry is on the verge of an operator needs gap. There is a growing need to replace highly trained leaders of the present generation with a new generation of qualified personnel – equally passionate, qualified, and trained to meet the challenges of the future. From what I understand, the greatest loss in institutional knowledge and talent may be felt in about ten years but will begin soon.

Based on a summary of discussions at the WEFMAX in Grand Rapids, Michigan on April 30-May 1, 2014, I have a better idea of the extent of this problem and what WEF is doing to help. I took a number of notes, in my role as official WEF House of Delegates session "summarizer" regarding this.

- Many operators are over 50 years in age and will soon be retiring. Without new qualified operators entering the field in sufficient numbers, there will be a "needs gap." Depending on the severity of the shortfall, there could be a failure to meet the critical need of the industry to produce clean water for the environment, which is necessary for public health and water quality. Again, without qualified personnel to operate systems, the goals and objectives of the Clean Water Act and its Amendments may not be fully achieved!
- There must be a significant increase in the number of persons who are qualified, dedicated and passionate about the profession. Not only must this pool of applicants be interested in the field, but they must be capable of passing operator examinations and becoming licensed.
- Our educational system must emphasize formal training in the form of two-year degrees and apprentice programs.
- In consideration of this needs gap, it is anticipated that salaries for qualified operators will increase over time, which is good news.
- WEF's Member Associations such as OWEA can help to provide learning fun through Operations Challenge programs that emphasize learning, communication, and skill building similar to that is done at the Indiana WEA. Unfortunately, the cost and participation in Operations Challenge programs is challenging for many Member Associations. Some Member Associations find it difficult to find teams. For those that do, Operations Challenge is rarely a money making event.
- In addition to encouraging Operations Challenge, WEF can help operators by teaching leadership skills to aspiring operators wishing to enter management. Leadership skills are a hot topic in my House of Delegates Workgroup this year.
- Social media and increased communication about operator programs can be an opportunity for increased participation. Like all generations, we must learn to communicate with the next generations in ways that are relevant and effective. While I have never "twittered" in my life, I was convinced after this discussion that I should start!

I wish to thank my friend and fellow OWEA Executive Committee Member Kim Riddell, who along with Dianne Sumego and others on the WEF House of Delegates, were instrumental in this workgroup. Kim was kind enough to provide me with the following approach that WEF took to developing their draft strategy, which I am sharing with you. Unfortunately, my column does not allow me space to elaborate in detail on the Operational Strategy proposed by WEF. Suffice it to say, this workgroup spent a lot time and energy developing the following:

- Proposed WEF Operations Personnel Strategy: Developed by the workgroup to provide a clear sense of direction for WEF future efforts in this area.
- Anticipated Benefits of the WEF Operations Personnel Strategy: Articulates the benefits Workgroup members anticipate that will accrue to operations personnel, customers/communities, the water sector/utilities and WEF.
- Recommended WEF Operations Personnel Strategy Work Areas: The specific work elements of the proposed WEF Strategy. These areas work in concert to support the strategy and are presented with detailed tasks.

Lab Event at OWEA Operations Challenge

I am convinced that there is no shortage of talent in this country. My participation in the OWEA Science Fairs and the Stockholm Junior Water Prize competition since 1996 bear testimony to this belief. However, what concerns me the most is what I perceive to be a lack of interest or excitement about the field. It appears that many entering the field – including the son of my brother-in-law's friend - stumble into the field by accident, rather than part of a career plan. This young man majored in Environmental Science at Gannon College in Pennsylvania. After a brief first job as an environmental technician for a consulting firm, he applied for a position in the public sector. I am happy to report that he is now enjoying a rewarding career as a wastewater operator/chemist for the Regional Sewerage Authority of Sharon, Pennsylvania. The work is important, steady, and his employer has provided a career path for him into leadership. When all is said and done, who could truly ask for anything more? Somehow, the benefits of the operations vocation must be better communicated! Two good web links are as follows:

http://news.wef.org/u-s-department-of-labor-approves-guidelines-for-wastewater-operator-apprenticeship/

http://news.wef.org/wef-operator-initiative-makes-the-profession-a-priority/

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Kocarek Korner continued from page 9

The Future Is Up to Us

In closing I am reminded of the dialog between two characters, Jennifer and Doc Brown, in the movie "***Back to the Future***." The following dialogue is from Part III of the trilogy.

Jennifer: *"Doc, I brought this note back from the future and now it's erased."*

Doc: *"Of course it's erased!"*

Jennifer: *"But what does that mean?"*

Doc: *"It means your future hasn't been written yet. No one's has. Your future is whatever you make it, so make it a good one."*

Christopher Lloyd as Doc Brown in Back to the Future, 1985, Universal Pictures

So, in closing, our future has not been written. It is up to us, WEF, our educators, fellow professionals, and our elected officials and lawmakers to continue to press upon the public the importance of what we do to clean water and protect human health. Water is life, and without it life is not possible. I feel that our field has unlimited potential and opportunity. It is our job to convince the next generation that it does too!

Dale E. Kocarek, PE, BCEE
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WATER FOR PEOPLE REPORT

Alicia Adams, Co-Chair

"Teamwork. Whether at work, at play, or at home, in most endeavors teamwork is the make or break factor in long term success. So it is with fundraising for Water For People . . . One critical key to teamwork is shared leadership . . . One of the keys to good leadership is also being willing to invite new leaders to take a stronger role," wrote Doug Borkosky in the December 2012 issue of the Buckeye Bulletin. With that said, Doug has decided to resign as Water For People Co-Chair and hand the baton over to Afaf Musa.

Doug is a natural born leader, educator, and philanthropist. He has taught me so many valuable lessons, inspired me to aim higher in all aspects of my life, and shown me what it means to truly be an exceptional person. I am very grateful to Doug for his dedication to the Water For People Committee and recognize that he leaves insanely large shoes to fill.

Afaf Musa is assuming the WFP Co-Chair position. If you've attended either of the Wine Tastings in Columbus, then you're sure to have met Afaf. She was instrumental in bringing the events to fruition. Afaf is a Project Engineer for CDMSmith. She has worked on analyzing wastewater, combined and stormwater system models, for the past seven years. Afaf has a BS in Civil and Environmental Engineering from The Ohio State University. Afaf came to Ohio in 2002 from Jordan. Afaf and her husband, Borhan, have 3 children, Jenna who is 9.5 years old and twin boys, Yasin and Zain who are 4.5 years old. Afaf brings new energy to the committee that is contagious.

water for people

Please help me give many thanks to Doug for all of his insurmountable wisdom and leadership, and help me welcome Afaf to her new role at the One Water Conference this month. Which speaking of . . . you will not have to look hard to find ways to get involved and help raise money for Water For People at the conference. Ways you can help the organization and have fun doing so are:

- Buy mulligans or try to "Beat the Pro" at the Golf Outing on August 26th at Foxfire
- Visit us at booth #725 in the exhibitor hall on August 27th and 28th.
- Join in the exciting Cornhole and/or Darts Competitions at the Meet & Greet @ Brothers on August 27th
- Come collaborate with us during the Water For People Committee Meeting on the 28th from 9-10 am in the Hopkins Room
- Purchase a 50/50 ticket during lunch in Hall C on the 28th
- Participate in the exciting Silent Auction on August 27th and 28th at the tables near the One Water Registration. Final call for bids before the Gala at 6:15pm
- Buy a raffle ticket to win the OSU vs. Indiana Football Game Package, winner drawn on August 28th at the Gala.

If you miss us at the One Water Conference, keep an eye on the website for information about an upcoming Wine to Water event returning to Northeast Ohio.

If you would like to become an active member on the OWEA Water for People Committee team, please contact me or Afaf.

Alicia Adams, *alicia.adams@stantec.com*
Afaf Musa, *musaab@cdmsmith.com*

Mark Livengood

Dale Kocarek

Doug Clark

Spring coolness has changed to heated humidity as I write this message. Many in Ohio have experienced record thunderstorm events this spring and summer, which has tested flood controls and pumping plans.

WEF has just completed its WEFMAX (WEF-MA- Exchange) meetings in May, which the last one in Charleston SC. The OWEA Board has always found these meetings to be very useful and worthwhile in attending. It is one effective means by which WEF gets to know us, and we get to better know them. Under the leadership of Eileen O'Neill, WEF is involved in a planning process to better understand and serve Member Associations such as OWEA.

In early June, the WEF Board of Trustees and the Executive Director, Eileen O'Neill, announced the formation of a new internal Member Association and House of Delegates support team, termed "Association Engagement." Linda Kelly will lead the team, working with Dianne Crilley and Kelsey Hurst. Linda's experience as a former member assocation president (Pacific Northwest Clean Water Association) and a former member of the House of Delegates gives her unique insights into the workings and needs of these important volunteer leaders. Linda and the association engagement team will report to Tim Williams, who will bring his skills as a strategist and his familiarity with MAs to an expanded role. For those that do not know Tim Williams, he has been the WEF lead person on the WEF Government Affairs Committee in recent years. Linda and Tim share a passion for the staff-volunteer partnership and are excited to work with these critical partners. In addition, effective August 1, another WEF staffer is being transferred to the team for even more support. Wade Riess, who began working with MAs last year, will now be leading WEF's membership strategy and services. This targeted support team will enhance information sharing and membership activities.

George Martin
WEF Trustee Will Attend
2014 One Water Conference

Ohio WEA is welcoming WEF Board of Trustees member George Martin to the One Water | Ohio WEA-AWWA 2014 Technical Conference & Expo, August 26-29, 2014. George works for the Greenwood, SC Metro District. Please say "hello" when you see him at any of the conference activities.

Registration and housing reservations have opened for WEFTEC14 in New Orleans. Complimentary registration (no cost) to attend the exhibits is again being offered. Do not delay in getting your hotel and attendance registrations taken care of. WEFTEC attendance continues to grow year by year.

My term on the House of Delegates will close at WEFTEC14. At our June Executive Committee meeting, Tom Angelo was chosen to become Ohio's new WEF Delegate. Along with Dale Kocarek and Doug Clark, Tom will provide excellent representation on the House of Delegates. Congratulations Tom!

Delegate Update provided by Mark Livengood

Mark Livengood, Senior WEF Delegate, *livengoodm@mcohio.org*
Dale Kocarek, Junior WEF Delegate, *dale.kocarek@stantec.com*
Doug Clark, Junior WEF Delegate, *douglas.clark@bgohio.org*

SWOWEA

Tom Brankamp, President

I would like to start off by saying "Thank You!" to Bob Beyer, City of Mason, for the leadership you provided for the Southwest Section this past year. I have big shoes to fill! I can only hope you will continue to mentor me this year, as you have so graciously done in previous years as we worked our way through the chairs.

I would also like to thank the Southwest Executive Committee and the Committee Chairs for your ongoing leadership and for your support as we begin the new year. We all know that you are the true leaders of this Section, and my job is merely to act "Presidential". I would like to welcome Erik Torgersen, Delaney & Associates, Inc. as the newest member of the SWOWEA Executive Committee as our Third-Year Director.

Now a little about me! My name is Tom Brankamp, and I work for Strand Associates, Inc. as a project manager and professional engineer. It scares me to say that I have worked in the engineering consulting business for 30 years. Most of that time I have been involved in the wastewater and stormwater industries. I am currently project manager for the Lick Run Valley Conveyance System Project for MSD of Greater Cincinnati. Within Strand, I serve as the Director of Operations for our Columbus office.

On a personal note, I am married to my wonderful wife Leslie of 17 years, and have three awesome children: Megan (15), Matthew (13), and Michael (9). This year is a special year in that Megan will be turning 16, Matthew just became a teenager, and Michael makes it to double digits! I'm pretty sure they were all just in their baby beds last week. So practicing driving around the neighborhood, softball and baseball tournaments, football, camps, Kings Island trips, and oh yeah - work, homework, yard work. There is a lot going on, yet a lot of fun and rewarding times!

It is truly an honor to serve as the President of the Southwest Section this coming year. I am becoming President of an outstanding organization, formed over the years by many who have come before me. My goal for this year is to work to ensure that the Executive Committee and the Committee Chairs have what they need to continue the momentum we have moving our Section forward. I would like to find ways to make some of our Committees more visible at the local level--- for example the Collection Systems and Safety Committees--- to encourage some members to get involved in ways beyond what we typically do in our Section.

As we kick off the year, please join us for our September Section Meeting on September 18th for a visit of the Troy Wastewater Treatment Plant (WWTP). Look for the technical article about the Troy WWTP on page 70 in this edition of the Buckeye Bulletin. We will also be visiting the Oxford WWTP in May. If you would like to host a Section Meeting in March, please let me know and we can make that happen. For all the latest you can find us at *www.swowea.org*.

NWOWEA

Joe Tillison, President

Hello to all fellow members. My name is Joe Tillison and I will be serving as the Northwest Section President for 2014-2015. I would first like to thank all the past and present executive committee members for all the support and guidance they have given me. I look forward to the upcoming year and the challenges that it may bring.

I have been in the waste water field for the past 12 years at the City of Bowling Green Water Pollution Control Facility as a maintenance / operator. I currently hold a Class III Ohio EPA waste waster license. I have been involved with the Northwest Section as the Committee Chair for Operations for the past five years and have recently been nominated to Co-chair the Plant Operations Committee at the state level as well.

I live outside of Bowling Green with my wife Kristin. Kristin and I have been married for 13 years and have recently had our first child. We welcomed our daughter Elsie Lynn to our family on June 6th of this year. Elsie enjoys sleeping, eating, staying up all night, and it maybe too early to tell, but I think she likes Notre Dame Football.

My goal as the NW Section President is to continue the growth of our membership and to provide excellent training and guidance to all in our field. With that being said, we hope you had a chance to join us for our Spouse and Friends Day in Put-In-Bay on August 1st. The meeting was held at Mr. Ed's Bar and Grill. The morning session included a brief business meeting, a one hour presentation by Bob Hrusovsky of MWH Americas, and was followed by lunch. In the afternoon, tours of the Put-In-Bay waste water plant were available for those who were interested.

Our October meeting will be a joint meeting with the Southeast Section. The meeting will be held in early October in Marion at the Columbus John Doutt Reservoir. I will provide more details when they become available.

I look forward to leading the Northwest Section of OWEA this year. Please check the OWEA website for meeting announcements at the Northwest Section link, *http://www.ohiowea.org/northwest_section.php* for additional information.

Joe Tillison, *jtillison@bgohio.org*

SWOWEA continued

And finally, some very exciting news to wrap up with - Bluyé DeMessie (from Mason) was one of two runner-ups for the 2014 Stockholm Junior Water Prize for the United States. The Stockholm Junior Water Prize is the most prestigious international competition for water-related research. We are proud that Bluyé is from Southwest Ohio! Hopefully one day very soon he will be an active YP, and ultimately a leader of our organization!

Tom Brankamp, *tom.brankamp@strand.com*

NEOWEA

Denise Seman, President

I am honored to serve as president in the Northeast Section of OWEA this year, and I want to thank Mary Ann Driscoll and the section presidents before her for mentoring me as I moved through the section chairs over the past 5 years. I would like to give special thanks to John Leiendecker for encouraging me to run for the Executive Committee, and Mike Welke for his words of wisdom. I have a BS in Chemistry and Biology, currently hold an OEPA Class 3 operator certification and an OWEA Class 4 lab certification. I have been employed by the City of Youngstown since 1990, the last 9 years as Lab Supervisor.

I would like to thank the NE Executive committee for all of their hard work over the past several years, and to take a moment to say goodbye to our outgoing treasurer, Art Kimpton. Art has done a wonderful job of trying to keep us in line, and was a wonderful addition to our committee over the last 6 years. Also, I would like to welcome three new people to our committee: Doug Harris is the First Year Committee Member, Todd Taylor is joining us as our new Treasurer, and Mike Welke is serving as the NE Delegate on the state Executive Committee. Ted Baker has moved up to the position of Vice-President of OWEA.

I have been serving as Lab Analysis Chair for the past 4 years, and will continue to do so, as long as OWEA will have me. It was a privilege to be able to serve several of those years as a co-chair with Eva Hatvani. I am actively involved in the Relay For Life, and currently chair the event held in my hometown of Niles. I have 2 adult children, 3 dogs, and a cat sharing a house with me in Mineral Ridge – I do love the small town appeal.

The NE section held their annual Bio-Massters Golf Outing on July 18, with the planning committee headed up by Andy Catanzarite. The golf outing is a wonderful social event, that allows us to also raise money for Water for People and our scholarship fund. Thanks to Andy for a great job organizing this event, and special thanks to our sponsors, golfers, and volunteers for helping make it such a success.

Our annual clambake will be held on September 13th. Please join us for some great food and good fun at this event. Registration will be available online. We are looking forward to hosting our annual supervisor seminar in October and a wastewater plant tour in the NE section in November. Please watch your calendars and join us for one (or more) of these events.

Until next time!

Denise Seman, *dseman@cityofyoungstownoh.com*

SEOWEA

Fred Smtih, President

Hello fellow members. I am honored and excited to serve as the 2014-2015 President of the Southeast Section. I first want to thank Matt Boone for the leadership he provided to the Southeast Section this past year as President. I was fortunate to learn from many of our recent past Presidents, and I hope that I can continue the tradition of great leadership that has been provided to the Section.

I want to welcome the new Southeast Executive Committee: Brandon Fox, First Vice President; John Owen, Second Vice President; Kris Ruggles, Secretary; Brenda VanCleave, Treasurer; Chris Tarr, Third Year Director; Melodi Clark, Second Year Director; Tiffany Maag, First Year Director; and Tyler Linton, Delegate. I look forward to continuing the hard work with each of you this year.

At our May Section Meeting, we acknowledged fellow colleagues for their contributions to the water environment with Section Awards. The recipients of our 2014 Southeast Section Awards are listed below. Please offer them a word of congratulations. It was great that we were able to recognize these members.

F.D. "Dean" Stewart – Benjamin Roth
J.W. Ellms – Dave Markley
F.H. Waring – Kevin Allender
W.D. Sheets – Nancy Taylor
Engineering Excellence – Fifth Avenue Dam Removal and Lower Olentangy Restoration Project
Lifetime Engineering – Guy Jamesson
Public Service – Mayor David Smith
Laboratory Analyst – Brian McFarland
Tom Hagerty – Keith Kroger
Professional Wastewater Operations – Josh Holton

My goal as the Section President this year is to continue the growth of our Section meetings. We have seen growth from 35 attendees to over 50 at each meeting during the last three years. My goal is that in the next three years we see attendance grow to 75. One of the reasons for this growth is our ability to continue to offer a contact hour for less than $6. We are able to offer this great value with the help of our Section Sponsors. We really started to recruit our sponsors last year and hope to see an increase this year. If you have not become a Southeast Section sponsor yet, please contact me for details.

Our October Section Meeting will be a first time ever joint meeting with the Northwest Section. This meeting will held in early October at the Columbus John Doutt Reservoir. More details will be available soon.

On a personal note, I have been married to Susie for 20 years. We have 2 daughters, Emily and Lucy. Emily will be a sophomore at Ohio State next fall, and Lucy will be a senior at Dublin Coffman High School. For fun I run marathons (ask Susie about our 20th anniversary trip) and coach my daughters' sports teams.

Fred Smith, *fsmith@msconsultants.com*

RESIDUALS MANAGEMENT COMMITTEE REPORT

by Jamie Gellner, Chair

Our two major events for the year are rapidly approaching:

Farm Science Review – The 2014 Farm Science Review (FSR) will be held September 16-18, 2014 at the Molly Caren Agricultural Center (MCAC) near London, Ohio. Last year we made significant upgrades to our promotional materials and we are currently working on additional changes to improve the information presented. The FSR is a great opportunity for us to interact with the agricultural community and to promote the benefits of land application of biosolids. We are in need of volunteers to staff our booth over the three days of the show. If you would like more information or are interested in helping out with display material helping at the booth, please contact Tom Dempsey (*Tom.Dempsey@daytonohio.gov*) or Jamie Gellner (*jgellner@hazenandsawyer.com*).

Biosolids Workshop – The Biosolids Workshop will be held on Thursday December 11, 2014 at the NorthPointe Conference Center. We will be finalizing the agenda for this workshop in the near future, but we still have presentation openings. If you have a topic that you would like to share with others throughout the state, please contact Steven Reese (*sreese@hazenandsawyer.com*) or Jamie Gellner (*jgellner@hazenandsawyer.com*).

Throughout the year, the Residuals Committee will continue work in the following areas:

- **Continue our working relationship with neighbor associations in IN and MI** – During the past year Steven Reese has led our efforts in reaching out to Residuals Committees in Indiana and Michigan. We'll continue this throughout 2014 and beyond to discuss common issues and pertinent industry news.
- **Alternate locations for our Residuals Committee meetings -** We will be holding our committee meetings at various locations in Ohio this year, including some at treatment plants with contact hours for tours. If you have any ideas for possible venues for future meetings or would like to help coordinate these locations, please let me know. Please keep an eye on the OWEA website for updates on scheduled meetings for the rest of 2014.
- **Review / discussion of P management requirements under revised land application regulations** – As a committee, we continue to constructively evaluate and review the requirements for management of phosphorus in land applied biosolids. The revised regulations went into effect in July 2013 and have reduced the amount of land application possible in some areas, depending on local soil conditions. We would like to compile experiences from utilities across the state to show the impact of this new rule on the beneficial use of biosolids. Please contact us if you are willing to share information on this important issue.
- **Information sharing across Ohio utilities –**We'd like to increase our sharing of biosolids related information and experiences from utility to utility. Often, when you have a vexing problem or question, someone else has faced this problem in the past and may have valuable experience / thoughts to share. If you have a question about a specific biosolids related process or problem, please contact us and we'll identify others within OWEA that may have had similar issues and is willing to provide input.
- **Verify member list / update contacts –** If you haven't received any correspondence from me and you would like to receive the correspondence related to committee activities, please send me an email (see contact information below). Please also drop me an email if your contact information has recently changed so that we can include you in upcoming activities.

We would love to have you as part of our committee. The Residuals Management Committee is focused on serving the OWEA membership through education, promotion of effective biosolids management, technical information on biosolids, and interface with OEPA on regulatory issues. We always welcome new membership and we would love see you at our next meeting. If you are interested in getting involved or if you have any questions about the committee, please contact me.

Jamie Gellner, *jgellner@hazenandsawyer.com*

SMALL SYSTEMS COMMITTEE REPORT

by Roberta Acosta, Chair

The Small Systems Committee held its regular meeting at the OWEA Conference Room on May 13, 2014. Keith Kroeger from the Ohio EPA Compliance Assistance Unit wanted to discuss the opportunity to collaborate on training with the committee. Ohio EPA has developed a one day workshop covering their process control troubleshooting program. He would like to collaborate with OWEA to deliver this training. The Ohio EPA can provide the training at no cost. OWEA would provide training venues, marketing, and outreach. The ideal class size is 15-20 and would include a field trip. The committee would like to coordinate with the sections to find a good location to provide a classroom setting in the morning for a two hour lecture, with a nearby package treatment plant that is functioning relatively well for the afternoon session. The target date for this event would be September. The committee chair will email current and in-coming section presidents to gauge support and interest in this activity. The training manual can be found at *http://www.epa.ohio.gov/portals/35/compl_assist/RavenHorizFlow.pdf*

The committee discussed again the idea of section liaisons for small system outreach. The thought is that very small system operators are not as likely to respond to a "mass mailing" and would benefit from having direct contact from the sections. This has already been discussed by the Northwest Section Executive Committee. Other committee members agreed to bring this up with their respective sections. The committee chair will also reach out to current and in-coming section presidents for support of this activity.

The committee discussed the committee policy and procedure document that has been requested by the OWEA Executive Committee (EC). The issues of succession planning and vice or co-chairs were brought up. The committee decided to establish a vice-chair who would act at the "section liaison coordinator." The draft small systems committee document is undergoing review by the committee before forwarding to the OWEA EC.

The next Small Systems Committee meeting is scheduled for August 28 at 10 am in the Hopkins Room at the One Water Conference.

Roberta Acosta, *rjacosta@wsos.org*

OWEA CERTIFICATION BOARD

by Kathy Richards, Director

Well Done!

We would like to congratulate the following analysts for passing the voluntary Wastewater Laboratory Analyst Exam which was given this past April.

Class I	Class II
Lance Cooke	Thomas Fritz
Evan McGuffey	Heather Kirkpatrick
Timothy Parker	Michelle Nelson
Nick Webber	
Tara Williams	

The next opportunity for you to sit for the examination will be October 24, 2014. The application deadline is September 19, 2014 and the form can be found on the OhioWEA website.

Thank you to the 450+ analysts that renewed their certifications that were set to expire on December 31, 2013. I am proud to be counted in your company.

Should you have any questions you may reach me at certification@ohiowea.org

Kathy Richards, Director, Certification Board

LAB CERTIFICATION EXAMS

Fall exam date: Friday, October 24, 2014
Application Deadline: Friday, September 19, 2014

Applications at *www.ohiowea.org* on the Certification tab. Mail to:

Ohio Water Environment Association
1890 Northwest Blvd, Suite 210
Columbus, OH 43212

PUBLIC EDUCATION COMMITTEE

by Tyler Linton, Chair

Join the Public Education Committee

Are you passionate about informing the public about what we do and how we work together to preserve and enhance water quality within the State of Ohio?

If so, I invite you to an informal meeting during the One Water Conference.

Public Education Committee Meeting
Thursday, August 28, 2014
8 a.m. to 9 a.m.
Hopkins Room at the Hilton Columbus Downtown

All interested members are encouraged to attend. Together we can make a difference. I hope to see you there.

Tyler Linton, Chair,
tlinton@glec.com

Gahanna High Point Elementary 5th Grade Class - Tour of Jackson Pike Wastewater Plant, May 16, 2014. Supported by a $550 OWEA Public Education Grant for busing.

GOVERNMENT AFFAIRS COMMITTEE UPDATE

by Dale Kocarek, P.E., Chair

The name of the **Government Affairs Committee** was changed to the **Government and Regulatory Affairs Committee** in March 2014. This was done after receiving a suggestion by one of our committee members, based on an impression of the true role of the committee. It was felt that this name change, while minor, helps convey a clearer message to our members on our mission and the audience we serve. Traditionally, our workshop and focus has been on regulatory issues, and this name change helps reinforce this message.

We had strong, positive feedback on our March 2014 workshop, and I wish to personally thank each person who attended. We had over 210 people in attendance, which set a record for our workshop and was one of the highest attendances of any workshop in recent years, with the exception of the annual conference. I feel gratitude that the event was well received and I personally hope that each person attending learned something new. I also wish to thank all our workshop presenters who made the event successful.

As we begin a new year, one of the things that I wish to demonstrate is a stronger and more consistent performance in doing research on articles and position papers on pending laws on both the federal and state level, often in coordination with AOMWA. Ultimately, I wish to do more broadcast emails on newsworthy topics to respond to member comments on wanting to see more of that. For our committee to do a more effective job in doing research, we will need more volunteers willing to help take this on.

We will soon begin planning for the **2015 Government and Regulatory Affairs Workshop**, which will be held on **March 5, 2015 at the Northpointe Hotel and Conference Center**. If anyone has topics that they wish to see presented, please contact John Owen at 614.728.3849 or Dale Kocarek at 614.486.4383. As part of our workshop planning, I am reaching out to the Utilities Enhancement Committee to see if they would like to have one or two papers presented as part of our workshop, with a focus on utility experiences or stories on topics that are of common interest to the Government and Regulatory Affairs Committee.

I am looking to participate with the Ohio AWWA in their Water Utilities Council meeting at the One Water Conference, and am inviting our committee to also attend. This meeting will be held on Thursday, August 28 from 2 - 4 pm. One of the things that I enjoy the most about being a committee chair is building relationships with our sister organizations including AOMWA, OAWWA, and NACWA. I hope to continue this trend in the future.

Ohio EPA, Nutrient Technical Advisory Group Update

As has been reported in recent issues of the OWEA Buckeye Bulletin, the Ohio EPA Nutrient Technical Advisory Group (TAG) has been meeting once per month, on the second Thursday of each month. TAG meetings include a variety of topics ranging from the Hypoxia Task Force to recent activities by USEPA.

During the last few months, the "Tropic Index Criteria" workgroup, of which I am a member, has been meeting under the leadership of group chair Guy Jamesson of the City of Columbus. The workgroup started off with a TIC score sheet, which included a numeric ranking system. The TIC was converted to an alternative "Box Model" system. The box model was a narrative table, absent of specific numerical values.

As a result of discussions on how to present our approach in a clear, concise format, suitable for presentation to USEPA, it was decided that the box model would be called the SNAP, which is short for the Stream Nutrient Assessment Procedure.

It is expected that the SNAP will be close to final draft form in July, and complete in August. The next step will be to discuss implementation issues.

WIFIA Legislation

As I wrote in my Kocarek Korner (the other column I write for the Buckeye Bulletin), President Obama signed House Resolution 3080: Water Resources Reform and Development Act of 2014 on June 10, 2014. HR 3080 includes a Water Infrastructure Finance and Innovation Authority (WIFIA) Pilot Program, which has been a topic of our focus at the DC Fly-Ins and subsequent discussions for the past three years.

In supporting this legislation, I realize that there may be challenges in implanting WIFIA into the State Revolving Funds (SRF) programs. There are many administrative and managerial issues to overcome. This fact was not lost on me when I met with the Ohio EPA Division of Environmental and Financial Assistance (DEFA) last fall to discuss the SRF and WIFIA. However, the position OWEA decided to take on WIFIA is to err on the side of clean water funding, regardless of the format in which it is packaged. The fact that Congress, known for partisan gridlock, acted in bipartisan support of this bill, was satisfying to see.

Dale Kocarek, P.E., BCEE
dale.kocarek@stantec.com
614.486.4383

This Week in Washington is a weekly publication of the Water Environment Federation's Government Affairs Department. It provides updates on the latest legislative and regulatory developments that affect water quality.

If you are interested in subscribing, contact Claudio Ternieden, *cternieden@wef.org.*

PLANT OPERATIONS COMMITTEE REPORT

by Kim Riddell and Joe Tillison, Co-Chairs

The Plant Operations Committee, along with the Laboratory Analyst and Safety Committees, hosted the Plant Operations, Lab and Safety Workshop on May 21 and 22, 2014. Ohio wastewater professionals attended the two day event and earned up to 13 contact hours. Presentations from Ohio's own experts as well as nationally known experts received high praises from attendees and generated significant interest in the 2015 version, which will be back on the normal schedule and held in the Fall of 2015.

If you missed the workshop, you missed 13 of the most interesting technical sessions offered in Ohio during 2014. In addition to laboratory presentations, attendees heard topics on plant operations and nutrient removal, regulatory considerations, anaerobic digestion and (back by popular demand) a series of presentations covering energy efficiency as part of USEPA's energy initiative. Each presentation had something for both the beginner as well as the most seasoned operator to take home and think about or try. The workshop organizers extend a sincere thank you to those who took the time to attend and share their knowledge with Ohio's operators, consultants, and regulators.

The Plant Ops Committee is very excited that the 2014 Operations Challenge will return to the annual conference for the first time in 5 years. Thus, there will not be the "Hands on Education Day" normally held in conjunction with the Operations Challenge. However, new this year, Ohio will host the first Ohio Operations Challenge Invitational!

We have room for up to 12 teams so there is still time to register your team! We already have Ohio teams, out of state teams and a Canadian team registered for the event! Don't miss out – come check this great event out on its return to the annual conference!

All team members are eligible to earn up to 12 contact hours and the winning Ohio teams earn the opportunity to represent OWEA at WEFTEC '14 in New Orleans! OWEA and its sponsors support this event and cover the team's expenses for representing Ohio at WEFTEC, so managers, don't worry about how much it costs to send a team to New Orleans, encourage them to sign up!

We also want to extend a special THANK YOU to Jim Borton, who is rolling off as co-chair of the committee after over 10 years of service to OWEA and the Plant Operations Committee and Operations Challenge! Jim is moving on to be the WEF Operations Challenge Committee Vice-Chair. We are pleased to announce the addition of Joe Tillison as Kim's Co-Chair on the committee! Welcome Joe . . . and again, thank you Jim for your many years of service to Ohio's operators and OWEA!

If you have interest in putting a team together for Operations Challenge, becoming a committee member or assisting as a judge / volunteer for Operations Challenge, please contact Kim Riddell at (419) 234-4507 or Joe Tillison at (419) 354-6274.

Kim Riddell, *kim@go-smith.com*
Joe Tillison, *jtillison@bgohio.org*

AUGUST 26-27, 2014

OWEA OPERATIONS CHALLENGE INVITATIONAL

OWEA Operations Challenge Competition

The Ohio Water Environment Association is proud to announce they will be hosting an Operations Challenge Competition and National Invitational as part of the One Water Conference in August 2014. 12 teams total with 6 spots held for invitational teams.

Teams registered (as of 7/21/14)
City of Bowling Green
City of Columbus
Greenwood Metropolitan District, SC
Northeast Ohio Regional Sewer District
Northwestern Water and Sewer District
Ontario Clean Water Agency
Western Virginia Water Authority

Visit ***www.ohiowea.org*** or contact:
Kim Riddell, *kim@go-smith.com*
Joe Tillison, *jtillison@bgohio.org*

Eric Wahlberg, Brown and Caldwell, on Activated Sludge Process Control

Sidney Innerebner, Indigo Water, discusses Anaerobic Digestion

SAFETY COMMITTEE REPORT

by Joe Bates, SW Section Safety Representative

PORTABLE EXTENSION AND STEP LADDER SAFETY

For some who are superstitious, walking under a ladder is a dangerous proposition. (Interesting Google search: *walking under a ladder superstition origin.*) The real danger, however, lies in our everyday use of ladders. The fact is that falls from portable ladders (step, straight, combination and extension) are one of the leading causes of occupational fatalities and injuries.

Causes of Ladder Falls?

Ladder fall injuries are a persistent hazard both in the workplace and at home. There are five major causes for extension-ladder fall incidents:

- Incorrect ladder setup angle
- Inappropriate ladder selection
- Insufficient ladder inspection
- Improper ladder use
- Lack of access to ladder safety tools and information.

The leading cause of ladder-related injuries, in approximately 40% of cases, is a ladder sliding-out at the base due to an incorrect ladder setup angle. Ladder users tend to set extension ladders at shallower angles than the desired optimal angle (75.5 degrees). Selection of a ladder with the proper duty-rating is also critical to avoid structural failure. However, knowledge on proper ladder selection is lacking among many ladder users, and this important safety step is frequently ignored.

Regular inspection and maintenance are good practices to reduce the likelihood of ladder structural failure, however, quick and easy access to ladder safety checklists is not always available. Inappropriate and unsafe ladder user behavior is associated with many ladder fall incidents. Activities such as overreaching, carrying objects, applying excessive force, slips and missteps are also frequent causes of ladder-related fall injuries. Finally, small companies that account for up to 80% of all construction companies, and individual ladder users, such as homeowners, do not typically receive the required training for safe use of extension ladders. Such ladder users are difficult to reach, often do not have access to safety information, and generally lack the resources to develop or follow an effective ladder safety program.

The study appears in the April 25 issue of the Morbidity and Mortality Weekly Report, published by the U.S. Centers for Disease Control and Prevention. *SOURCE: U.S. Centers for Disease Control and Prevention, news release, April 24, 2014*

How BIG Is the Problem?

In the US, more than 500,000 people a year are treated, and about 300 people die, from ladder-related fall injuries. The estimated annual cost of ladder injuries in the US is $11 billion, including work loss, medical, legal, liability, and pain and suffering expenses. Recent analysis of data from three surveillance systems showed that in 2011, work-related ladder fall injuries in the US resulted in 113 fatalities, an estimated 15,460 nonfatal injuries that involved days away from work, and an estimated 34,000 nonfatal injuries treated in emergency departments. Workers who are male, Hispanic, older, self-employed, work in smaller establishments, and work doing construction, maintenance, and repair experience higher ladder fall injury rates. There is a pressing need to address the serious problem of ladder-related falls and to reduce the resulting injury and death. *Content source: National Institute for Occupational Safety and Health Division of Safety Research*

Ladder Safety App?

The National Institute for Occupational Safety and Health (NIOSH) recently released its first smart phone application (app), which is aimed at improving extension ladder safety. The Ladder Safety App addresses the major causes of ladder falls by placing a number of interactive and easy-to-use graphic-oriented tools into the hands of the ladder users upon demand.

The app features an angle of inclination indicator which uses visual, sound, and vibration signals making it easier for workers and other users to set an extension ladder at the proper angle of approximately 75.5 degrees. The app also includes a "Selection" tool which provides an interactive and easy-to-use procedure to select the minimum required ladder duty-rating corresponding to the user characteristics and task.

Furthermore, the app features an "Inspection" tool which provides a comprehensive, graphic-based, interactive and easy-to-use checklist for ladder mechanical inspection. Occupational Safety and Health Administration (OSHA) regulations and American National Standards Institute (ANSI) A14 standards include a set of rules for safe ladder use. The app's "Proper Use" tool presents these rules in a clear graphic format, which is both informative and easy to understand.

Using smart phone technology, the NIOSH Ladder Safety app delivers free and easy-to-use ladder safety tools and information, reference materials, and training resources into the hands of individual ladder users wherever and when they are needed. The application is available in English and Spanish as a free download for Apple iPhone/iPad and Google Android devices.

A ladder safety checklist is always a good addition to your safety program. (See next page for sample check list)

Joe Bates, SW Section Safety Representative
JBates@vil.yellowsprings.oh.us

An example of what not to do from www.thereifixedit.com.

OSHA Ladder Safety Checklist

To prevent falls from ladders, make sure your have the following controls in place:

- ❑ Use only ladders that are in good condition and designed to handle the climbing job that needs to be done.
- ❑ Train employees on proper ladder use.
- ❑ Make proper ladder use a performance requirement for the job.
- ❑ Require employees to complete a ladder inspection before each use.

Criteria for Ladder Purchase and Care:

- ❑ Check OSHA standards for the type of ladder you are using.
- ❑ Use only Underwriter's Laboratory approved ladders (will have the UL seal).
- ❑ Protect wood ladders with a clear sealer, such as varnish, shellac, linseed oil or wood preservative because paint can hide defects.

Ladder Usage:

- ❑ Be sure step ladders are fully open and locked before climbing them.
- ❑ Place ladder on a flat, secure surface.
- ❑ Place ladder on a hard surface as it will sink into a soft surface.
- ❑ Place ladder on non-movable base.
- ❑ Lean ladder against a secure surface, not boxes or barrels.
- ❑ Do not place ladder in front of a door.
- ❑ Position base of ladder one foot away for every four feet of height to where it rests (1:4 ratio).
- ❑ Ladder rails should extend at least three feet above top landing.
- ❑ Check shoes to ensure they are free of grease or mud.
- ❑ Mount the ladder from the center, not from the side.
- ❑ Face ladder when ascending or descending, and hold on with both hands.
- ❑ Carry tools in pockets, in a bag attached to a belt, or raised and lowered by rope.
- ❑ Don't climb higher than the third rung from the top.
- ❑ Work facing the ladder.
- ❑ Do not overreach, always keep your torso between the ladder rails.
- ❑ When using ladder for high places, securely lash or fasten the ladder to prevent slipping.
- ❑ Avoid outdoor ladder use on windy days.
- ❑ Avoid aluminum ladders if work must be done around electrical wires or power lines.




LABORATORY ANALYSIS COMMITTEE

by Denise Seman, Chair

Hi Everyone!

If you are able to attend, please join me at One Water | Ohio WEA-AWWA 2014 Technical Conference & Expo: August 26-29, 2014. It's always a fun time as well as a very informative and educational event. Thanks to those who have been working so diligently to organize this event.

It's been a great year. A special thanks to all that made it possible. I appreciate your help in providing venues to hold our meetings and also sharing your expertise in the area of wastewater analysis.

If you plan to attend conference, don't forget to check out Ops Challenge this year. We're back at the conference, and the competition will be on Wednesday, August 27th. Come on out and see the teams compete . . . or better yet, contact me before conference and join the panel of judges. This year's lab portion is the BOD event using the YSI ProODO.

SW LAC – Jim Davis and Karen Tenore

The Southwest Laboratory Analysis Committee held its spring meeting on April 17, 2014 at LeSourdsville Regional WRF. We had 35 people in attendance to hear talks on Mill Creek water quality monitoring, developing site specific copper criterion, pH analysis, and a facility tour. Our summer meeting was held on July 17, 2014 at Hobart Brothers in Troy.

The fall meeting will be at YSI on October 16, 2014. Look for the registration in late September.

To inquire about being added to our e-mail list or to get information about attending, hosting, sponsoring, or presenting at a future LAC meeting please contact:

Karen Tenore, City of Dayton WRF
Karen.Tenore@daytonohio.gov, (937) 333-1845

Jim Davis, Montgomery County Water Services
DavisJi@mcohio.org, (937) 496-7051

Committee Members:
Darrin Honious, YSI
Lynette Hodnicki, City of Fairfield
Lori Kyle, Greene County
Greg Mitchell, City of Sidney
Roger Rardain, City of Fairborn
Teresa Shinkle, Greene County

NW LAC – Bridget Shiets

The NW LAC member directory is complete. If you would like your name to be added to the member directory, please email Bridget

As always, should you or someone you know be interested in presenting a topic, please email Bridget at the email below.

Bridget Shiets, *wwtplab@cityofbellevue.com.*

NE LAC – Bev Hoffman

We had our second Friday the 13th meeting this June. Everyone made it through safely and we were all quite impressed with NEORSD's recently remodeled laboratory. I would like to thank the presenters:

- NEORSD Lab Tour - Mark Citriglia and Cheryl Soltis-Muth
- pH & Solids - Patricia Boone and Megan Muhar
- Nitrogen: It's Cycle & Analysis - Denice Johnson

Please let me know if you have a topic you would like to hear about or know someone who would like to present a topic. If you would like to be added to the NESLAC membership directory and receive automatic email updates for training events and other news, please send your contact information to Beverly Hoffman at *NESOWEALAC@gmail.com*.

Committee Members:
Beverly Hoffman *nesowealac@gmail.com*
Marie Simon *marie@northcoastlabs.com*
Lisa Feigle *lisaf@gcdwr.org*
Amy Starkey *ajstarkey@co.stark.oh.us*

SE LAC – Melodi Clark

Our second meeting of the year saw a huge turnout for our section - 18 people! I want to thank YSI/Xylem for hosting the meeting. Once again, the topics were great and the food from Young's Dairy was wonderful! I am working on scheduling a meeting in Columbus, with the City of Columbus Crime Lab as host, for an upcoming SE LAC event in September. I hope to see a lot of people there. Have a great summer!

Melodi Clark, *MLClark@columbus.gov*

Lab Analysis Committee Contact Information

State Chair
Denise Seman, 330.742.8820, *dseman@cityofyoungstownoh.com*

Northeast Chair
Beverly Hoffman, 440.446.4228, *nesowealac@gmail.com*

Southeast Chair
Melodi Clark, 614.645.1239, *mlclark@columbus.gov*

Northwest Chair
Bridgit Shiets, 419.483,7514, *wwtplab@cityofbellevue.com*

Southwest Chairs
Karen Tenore, 937.333.1501, *karen.tenore@cityofdayton.org*
Jim Davis, 937.496.7051, *davisji@mcohio.org*

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IS THERE A PLANT UPGRADE OR EXPANSION IN YOUR FUTURE? TALK TO OHIO EPA EARLY

by Elizabeth Wick, P.E., Ohio EPA, NWDO

If there is a plant upgrade, expansion or a new plant in your future, one of the first phone calls you should make is to your Ohio EPA district office. The old saying, *"Better to ask forgiveness than permission"* does not apply to Ohio's rules and regulations. Each project could be subject to 208 planning, antidegradation, permits-to-install, Section 401/404 requirements or storm water rules.

208 Planning

Authorized under Section 208 of the Clean Water Act (CWA), Areawide Waste Treatment Management Plans, aka 208 Plans, are available that contain comprehensive programs for the treatment of water and controlling water pollution from all point and non-point sources in a geographic area. Initial plans prepared in the 1970s were necessary for the operation of the construction grant program which provided federal funds for the design and construction of sewage collection and treatment facilities.

The 208 plans are updated periodically by the responsible areawide planning agency or the state. Areawide Councils of Governments prepare and approve the 208 Plan in 24 Ohio counties (those with large urban populations). The State of Ohio prepares and maintains the 208 Plan applicable in the remaining 64 counties. The Governor then certifies the entire 208 Plan via submission to U.S. EPA for their approval.

Local governments typically conduct planning to meet the sewage disposal needs of the community. Ohio EPA has established planning guidelines that are useful in the context of Section 208 Plans. Local governments that follow these guidelines are more likely to have the results of their planning work incorporated into the State 208 plan prepared by Ohio EPA. The Areawide Planning Agencies have established their own operating protocols, committees, and processes to involve local governments in shaping their 208 plans.

Why does this matter to you?

When a permit-to-install (PTI) for a sewer extension or new treatment plant comes into a district office, we must check to be sure the project complies with the planning process and jurisdiction outlined in the 208 Plan. If a project does not comply with the 208 Plan, Ohio EPA cannot approve the project. The project must be adjusted to meet the 208 requirements, or the local jurisdictions have to agree on changes to the 208 Plan.

Antidegradation

Provisions addressing antidegradation are in the Water Quality Standards chapter of the Ohio Administrative Code (OAC Chapter 3745-1). Within that chapter, rule 3745-1-54 addresses antidegradation provisions for wetlands and rule 3745-1-05 addresses antidegradation provisions for other surface waters of the state. Antidegradation refers to provisions that must be followed before authorizing any increase in the discharge of a regulated pollutant or activities that may significantly alter the physical habitat. Antidegradation protects the existing beneficial uses of the water body and only allows a lowering of water quality when it is necessary to support important social and economic development. Simply put, the antidegradation rule establishes a procedure to determine that a discharge is necessary before authorizing it. The procedure includes public participation activities, intergovernmental coordination, determination of important social and economic development, an alternatives analysis and greater protection for exceptional quality streams.

Why does this matter to you?

When the district office receives a PTI or a National Pollutant Discharge Elimination System (NPDES) permit for a new discharge or a PTI or NPDES permit for a plant expansion that will result in a load increase, the staff must promptly prepare a public notice of the receipt of application. This is public noticed for 30 days. A public hearing must be held if anyone requests one during the 30 day comment period. A public hearing date must be public noticed for 45 days before the hearing. Once the hearing is held, and the transcript of the hearing is received by the district office, a response to comments and a draft permit action are prepared. The draft permit is public noticed for 30 days before it is issued final. To accommodate for these required timeframes, and allow adequate time for staff to review the proposal, if your permit action is subject to antidegradation it could take up to six months to be issued final.

Permits-to-Install (PTI)

OAC Section 3745-42 contains the applicability, exemptions and procedures for PTIs. A PTI is needed when any new wastewater collection, storage or treatment system is constructed or any existing wastewater collection, storage or treatment system is modified. The Ohio Revised Code prohibits constructing any

2013 construction of the Waldo, Ohio sewers and wastewater treatment plant.

new disposal system or modifying an existing disposal system without first obtaining a permit. If your project is subject to antidegradation, the NPDES permit and the PTI application package must be submitted at the same time. Legally, Ohio EPA cannot approve a PTI for an increase in load to the stream without first approving the corresponding NPDES permit.

Why does this matter to you?
Always obtain an approved PTI from Ohio EPA prior to starting construction of your project. OAC 3745-42 outlines steps that can be completed before a PTI is obtained. Ohio EPA has taken enforcement action against facilities for constructing without a PTI. If your project is subject to antidegradation, it can take up to six months to obtain an approved PTI.

Section 401/404 Permits

A Section 401 Water Quality Certification (WQC) is required for activities that require a federal permit such as Section 404 permit, a Federal Energy Regulatory Commission (FERC) license or a U.S. Coast Guard permit. Any person who wishes to place fill material into wetlands, streams or lakes must apply for an individual Section 401 WQC unless the project meets Ohio EPA's conditions of applicable nationwide permits. Nationwide permits are issued by the Army Corps of Engineers (ACOE) to authorize specific activities that have minimal environmental impacts. There are currently 40 types of activities authorized by nationwide permits in Ohio.

Once a site is chosen for your project, the first thing to check for is the presence of wetlands. A consultant can conduct a wetland delineation and Ohio Rapid Assessment Method (ORAM) evaluation on the site. This delineation will reveal whether there are wetlands present, their exact location and their quality. Once wetlands are identified on the site, the ACOE should be contacted to verify the delineation and issue a jurisdictional determination. If wetlands are connected to other surface waters, they will be deemed jurisdictional. Impacts to jurisdictional wetlands require either a nationwide permit from the ACOE or both a 401 WQC from Ohio EPA and a 404 permit from the ACOE. If wetlands are not connected to other surface waters, they will be deemed isolated. Impacts to isolated wetlands require only an isolated wetland permit from Ohio EPA.

Once an application is received, Ohio EPA has 15 business days to determine whether the application is complete and notify the applicant in writing. The applicant is then responsible for issuing a public notice within 21 days after the completeness determination. The public will then have 30 days to provide comments. If a hearing is requested during that time, the hearing must be public noticed at least 30 days before the hearing date. The applicant is responsible for public noticing the details of the hearing. Ohio EPA will conduct a public hearing for projects if the director determines that there is significant public interest. A public hearing is mandatory for impacts proposed in high-quality wetlands and streams.

Much like the antidegradation process, an applicant seeking a 401 WQC must present an evaluation of alternatives and discuss the social and economic impacts that will result from the project. Additionally, an applicant must mitigate for impacts by either constructing new wetlands or streams on site or purchasing credits from a mitigation bank. The CWA allows Ohio up to one year to act on applications for Section 401 WQCs. However, Ohio EPA rules allow a 180 day issuance timeframe.

All of the following items are required components of a Section 401 WQC application package.

1. A complete 401 Water Quality Certification application form and applicable impact tables.
2. A copy of the ACOE's jurisdictional determination letter. If no jurisdictional determination is to be issued by the ACOE, the public notice or notification that the project is authorized under a general permit will fulfill this requirement.
3. If the project impacts a wetland, a wetland characterization analysis consistent with the Ohio Rapid Assessment Method (ORAM).
4. If the project impacts a stream for which a specific aquatic life use designation has not been made, a use attainability analysis.
5. A specific and detailed mitigation proposal, including the location and proposed legal mechanism for protecting the property in perpetuity.
6. Applicable permit fees.
7. Site photographs.
8. Adequate documentation confirming that the applicant has requested comments from the Ohio Department of Natural Resources and the United States Fish & Wildlife Service regarding threatened and endangered species, including the presence or absence of critical habitat.

continued on page 24

Following Ohio EPA guidelines protects waterways such as Dry Run (l) and the Olentangy River (r).

9. Descriptions, schematics and appropriate economic information of the applicant's preferred alternative, non-degradation alternatives and minimal degradation alternatives for design and operation of the activity.
10. The applicant's investigation report of the waters of the United States in support of the 404 permit application. If no investigation report is required by the ACOE, the public notice or notification that the project is to be authorized under a general permit will fulfill this requirement.
11. A copy of the ACOE's public notice regarding the 404 permit application. If no public notice is to be issued by the Corps, notification that the project is authorized under a general permit will fulfill this requirement.

What does this mean to you?

Working with the ACOE and Ohio EPA to obtain these permits is time consuming. ORAM scores and wetland delineations can only be verified during the growing season. Working outside of this season can lengthen the review time. Ohio EPA strongly recommends that as soon as a project site is determined, the consultant call the district office 401 contact to work through a pre-application process. This will speed up the review time of the actual 401 application. Avoiding all wetlands and streams on a site will result in a faster project review and no 401/404 permits.

Storm water permits

If the project disturbs one acre or more, an NPDES permit to discharge storm water associated with construction activities from the site must be obtained. If the project disturbs less than one acre, but is part of a larger plan of development or sale, a permit to discharge storm water from the site is still required.

Most sites get permit coverage under the general permit for discharges of storm water associated with construction activity. This permit is often referred to as the construction general permit (CGP). To get permit coverage, follow these steps, in order:

- develop a Storm Water Pollution Prevention Plan (SWP3) for the construction site;
- submit a Notice of Intent (NOI) requesting coverage for the discharges under the general permit;
- wait to receive the Ohio EPA approval letter stating that the project is covered under the general permit;
- ensure that contractors, subcontractors and staff understand their roles in carrying out the SWP3 and make sure any contractor who is also an operator (as defined in the CGP) submits the Co-Permittee NOI application;
- implement the SWP3;
- proceed with construction, including regular maintenance and inspection of sediment and erosion controls and storm water management facilities.

What does this mean to you?

At least 21 days before the start of construction, the NOI should be submitted to Ohio EPA with the appropriate fees. Be sure an SWP3 is developed for the site. Letters authorizing coverage under the CGP are usually received within two weeks of submitting the NOI. Storm water controls must be in place prior to grading and within seven days of grubbing. Ohio EPA storm water staff may inspect the site while it is under construction.

In addition, permanent post-construction storm water management practices may be required to be installed during construction to treat runoff after the project is complete. These best management practices (BMPs) must be included in the SWP3. Information on post construction BMPs can be found in the CGP and on Ohio EPA's website at epa.ohio.gov/dsw/storm/CGPPCQA.aspx.

Industrial storm water permitting may apply to the Publicly Owned Treatment Works. A change at the wastewater treatment plant may affect the No Exposure Certification (NOE) for the property. Be sure that once the project is complete, the conditions of the NOE can still be met. As an example, if improvements to the biosolids area exposes material to precipitation and the runoff doesn't drain to the plant headworks, the NOE may be invalid. Some improvements may alter drainage pathways, meaning a storm water outfall may need to be added to the NPDES permit.

There is a lot to think about when it comes to projects at your utility. The applicant must secure all permits and the best way to manage the process is to coordinate with your district office early in the process. This can help avoid costly and time consuming mistakes. Be prepared to be flexible. Identify and evaluate different alternatives and seek creative ways to minimize impacts in advance. Ohio EPA and other permitting agencies would rather assist facilities as they develop their project than risk damage to the environment and possible enforcement later.

Elizabeth Wick, P.E., Ohio EPA, NWDO
elizabeth.wick@epa.ohio.gov

WELCOME NEW MEMBERS

April 2014 to June 2014

Felicia Armstrong
Brad Barnett
Robert Bianchi
Brent Bruggeman
Tom Burgan
Jared Chagin
Robert Coker
Michael Cook
Lance Cooke
Jim Davis
Tamara Egan
Patrick Eiden
Kurt A. Erichsen
Jason Evans
Andrew Feucht
Joshua Ford
Juan Granja
David Green
Edward Grobelny
Steven James Hallett
Todd Harkins
Rhonda Harris
John Herchl
Aaron M. Hetrick
Samuel Hollyer
Curtis L. Inks
Kurt Kinney
Brandon Leeth
Zhen Li
Tom Long
Sherry M. Loos
Todd E. Magrum
Ralph Mastrocola
Mugdha Mathure
Scott McBrayer
Matt McCutcheon
Christine Marie Minor
Elizabeth Moore
Wyndi Moore
Disha Patel
Monique Phillips
Rory Reed
David Reutter
Jeff Rexhausen
Dwight Ross
Michael Searls
Andrew Skeriotis
Paul Vondermeulen
Megan Waddel
Dale Wampler
Lee Weber

Thank you for joining the Ohio Water Environment Association and the Water Environment Federation.
We welcome your contribution to preserving and enhancing Ohio's water quality environment.

ROLL CALL

George A. Elmaraghy was recently appointed as Commissioner on the Ohio River Valley Water Sanitation Commission by President Obama. George is currently Senior Project Manager at Stantec Consulting Ltd., a position he has held since October 2013. Prior to this, Mr. Elmaraghy served in various roles at the Ohio Environmental Protection Agency from 1974 to 2013, including Division Chief of the Division of Surface Water, Assistant Division Chief of the Division of Surface Water, and Assistant Division Chief of the Division of Water Pollution Control. Mr. Elmaraghy began his career as a Graduate Research Assistant at The Ohio State University Department of Civil Engineering from 1972 to 1974. He received a B.S. from Cairo University and an M.S. from The Ohio State University.

OWEA members may submit brief announcements with photo for publication in the Buckeye Bulletin. Complete the Roll Call form at ***http://www.ohiowea.org/memberships.php*** *All requests subject to editorial review.*

Alice Godsey, PE, has been named Director of Public Utilities for the City of Perrysburg, Ohio, with responsibility for leading wastewater collections, wastewater treatment, water distribution, stormwater management, employee development and customer relations. She has more than 35 years experience in the wastewater industry, including positions with Clark County Utilities, City of Lima, and Jones & Henry Engineers.

Alice is a past recipient of the J.W. Ellms award and is a member of 5S. She holds a Class III wastewater and a Class III water license.

Brandon Leeth has joined The Henry P. Thompson Company covering plant sales and service. Brandon comes to HPT from the City of Hillsboro, OH where he served as an operator for 3 years and then 11 years as the Wastewater Plant Superintendent.

Brandon attended Southern State Community College for two years before obtaining his Class III wastewater treatment license in Ohio. He was also the former president of The Leadership Highland Board and is currently a member of OWEA and member of the Southwest OWEA Plant Operations Committee.

Brandon will work out of the Milford, OH office and will cover the Tri-State area including N. Kentucky, S. Ohio and S. Indiana.

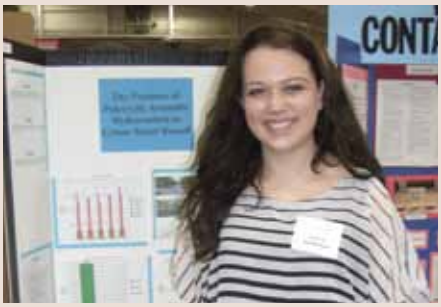
OWEA'S SJWP AND OHIO SCIENCE DAY AWARD WINNERS

2014 JUDGES

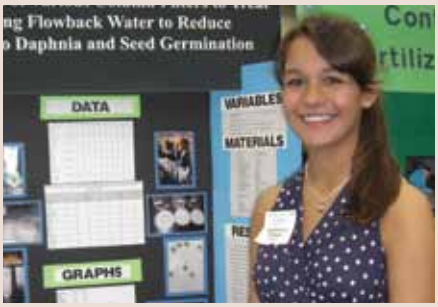
Tyler Linton, GLEC
David Stewart, CDM Smith
Drew Richards, CDM Smith
Erin Stachler, CDM Smith
Paula Kulis, CDM Smith
Kent Halloran, OSU
Ari Pandian, Burgess & Niple
Judi Henrich, OWEA

Ohio Stockholm Junior Water Prize Winner
Mr. Bluyé - 11th Grade
William Mason High School
Developing a Sustainable Water Filtration System for Low Income Countries
Runner Up at National SJWP Competition

$1000 Scholarship
Mr. Richard J. Abel - 12th Grade
Canfield High School
The Effects of CO2 on Algal Growth



$500 Award
Ms. Erin E. Sanderson - 11th Grade
Bloom Carroll High School
The Presence of Polycyclic Aromatic Hydrocarbons in Urban Water Runoff



$300 Award
Ms. Anastasia S. Johnson - 9th Grade
Canfield High School
Comparison of Various Column Filters to Treat Fracking Flowback Water to Reduce Toxicity to Daphnia and Seed Germination

$200 Award
Mr. Jeremy J. DeMuth -8th Grade
Miller City Middle School
The Effect of Waste Water Treatment Plants on Phosphorus and Coliform Levels in Rivers and Waste Water

Ohio Water Environment Association

One Water

Ohio WEA-AWWA 2014 Technical Conference & Expo

www.onewaterohio.org

Ohio Section American Water Works Association

Hilton Columbus Downtown | **August 26-29, 2014** | Greater Columbus Convention Center

Make Plans to Attend the First Ever Joint Ohio Water Professionals Technical Conference and Expo

History - How the Joint Conference Came to Be

Ohio's water professionals have long realized that there really is only "One Water." You may treat it for drinking, home, and industrial use or you may treat it after it has been consumed by people, used in homes, businesses and industry, or run off our streets and buildings, but we are all working with a finite resource.

The membership of the Ohio Water Environment Association and Ohio Section of the American Water Works Association attend many of the same conferences, work for the same utilities or consulting firms, and serve the same public and clients. OAWWA and OWEA have collaborated to attend Government Affairs Fly-Ins to discuss water issues with our country's legislators. The associations' sections and committees have worked together to hold meetings, encourage students to consider professions in the water field, and raise money for Water for People. It made complete sense to hold a joint water professionals conference.

In the summer of 2011, the conversation began. After several meetings, a Memorandum of Understanding was signed by the two organizations in early 2012. The sites of the Hilton Columbus Downtown and Greater Columbus Convention Center were selected in the summer of 2012.

And then the planning began. A Conference Committee of nearly 60 volunteers, equally representing both organizations, is working to bring you an educational and memorable conference experience.

You Are Invited to Attend

We hope you will take advantage of this unique opportunity to network with and learn from the best in Ohio's water quality community. An excellent technical program, expansive exhibit expo, and multiple networking events will await you.

Kurt Smith, Chair, Ohio AWWA
kurt.smith@arcadis-us.com

Mike Spriggs, OAWWA Conference Co-Chair
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Jill Taptich, OAWWA Conference Co-Chair
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Dan Sullivan, President, Ohio WEA
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Rob Herr, OWEA Conference Co-Chair
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John Newsome, OWEA Conference Co-Chair
jgnewsome@columbus.gov

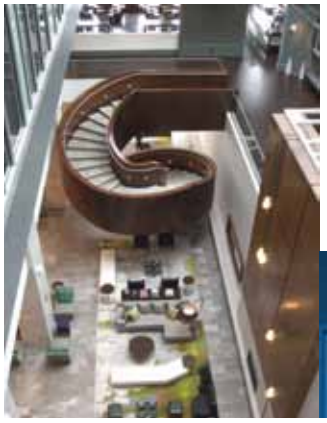
@OneWaterOhio

TECHNICAL TRACKS

Drinking Sourcewater
Energy Sustainability
Green Technologies
Lab
Maintenance
Operations
Regulatory
Residuals/Recovery
Stormwater
Utility Management
Wastewater Collections
Wastewater Treatment
Water Distribution
Water Treatment
Workforce Development

Bringing more Ohio water professionals together than ever before

ONE TIME ONE PLACE ONE WATER OHIO



The two premier Ohio water associations are teaming up and working together to hold a joint water professionals conference in 2014.

The joint conference will be held August 26-29, 2014 at the new **Hilton Columbus Downtown** and **Greater Columbus Convention Center**, which are connected by a stunning glass skywalk.

Information and registration at *www.onewaterohio.org*

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TUESDAY, AUGUST 26

8:30 a - 5:00 p Golf Outing - Foxfire Golf Club *sponsored by* ***CH2M Hill, Jacobs Engineering Group, and Thermal Process Control***
7:00 a - 10:00 p Registration - Hilton *sponsored by* ***ARCADIS***
10:00 a - 4:00 p Management Development Seminar *sponsored by* ***HDR***
10:00 a - 4:00 p Emerging Issues for Source Water Workshop *sponsored by* ***Flygt, a Xylem Brand***
10:00 a - 4:00 p One Water - Water Facility Tour *sponsored by* ***The H.P. Thompson Company***
10:00 a - 4:00 p One Water - Wastewater Facility Tour *sponsored by* ***URS***
10:00 a - 4:00 p One Water Maintenance Tour *sponsored by* ***AECOM***
2:00 p - 5:00 p OWEA Ops Challenge *sponsored by* ***OVIVO and OWEA Sections***
6:00 p - 9:00 p Exhibitor Setup - Conv Center Hall C
6:00 p - 10:00 p Welcome Gathering - Barley's *sponsored by* ***H. R. Gray***

WEDNESDAY, AUGUST 27

6:00 a - 7:00 p Registration - Hilton *sponsored by* ***ARCADIS***
7:00 a - 9:00 a Exhibitor Setup - Conv Center Hall C
7:00 a - 9:00 a Kick-Off Breakfast & Awards - Hilton *sponsored by* ***Kokosing Construction Company, Inc.***
9:00 a - 4:35 p Technical Sessions - Four Tracks in C-Pod
9:00 a - 5:00 p Exhibit Exposition Open - Conv Center Hall C
9:00 a - 5:00 p Exhibit Tours *(earn Contact Hours Times TBA)*
9:00 a - 5:00 p OAWWA Tapping, Top Ops, Taste Competitions
9:00 a - 5:00 p OWEA Ops Challenge *sponsored by* ***OVIVO and OWEA Sections***
9:00 a - 4:30 p Spouse/Guest Program
12:30 p - 2:00 p Lunch - Conv Ctr Hall C *sponsored by* ***Terra Contracting***
5:00 p - 7:00 p Expo Social & Awards *sponsored by* ***Brown and Caldwell***
5:00 p - 7:00 p OAWWA Meter Madness
7:00 p - 11:00 p Meet & Greet - Brothers *sponsored by* ***CT Consultants***

THURSDAY, AUGUST 28

7:00 a - 6:30 p Registration - Hilton *sponsored by* ***Hazen and Sawyer***
7:00 a - 8:30 a Continental Breakfast *sponsored by* ***Stantec***
7:00 a - 8:00 a Cystal Crucible Breakfast *sponsored by* ***Alloway***
8:00 a - 11:45 a Technical Sessions (6 Concurrent Sessions) - Hilton
8:00 a - 11:45 a Technical Sessions - Conv Center Hall C
9:00 a - 4:30 p Spouse/Guest Program
8:00 a - 2:00 p Exhibit Exposition Open - Conv Center Hall C
11:30 a - 1:30 p Lunch - Conv Center Hall C
1:30 p - 4:30 p Technical Sessions (6 Concurrent Sessions) - Hilton
4:30 p - 6:00 p OAWWA Business Meeting & Awards - Hilton
4:30 p - 6:00 p OWEA Membership Meeting & Awards - Hilton
6:30 p - 10:00 p One Water Gala - Hilton *sponsored by* ***CDM Smith***

Full Conference Information and Registration Available at
www.onewaterohio.org
Early Bird Rates end Aug 11!

FRIDAY, AUGUST 29

7:00 a - 12:00 p Registration - Hilton *sponsored by* ***Hazen and Sawyer***
7:00 a - 8:30 a Continental Breakfast *sponsored by* ***Stantec***
7:00 a - 8:30 a OWEA 5S Breakfast *sponsored by* ***Jones & Henry***
7:00 a - 8:30 a OAWWA Award Winners & Past Presidents Breakfast *sponsored by* ***Burgess & Niple***
8:00 a - 11:45 a Tech Sessions (3 Concurrent Sessions) - Hilton
10:00 a - 12:00 p OAWWA Governing Board Meeting - Hilton
10:00 a - 12:00 p OWEA Executive Committee Meeting - Hilton
12:00 p - 1:00 p Joint Board Meeting Lunch - Hilton

Ohio Section American Water Works Association
American Water Works Association
Water Environment Federation the water quality people
Ohio Water Environment Association

Technical Session Schedule

Register online at *www.onewaterohio.org*

Technical Schedule as of 7/21/14
Subject to minor changes and updates

@OneWaterOhio

Tuesday, August 26

Each Preconference Workshop, Seminar, and Tour is a separate event. Attendee stays with one event all day.

Preconference Workshop, Seminar, and Tours are not included in Full or One Day Conference Registrations.

Early Bird - $85 by Aug 11 and $110 Aug 12 or later (includes lunch, contact hours and/or PDH's)

Emerging Issues for Source Water Workshop - Bellows D at Hilton 5 CH/PDH

9:00	9:30	**In-Stream Remediation Using Biofiltration**	Jeff Kauffman Columbus Dept. of Public Utilities
9:30	10:00	**The Benefits of Laboratory Accreditation**	Mark Citriglia, NEORSD
10:00	10:30	**Ohio River Valley Water Sanitation Commission (ORSANCO) Overview**	Jerry Schulte, ORSANCO
10:30	10:45	Break	
10:45	11:15	**Recent Issues in Source Water Protection**	Barb Lubberger, Ohio EPA
11:15	11:45	**Columbus Taste and Odor Event**	Matt Steele and Rod Dunn Columbus Dept. of Public Utilities
11:45	12:15	**Cyanobacteria Toxin and Cell Propagation through Six Lake Erie Treatment Plants *(D/OM)***	Nicholas Dugan, US EPA
12:15	1:00	Lunch	
1:00	4:00	**Tour - Ohio EPA and Ohio Department of Agriculture Laboratories**	Various Staff

Management Development Seminar - Burkhart A/B at Hilton 6 CH/PDH

9:30	11:30	**Lean Six Sigma**	Tracy Owens, Ohio Six Sigma
11:30	11:45	Break	
11:45	12:45	**The People Pipeline: Workforce Development for a Changing Water Environment**	Mo Wright, RAMA Consulting Group
12:45	1:15	Lunch	
1:15	2:15	**Reliability Centered Maintenance - RCM2**	Keith Kortz, Strategic Technologies, LLC.
2:15	2:30	Break	
2:30	4:30	**Innovate How You Lead**	Maureen Metcalf Metcalf & Associates, Inc.

Water Facility Tour - Parsons Avenue Water Plant & Columbus River Projects 5 CH/PDH

10:00	12:30	**"It Starts with the River" (Part 1 and 2)** **Parsons Avenue Water Plant Tour**	Travis Shite, Stantec Steve Hainen, Parson Av Water Plant
12:00	12:30	Lunch	
12:30	4:00	**Olentangy River Wetland Research Park** **"It Starts with the River" (Part 3 and 4)** **Olentangy River Restoration Project** **Scioto River Restoration Project**	Kay Stefanik, Research Park Director Travis Shite, Stantec

Wastewater Facility Tour - Jackson Pike WWTP & Columbus River Projects 5 CH/PDH

10:00	11:45	**"It Starts with the River" (Part 1 and 2)** **Olentangy River Wetland Research Park**	Bryan Ringley, Stantec Kay Stefanik, Research Park Director
11:15	11:45	Lunch	
11:45	4:00	**Olentangy River Restoration Project** **"It Starts with the River" (Part 3 and 4)** **Scioto River Restoration Project** **Jackson Pike Wastewater Treatment Plant Tour**	Bryan Ringley, Stantec Gary Hickman and Carnell Felton, City of Columbus

Maintenance Tour - Concrete Pipe, Plastic Pipe, Tours and Demos 5 CH/PDH

10:00	12:45	**Hanson Pipe Precast Tour, Ferguson Thermal Plastic Pipe Repairs Demos and CCTV Presentations (to include both gravity and pressure pipes)**	Dave Wehr, Joe Babcanec
12:45	1:15	Lunch	
1:15	4:00	**City of Columbus Sewer Maintenance Operations Center Tour & Demos: SCADA, Electrical Safety, Deep Shaft Portable Elevator, Sandbag Machine and CCTV Presentations (to include both gravity and pressure pipes)**	Dave Wehr, Dwayne Maynard, Larry Lamp, Tim Hedges, Mike Foster

Wednesday, August 27 - 9:00 a.m. to 12:00 p.m.

Green Technologies - Convention Center Room C111			
9:00	9:30	**Diverting FOGs from Wastewater Stream for Biodiesel Production** ***(S/OM)***	Qingshi Tu, PhD Candidate University of Cincinnati
9:35	10:05	**Energy Procurement Options: Control Your Utilities Grid** ***(B/OM)***	Kevin T. Krejny, Montgomery County
10:10	10:40	**The Envision Sustainable Infrastructure Rating System: System Introduction and Case Study** ***(B/X)***	Andrew Hunter HDR Engineering, Inc.
10:40	10:55	Break	
10:55	11:25	**Triple Bottom Line Analysis Favors Green Infrastructures Over Offline Storages to Mitigate the Upper Olentangy CSOs** ***(S/OM)***	Hunter Kelly, Columbus DPU Hazem Gheith, ARCADIS Kwasi Amoah, Dynotec, Inc.
11:30	12:00	**Green Infrastructure - A Critical Review of Design, Construction and Maintenance Methods** ***(B/X)***	Vinnie Tremante, ARCADIS
Industry - Convention Center Room C112			
9:00	9:30	**Retention, Washout and Regrowth of Escherichia Coli in a Mixed Species Biofilm Developed from Dechlorinated Cincinnati Tap Water in a Laboratory Annular Biofilm Reactor System** ***(D/OM)***	Mugdha Mathure, MS Student University of Cincinnati
9:35	10:05	**Closed Vessel Ultraviolet (UV) Technology For Municipal Wastewater** ***(S/OM)***	Patrick Bollman Engineered Treatment Systems
10:10	10:40	**On-Site Hypochlorite Generation - The Safe, Sound, Clean & Green Disinfection Option** ***(S/OM)***	Brian W. Branch Process Solutions, Inc.
10:40	10:55	Break	
10:55	11:25	**New and Innovative Rare Earth Technology for Low-Level Phosphorus Removal** ***(S/OM)***	Joseph Lupo Molycorp, Inc.
11:30	12:00	**Achieving Stage 2 Compliance by Online Monitoring with Large Distribution and Consecutive Systems** ***(D/OM)***	Tom Williams Aqua Metrology Systems
Wastewater - Convention Center Room C114			
9:00	9:30	**Wooster, Ohio & quasar energy group: Public-Private Partnership (P3) for Biosolids Management** ***(S/X)***	Bill Johngrass, URS Corporation Kevin Givins, City of Wooster Clemens Halene, quasar energy group
9:35	10:05	**Modeling Sewer Pipe Deterioration for Risk Based Planning Using a Markov Chain Model** ***(S/OM)***	Christopher Pawlowski and Shawn Loew, AECOM
10:10	10:40	**One Hundred Years of Activated Sludge – Is It Demise or an Even Brighter Future?** ***(S/OM)***	Dr. Samuel Jeyanayagam and Dr. Julian Sandino, CH2M HILL
10:40	10:55	Break	
10:55	11:25	**Reducing Phosphorus Discharges from the NEORSD WWTPs** ***(S/OM)***	Don Esping Brown and Caldwell
11:30	12:00	**Will Removal of CSO's and SSO's Be Enough to Improve Your Water Quality? An Integrated Approach for Water Quality Monitoring and Planning** ***(S/OM)***	Ting Lu Black & Veatch
Sourcewater - Convention Center Room C115			
9:00	9:30	**Responding to an Upstream River Spill – GCWW's Approach to the Elk River WV Spill** ***(D/OM)***	Bruce Whitteberry Greater Cincinnati Water Works
9:35	10:05	**Modeling River Spills: Lessons from the Elk River Spill** ***(D/OM)***	Jim Springer Greater Cincinnati Water Works
10:10	10:40	**Developing a Quick Response Plan for Dead-Zone Episodes** ***(D/OM)***	Stan Zachopoulos, MWH Maggie Rodgers, Cleveland Water
10:40	10:55	Break	
10:55	11:25	**Idealism vs Realism: Implementing Akron's EPA Approved Watershed Control Program** ***(D/OM)***	Jessica Glowczewski Akron Water Supply
11:30	12:00	**UV-254 nm-Assisted Photochemical Destruction of Iodinated Pharmaceuticals** ***(S/OM)***	Xiaodi Duan, PhD Candidate University of Cincinnati

Legend: ***D*** *= Drinking Water* ***S*** *= Wastewater* ***B*** *= Both* ***OM*** *= Operations/Maintenance* ***X*** *= Other*

Wednesday, August 27 - 1:00 to 4:30 p.m.

Customer Service - Convention Center Room C111			
1:00	2:00	**Social Media – Communicating with Our Customers** ***(B/X)***	Christa Dickey and Kevin Kilbane City of Westerville
2:00	2:15	Break	
2:15	3:15	**Technology Improvements – Solutions that Bring Value** ***(B/X)***	Diana Steck, City of Xenia Ray Schwarz, Neptune Equipment Sherri O'Brien, SmartBill, LLC
3:15	3:30	Break	
3:30	4:30	**Ask the Experts Panel – Customer Service, Water, Sewer, Training** ***(B/X)***	Pam Whited, United Water; Richard Lorenz, City of Westerville; Michael Caprella, City of Lima; Curtis Truss, OTCO
Industry - Convention Center Room C112			
1:00	1:30	**Pellet Softening Treatment: Is it Right for Your Community's Water Treatment Needs? Evaluating Pellet Softening Treatment for Manor Township Joint Municipal Authority (MTJMA) Water Treatment Plant**	Sierra McCreary, Black & Veatch April Winklmann, MTJMA
1:35	2:05	**The Basics of Carbon Dioxide Injection Methods and Equipment for pH Control** ***(D/OM)***	Michael Dirth, TOMCO2 Systems
2:10	2:40	**Upgrading Lagoons to Remove Ammonia, Phosphorus, and Nitrogen** ***(S/OM)***	Todd Latchaw Nelson Environmental Inc.
2:40	2:55	Break	
2:55	3:25	**The Science of Mixing and Improving Water Quality in Storage Tanks** ***(D/OM)***	Mike Duer, Tideflex Technologies
3:30	4:00	**Data Integration Solutions for Effective Utility Management** ***(B/OM)***	Jeff M. Miller and Tim Murphy Schneider Electric
4:05	4:35	**Water Sustainability through the use of Advanced Biological Nutrient Recovery** ***(S/OM)***	Rick Johnson Clearas Water Recovery
Utility Management - Convention Center Room C114			
1:00	1:30	**EPA's Climate Resilience Evaluation and Awareness Tool (CREAT): A Case Study** ***(S/X)***	Rina N. Dalal, T&M Associates
1:35	2:05	**Water tweetment: Why, Which, and How Water Utilities Can Benefit from Social Media** ***(B/X)***	John Gonzalez, NEORSD
2:10	2:40	**The Challenges and Benefits of an Environmental Management System for a Midwestern Public Utility** ***(B/OM)***	Dominic J. Hanket, Columbus DPU Robert W. McGormley, Gresham, Smith and Partners
2:40	2:55	Break	
2:55	3:25	**Blueprint Columbus Workforce Development Program: Working Together, Working in Neighborhoods** ***(B/X)***	Cindy Jacobsen T&M Associates
3:30	4:00	**Feasible and Affordable – SSO Elimination and the NFA Process** ***(S/OM)***	Mac McCauley, CT Consultants Chris Clark, Logan County Water Pollution Control District
4:05	4:35	**Using Monetized Risk and Triple Bottom Line Lifecycle Costs to Make Capital Improvement Decisions – NW Distribution System Transmission Improvements Case Study** ***(B/OM)***	George F. Meyers Columbus Dept. of Public Utilities
Laboratory - Convention Center Room C115			
1:00	1:30	**The Fabulous Lab Game Show** ***(S/X)***	Jerome Wright and Miyah Dunford City of Dayton WRF
1:35	2:05	**The Nature of Defensible Data** ***(S/OM)***	John Hoffman, Alloway
2:10	2:40	**Predictive Models and Beach Water Quality Advisories - Villa Angela Beach** ***(S/OM)***	Lindsey Koplow, NEORSD
2:40	2:55	Break	
2:55	3:25	**Human Mitochondrial DNA as a Direct Marker of Fecal Waste in Environmental Waters** ***(S/OM)***	Vikram Kapoor, PhD Candidate University of Cincinnati
3:30	4:00	**Optimization of EPA Method 1664 B for Oil and Grease Using Solid Phase Extraction** ***(S/X)***	Brian McFarland City of Lancaster
4:05	4:35	**Understanding and Predicting Harmful Cyanobacterial Algal Blooms** ***(D/OM)***	Donna Francy and Erin Stelzer U.S. Geological Survey

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Thursday, August 28 - 8:00 to 11:35 a.m.

Distribution - Hilton Bellows AB			
8:00	8:30	**How to Fix the Water Pressure for a Subdivision Built Next to a Ground Storage Tank** ***(D/OM)***	Jeremy Cook, URS Corporation Lance Livesay, City of Fairborn
8:35	9:05	**Forecasting the Future for Columbus Water Distribution Mains Using Advanced Statistical Tools** ***(D/OM)***	Joseph Clouse, Columbus DPU Dr. Annie Vanrenterghem Raven, infraPLAN, Chris Heltzel, AECOM
9:10	9:40	**Tracer Study to Evaluate Passive Mixing System in a 3 Million Gallon Elevated Storage Tank** ***(D/OM)***	Niranjan Deshpande Greater Cincinnati Water Works
9:40	9:55	Break	
9:55	10:25	**Small Diameter Water Main Rehabilitation An Economical and Sustainable Alternative to Open-Cut Construction** ***(D/OM)***	David Pyzoha and Katie Nolan Gresham Smith and Partners
10:30	11:00	**City of Columbus' Water Storage Tanks: How Operations, Maintenace, Inspections and Engineering Improvements Lead to Improved Water Quality - Part 1 and 2** ***(D/OM)***	Michele Gilkerson, Randy Warner, Ron Christian, Tim Huffman Columbus Dept. of Public Utilities
11:05	11:35		
Wastewater Treatment - Hilton Bellows C			
8:00	8:30	**Wet Weather Treatment with a Difference: Demonstration Testing of Chemically Enhanced Primary Treatment with High Rate Disinfection** ***(S/OM)***	Nick Bucurel, Brown and Caldwell Greg Binder, NEORSD
8:35	9:05	**Managing the Paradigm Shift: Wastewater Treatment into Water Resource Recovery** ***(S/OM)***	Jason Tincu, City of Dayton
9:10	9:40	**Be Careful What You Wish For – Unintended Consequences of Effective Biological Phosphorus Removal** ***(S/OM)***	James Gellner and Dan Miklos Hazen and Sawyer
9:40	9:55	Break	
9:55	10:25	**Do You Have Too Much Mixing in Your Treatment Plant? A Review of Mixing Requirements After Primary Clarification** ***(S/OM)***	Wenguo Feng CHA Consulting Inc.
10:30	11:00	**Living with a 41 Month Construction Project - MSDGC's Mill Creek WWTP Secondary Treatment Upgrade / Rehab** ***(S/OM)***	Deborah Schafer, Jacobs Engineering Group and Mark Zilli, MSDGC
11:05	11:35	**Overcoming Challenges During Design, Construction, and Startup of a Cost Effective Nutrient Upgrade** ***(S/OM)***	Ned Talbot O'Brien & Gere
Water Treatment - Hilton Bellows D			
8:00	8:30	**Comparing Carbon Options for DBP Control** ***(D/OM)***	Bret M. Casey, Hazen and Sawyer
8:35	9:05	**Balancing Public Health Risk Reduction and Costs for Cincinnati's UV Disinfection Operation** ***(B/OM)***	Ramesh D Kashinkunti Greater Cincinnati Water Works
9:10	9:40	**Conventional Drinking Water Treatments on Strontium Reduction**	Alyssa O'Donnell University of Cincinnati
9:40	9:55	Break	
9:55	10:25	**Enhancing Biofiltration Performance with Chemical Oxidation - A Year-long Pilot Study** ***(D/OM)***	Ying Hong Greater Cincinnati Water Works
10:30	11:00	**Process Treatment Selection and Design for the City of Piqua's new WTP** ***(D/OM)***	Jeff Macomber, CDM Smith
11:05	11:35	**Dublin Road Water Plant - Design and Bench, Pilot, and Full Scale Testing of Filter and Coagulant Aid Polymer** ***(D/OM)***	Scott Lockhart, Columbus DPU
Collections - Hilton Bellows EF			
8:00	8:30	**Queen City Avenue Phase 1 & 2 Sewer Separation Projects: Delivery of a Large Diameter Storm Sewer Incorporating Sustainable Solutions Within an Integrated Wet Weather Strategy for Lick Run** ***(S/OM)***	Katie Nolan and David S. Pyzoha Gresham Smith and Partners
8:35	9:05	**MSDGC's First Sewer Design Build Project – A Huge Success!** ***(S/OM)***	Tim Koch, Brown and Caldwell Ali Bahar, MSDGC
9:10	9:40	**If You Build It, It Will Rain - City of North Olmsted Phase 1 & 2 Collection System Improvements** ***(S/OM)***	Scott Ankrom and Curt Courter Hazen and Sawyer
9:40	9:55	Break	
9:55	10:25	**Unique Solution: Bending Weir Solves Overflow and Water In Basement Problem** ***(S/OM)***	Elizabeth Ehret, ms consultants, inc. Hazem Gheith, ARCADIS
10:30	11:00	**Reducing Overflows Using a Baffling Solution** ***(S/OM)***	Juan Granja, URS Corp Steve Janosko, NEORSD
11:05	11:35	**Cosgray Road Extension: Exceeding Expectations for Stormwater Management** ***(B/OM)***	Anil Tangirala ms consultants, inc.

Thursday, August 28 - 8:00 to 11:35 a.m.

Utility Management - Hilton Pierce AB			
8:00	8:30	**Northeast Ohio Plant Operations User Group "Encouraging Dialogue to Promote Plant Operations Excellence"** ***(D/OM)***	Jeffrey Bronowski, City of Akron
8:35	9:05	**Lessons Learned from Dayton Water's Successful Implementation of a Sustainable Asset Management Program** ***(D/OM)***	James Decker, CH2M Hill Dave Wilson, City of Dayton Water
9:10	9:40	**Communicating Your Utility's Financial Position to Your Board and Customers** ***(B/X)***	Joseph Crea Raftelis Financial Consultants
9:40	9:55	Break	
9:55	10:25	**Integrated Planning for Effective Resource Management** ***(S/X)***	Jeff Eger and Kimbery Kennedy HDR Engineering, Inc.
10:30	11:00	**"JOINING FORCES" - A Look at Restructuring of a Water and Sewer Utility** ***(B/OM)***	Karen Hawkins, City of Fairborn Dr. Thomas Marshall, ME / IBI Group
11:05	11:35	**How to Maintain Asset Reliability: Hope Is Not a Plan** ***(B/OM)***	James Gross and Todd Krenelka Columbus Dept. of Public Utilities
What's Going On in Columbus - Hilton Burkhart AB			
8:00	8:30	**Quenching Central Ohio's Thirst for Additional Water Supply: The Columbus Upground Reservoirs Project** ***(D/OM)***	Rick Westerfield, Columbus DPU Ken Ricker, ms consultants, inc.
8:35	9:05	**Converting to Biologically Active Filtration** ***(D/OM)***	Tom Bell-Games, Burgess & Niple Gary Hopkins, Columbus DPU
9:10	9:40	**Integrating Ozone and Ion Exchange into a 40 Year Old Lime Softening Plant** ***(D/OM)***	Matt Steele, Columbus DPU Enoch Nicholson, CH2M Hill
9:40	9:55	Break	
9:55	10:25	**Getting the Biggest Bang for Your Buck During a $200 million Treatment Plant Upgrade and Expansion** ***(D/OM)***	Matt Leach, CH2M HILL Mark Eppich, Columbus DPU
10:30	11:00	**Blueprint Columbus: Leveraging Consent Order Commitments to Enhance Neighborhoods** ***(S/X)***	Dax Blake, Columbus DPU Kathleen Smith, ARCADIS
11:05	11:35	**OARS - OSIS Augmentation & Relief Sewer: How to Eliminate More than a Billion Gallons of CSO Annually** ***(S/OM)***	Jeff Coffey, DLZ Ohio Greg Fedner, Columbus DPU

Products and Innovation - Convention Center Hall C			
8:00	8:30	**New Advancements in Global SCADA (Supervisory Control and Data Acquisition) Using Cloud-Based Technology** ***(B/OM)***	Michael Tuel, Xylem, Inc.
8:35	9:05	**Greenhouse Gas Emissions From Wastewater Treatment – A Comprehensive Review** ***(S/OM)***	S. Rao Chitikela Johnson Controls, Inc.
9:10	9:40	**Introducing the Hybrid Sand Filter**	Omar Gadalla, Parkson Corporation
9:40	9:55	Break	
9:55	10:25	**Understanding Fluid Mechanics and Chemistry in Advanced Polymer Mixing for Improved Coagulation and Dewatering** ***(S/OM)***	Yong Kim, UGSI ChemFeed, Inc.
10:30	11:00	**Advanced Metering Analytics: The Clear Path to Better Utility Management and Enhanced Customer Service** ***(D/OM)***	Tina Odum, Badger Meter, Inc.
11:05	11:35	**AWWA Tank Standard D101: The Development of the New Water Storage Tank and Related Facilities Standard** ***(D/OM)***	Patrick Brown Tank Industry Consultants

Legend: ***D*** *= Drinking Water* ***S*** *= Wastewater* ***B*** *= Both* ***OM*** *= Operations/Maintenance* ***X*** *= Other*

Awards, Awards, Awards!

Awards will be given out at several conference events! See the full schedule at *www.onewaterohio.org.*

One Water Kick-Off Breakfast and Awards
Wednesday, August 27, 2014, 7:00 to 9:00 am, Hilton Columbus Downtown/George Bellows Ballroom

Expo Social and Awards
Wednesday, August 27, 2014, 5:00 to 7:00 pm, Greater Columbus Convention Center/Hall C

OWEA Awards and Membership Meeting
Thursday, August 28, 2014, 4:30 to 6:00 pm, Hilton Columbus Downtown, (Emerson Burkhart AB - Lower Level)

One Water Gala and Awards
Thursday, August 28, 2014, 6:30 to 10:00 pm, Hilton Columbus Downtown/George Bellows Ballroom

THURSDAY AFTERNOON SESSIONS

Thursday, August 28 - 1:30 to 4:30 p.m.

Distribution - Hilton Bellows AB			
1:30	2:00	**Reducing THMs via Spray Aeration: A Case Study** ***(D/OM)***	Gary Williams Jones & Henry Engineers
2:05	2:35	**Challenges in Maintaining Drinking Water Quality at Hospitals and Other Large Buildings** ***(D/X)***	Simoni Triantafyllidou, US EPA, Office of Research and Development
2:35	2:50	Break	
2:50	3:20	**What's Your Water Age: Evaluating DBP Formation and Control in Water Distribution Systems** ***(D/OM)***	Eric Anderson, CHA Consulting, Inc.
3:25	3:55	**Greater Cincinnati Water Works Lead Line Replacement / Filter Distribution Program** ***(D/OM)***	Dawn Webb Greater Cincinnati Water Works
4:00	4:30	**Trenchless Water Main Rehabilitation Design Considerations** ***(D/OM)***	V. Firat Sever American Structurepoint
Wastewater Treatment - Hilton Bellows C			
1:30	2:00	**City of Euclid Consent Decree Implementation**	Lesley Gordon, CT Consultants, Inc. Dan Knecht, City of Euclid
2:05	2:35	**Construction and Startup of Innovative HRT Facility to Help Eliminate Wet-Weather Bypasses at Springfield's WWTP** ***(S/OM)***	Jerry Ussher, City of Springfield Bob O'Bryan, Black & Veatch
2:35	2:50	Break	
2:50	3:20	**Exploring TOC as an Alternative to CBOD for NPDES Reporting** ***(S/OM)***	Kathy Richards, City of Akron
3:25	3:55	**Aeration System Improvements at Two Wastewater Treatment Plants with Less Than Five Year Payback: Case Studies** ***(S/OM)***	Scott Phipps, Hazen and Sawyer
4:00	4:30	**Activated Sludge Process Control Made Easy: Conceptual Basis of Wasting Mixed Liquor Using a Wasting Clarifier** ***(S/OM)***	Eric J. Wahlberg, Brown and Caldwell
Water Treatment - Hilton Bellows D			
1:30	2:00	**Attaining Water Treatment Goals in Challenging Situations: Are You Prepared?** ***(D/OM)***	Gary Logsdon
2:05	2:35	**Practical Experiences Operating a Hospital as a Regulated Public Water System** ***(D/X)***	Jeff Swertfeger Greater Cincinnati Water Works
2:35	2:50	Break	
2:50	3:20	**Maintaining Raw Water Flow while Installing New Intake Pump and Screen Improvements at the City of Elyria WTP** ***(D/OM)***	Timothy McCann, AECOM Samuel W. Jacob, City of Elyria
3:25	3:55	**Bridging the Gap from Water Plant Data Collection and Data Analytics to Operational Decision Support for Harmful Algal Blooms** ***(D/OM)***	Christopher Miller, University of Akron
4:00	4:30	**Iced! The Water Utility vs. the Polar Vortex** ***(D/OM)***	Steve Heimlich and Elana West Avon Lake Regional Water
Collections - Hilton Bellows EF			
1:30	2:00	**North Street Reconstruction and Integrated Stormwater Management: A Sustainable Street Case Study** ***(S/X)***	Ted Blahnik, Williams Creek Consulting and Jennifer Miller Leshney, City of Lafayette
2:05	2:35	**Confirming Wet Weather Treatment Facility Hydraulic Design with Physical Model Study** ***(S/OM)***	Tony Yee, MSDGC Jared Hutchins, Black & Veatch
2:35	2:50	Break	
2:50	3:20	**Challenges and Rewards of Sewer Interceptor Assessment and Rehabilitation The City of Fairborn Experience** ***(S/OM)***	Marcus Lehotay, City of Fairborn Marcia M Bland, EMH&T
3:25	3:55	**Project Dry Basement: A Description of the City of Columbus Backwater Prevention Program** ***(S/OM)***	Robert Ellinger, Columbus Division of Sewerage and Drainage
4:00	4:30	**Tracking Down Rapid Infiltration in a Tangle of Pump Stations** ***(S/OM)***	John Barton, Stantec Consulting

Legend: ***D*** *= Drinking Water* ***S*** *= Wastewater* ***B*** *= Both* ***OM*** *= Operations/Maintenance* ***X*** *= Other*

Thursday, August 28 - 1:30 to 4:30 p.m.

Utility Management - Hilton Pierce AB			
1:30	2:00	**Toledo's Wet Weather Program – Dollars and Common Sense!** ***(S/OM)***	Robert Harbron, Black & Veatch Corp
2:05	2:35	**A Recipe for Success – Using Progressive Design Build to Restore Reliability to a Critical Pump Station** ***(S/OM)***	Harry Shaposka, NEORSD Karrie Buxton, NEORSD Rich Atoulikian, HDR Engineering, Inc.
2:35	2:50	Break	
2:50	3:20	**Strategic Planning: Creating a Game Plan for the Future** ***(B/OM)***	Dr. Steven F. Schulze, Montgomery County Environmental Services
3:25	3:55	**Green Infrastructure and Adaptive Management: A New Synergy** ***(B/X)***	Tina Wolff, ARCADIS
What's Going On in Columbus - Hilton Burkhart AB			
1:30	2:00	**Blueprint Clintonville Integrated Solutions Project – Pilot Area Technical Committee (PATC) Approach and Interim Findings in Columbus, Ohio** ***(S/X)***	Nick Domenick and Hunter Kelly Columbus Dept. of Public Utilities
2:05	2:35	**Columbus Southerly WWTP Digester Optimization and Foam Abatement Investigation** ***(S/OM)***	Dale Kocarek, Stantec Jeff Hall, Columbus DPU
2:35	2:50	Break	
2:50	3:20	**City of Columbus 2012 Comprehensive Water Audit** ***(D/X)***	Steve Gooding and Brian Haemmerle Columbus Dept. of Public Utilities
3:25	3:55	**Greener Grounds: Urban Regeneration Anchored by Vacant Parcel Green Infrastructure Installations** ***(S/OM)***	Steven Thompson, AECOM C. Timothy Fallara, Columbus DPU

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Friday, August 29 - 8:00 to 11:45 a.m.

Green Technologies and Stormwater - Hilton Bellows AB			
8:00	8:30	**Guide to Demonstrating the Economic Benefits of Green Infrastructure for CSO Mitigation** ***(S/OM)***	Jeff Rexhausen, University of Cincinnati
8:35	9:05	**Best Practices for Green Infrastructure: A Discussion on Lessons Learned and Construction Management** ***(B/X)***	Kelsey Hoffman, H.R. Gray
9:10	9:40	**Controlling Combined Sewer Overflow Utilizing Green Techniques in an Urban Environment** ***(S/OM)***	Kimberly Colich, NEORSD Michael Seluga, NEORSD
9:40	9:55	Break	
9:55	10:25	**Blueprint Columbus Green Infrastructure Implementation and Design Guidelines** ***(S/X)***	Jason Sanson, Columbus DPU John Herchl, CDM Smith
10:30	11:00	**Green Demolition: Paving the Way for Green Infrastructure** ***(B/X)***	Andrew Reynolds, RA Consultants & MSD of Greater Cincinnati
11:05	11:35	**Green Infrastructure Modeling in Cincinnati Ohio** ***(B/X)***	Paul Bahs and Leah Buerman ARCADIS U.S., Inc.
Regulatory - Hilton Bellows CD			
8:00	8:30	**Ohio EPA Director's Update**	Craig Butler, Ohio EPA
8:35	9:05	**Ohio EPA Division of Drinking and Groundwater Update**	Mike Baker, Ohio EPA DDAGW
9:10	9:40	**Ohio EPA Division of Surface Water**	Karl Gebhardt, Ohio EPA DSW
9:40	9:55	Break	
9:55	10:25	**Operator Certification Update** ***(B/OM)***	Andrew Barienbrock, Ohio EPA
10:30	11:00	**Successful Regulatory Permitting of Alternative Delivery Municipal Water and Wastewater Projects** ***(B/OM)***	Justin Arnold Kokosing Construction Company
11:05	11:35	**The Long-Term Lead and Copper Rule: Understanding Potential Changes and Impacts on Community Water Systems** ***(D/OM)***	Rebecca Slabaugh, ARCADIS
Residuals and Recovery - Hilton Bellows EF			
8:00	8:30	**To Digest or Incinerate Sludge? That Is the Question** ***(S/OM)***	Mark Greene, O'Brien & Gere
8:35	9:05	**Full Scale Demonstration Studies of Recalcinated Lime at a Ground Water Facility** ***(D/OM)***	Katie Jamriska Greater Cincinnati Water Works
9:10	9:40	**Speedway, Indiana, WWTP Biosolids Upgrade: Storage Nitrification / Denitrification Reactor (SNDR) Results in Ammonia Loading Reduction** ***(S/OM)***	Cindy Fort and Karen Saavedra American Structurepoint
9:40	9:55	Break	
9:55	10:25	**Pushing the Limits: Challenges Of Compliance With TDS Regulations in Ohio** ***(S/OM)***	Rob Shoaf, URS
10:30	11:00	**Helping Phosphorus Recovery Become More Prosperous** ***(S/OM)***	Jim Fitzpatrick and Andy Shaw Black & Veatch
11:05	11:35	**Improved Performance in Solar Biosolids Dryer Technology** ***(S/OM)***	Christopher Hubbard Huber Technologies

Legend: ***D*** *= Drinking Water* ***S*** *= Wastewater* ***B*** *= Both* ***OM*** *= Operations/Maintenance* ***X*** *= Other*

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Full Conference includes: Technical Sessions, Expo Events, Kick-Off Breakfast, Wed/Thu Lunches, and Evening Networking Events	Full Conference Member	$295 ☐	$345 ☐	
	Full Conference Nonmember	$395 ☐	$445 ☐	
	Full Conf Member Retired *(not working)*	$200 ☐	$235 ☐	
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Wed Only includes: Technical Sessions, Expo Events, Kick-Off Breakfast, Lunch, and Evening Networking Meet & Greet at Brothers	Wednesday Only Member	$170 ☐	$195 ☐	
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Thur Only includes: Technical Sessions, Expo, Continental Breakfast, Lunch, and One Water Gala at Hilton	Thursday Only Member	$170 ☐	$195 ☐	
	Thursday Only Nonmember	$220 ☐	$245 ☐	
Includes: Program Activities, Kick-Off Breakfast, Brothers, Hilton One Water Gala Events	Spouse/Guest Program + 3 Events	$195 ☐	$245 ☐	
Includes: Program Activities Only	Spouse/Guest Program Limited	$140 ☐	$190 ☐	
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	Extra Wed Brothers Meet & Greet Ticket	___ x $60 each		
	Extra Thu Hilton One Water Gala Ticket	___ x $65 each		
Preconference Workshops & Tours (select one if attending)				
Includes: Technical Session &/or Tours, Lunch, and Transportation if part of program. (10 am - 4 pm, 5 Contact Hours/PDH)	Emerging Issues for Source Water	$85 ☐	$110 ☐	
	Management Development Seminar	$85 ☐	$110 ☐	
	One Water Facilities Tour — Water ☐ Wastewater ☐	$85 ☐	$110 ☐	
	One Water Maintenance Tour	$85 ☐	$110 ☐	
Budget Options - No Food, Beverage, or Events Included				
Includes: Technical Sessions and Exhibit Expo Access Only	Wed Technical Program/Expo Only	$75 ☐	$100 ☐	
	Thurs Technical Program/Expo Only	$75 ☐	$100 ☐	
	Fri Half Day Technical Program	$50 ☐	$75 ☐	
	Full Technical Program Only	$200 ☐	$278 ☐	
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STRATEGIES FOR PHOSPHORUS MANAGEMENT
PART 2 – CHEMICAL PHOSPHORUS REMOVAL

by Samuel Jeyanayagam, PhD, PE, BCEE, Vice President/Senior Principal Technologist, CH2M HILL

Introduction

Phosphorus (P) is both a nuisance and life sustaining element. This opposing nature of P should be considered by water resource recovery facilities (WRRFs) in implementing integrated, sustainable, and cost-effective phosphorus management strategies. Part 1 of this article (Buckeye Bulletin Volume 87; Issue 1, 2014) presented an argument for the conservation of P as an irreplaceable resource. This article (Part 2) is focused on P removal using chemicals. Part 3 in the series will appear in the next issue of Buckeye Bulletin and will discuss enhanced biological P removal (EBPR). (Note: In keeping with WEF initiative, this article refers to wastewater treatment plants as WRRFs).

Chemical Phosphorus Removal

Chemical P removal is the most commonly used approach for controlling effluent P levels either as a standalone process or as a supplemental process to EBPR. In either case, the basic concept is to convert soluble P in the wastewater to an insoluble chemical solid and remove it with the sludge. Net P removal occurs when the sludge is wasted from the system. In conventional chemical P removal, chemicals are added prior to primary and/or secondary clarifiers. In a well operated WRRF, this approach can typically achieve an effluent total phosphorus (TP) of 0.5 to 1.0 mg/L without filtration. However, effluent filtration is often added when targeting 0.5 mg/L TP to ensure process reliability. Reaching lower effluent TP levels (<0.05 mg/L) will require tertiary treatment steps (chemical addition and solids separation) following conventional P removal. This article focusses on conventional chemical P removal, which is of interest to OWEA members.

Removal Mechanism

The classic chemical P removal model assumes straight soluble P precipitation as metal-phosphate. However, recent laboratory studies and full scale plant data reveal that this assumption is flawed. We now know that metal-phosphate precipitation can only occur at low pH values (pH<5) and not under conditions typically encountered during wastewater treatment. The P removal mechanisms are much more complex and a failure to understand the associated reactions results in poor design and suboptimal chemical dose leading to costly operation. Recent plant data confirms chemical P removal mechanisms to include the following (**Figure 1**):

- *Hydrous Metal Oxide formation*: When iron or aluminum salt is added, it quickly hydrolyzes to form a variety of complex precipitants with varying composition depending on many factors including alkalinity, pH, age, etc. Collectively called hydrous metal oxide (HMO), the freshly formed precipitants are amorphous and have highly reactive surface sites capable of adsorbing ions. HMO formation is rapid and occurs in a few seconds.
- *Co-Precipitation:* Co-precipitation is the phenomenon whereby a dissolved species (e.g. soluble P) is removed by an already formed precipitate (e.g. HMO) through surface adsorption. It represents the primary P removal mechanism since soluble P has a high adsorptive binding strength to HMO. The process occurs simultaneously with the formation and growth of the HMO floc and is responsible for the initial rapid removal of soluble P. With time, the HMO floc ages and the number of adsorptive sites are reduced resulting in slower P adsorption. (Note: Adsorption is a surface phenomenon restricted to surface adsorption sites while absorption involves the entire volume of the solid.)
- *Entrapment:* As the HMO floc grows, colloidal P in the bulk liquid is physically entrapped within the growing particle. This is a minor P removal mechanism facilitated by the HMO floc acting like a fish net to gather and enmesh finely dispersed P-containing particles. This 'sweeping' action results in additional P removal.

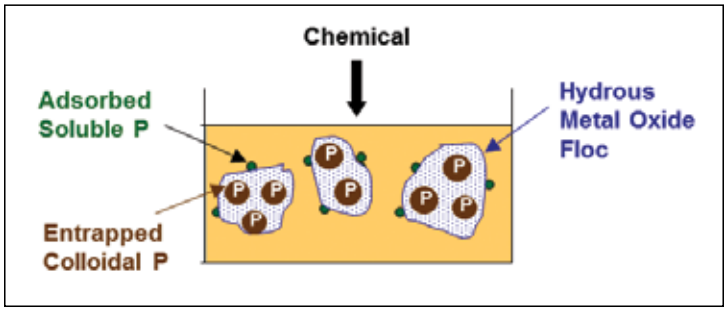

Figure 1: Chemical Phosphorus Removal Mechanism

A review of the above mechanisms reveal that HMO formation in itself does not remove P. However, it is crucial to the subsequent mechanisms (co-precipitation and entrapment) that are responsible for P removal. As shown in **Figure 2**, plant data confirm the initial rapid soluble P removal (from 3 to 1.8 mg/L) via co-precipitation. The resulting rapid adsorption is enabled by the presence of: (a) freshly-formed HMO floc with many active adsorption sites, and (b) soluble P (ions) with a high affinity for binding with HMO. This is followed by relatively modest removal (from 1.8 to 1.0 mg/L) via slower surface adsorption by older floc and, to a lesser extent, by entrapment.

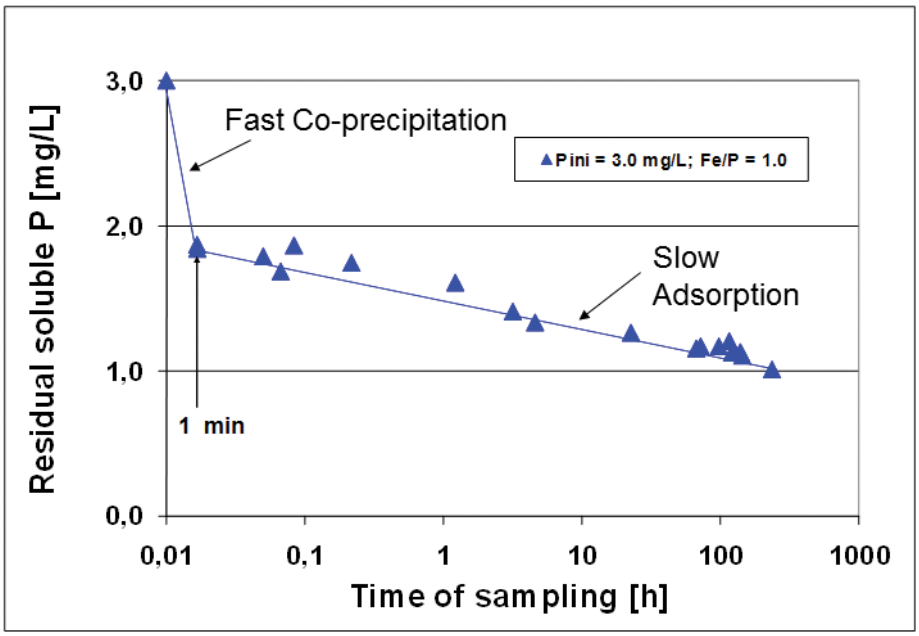

Figure 2: Plant Data Supporting Chemical P Removal Mechanism (Tacakcs, et al)

Chemicals Used

A variety of chemicals can be used for P removal. Key characteristics of commonly used metal salts and stoichiometric dose requirements for phosphorus removal are summarized in **Table 1**. A brief overview of the various chemicals is provided below.

Alum and Ferric Chloride

Ferric chloride and alum are the most commonly used chemicals for P removal. They have similar chemistry and removal mechanisms and are discussed together. As noted previously, the reactions are complex resulting in the formation of several types of precipitates with varying composition. However, the following simplified explanation of the reactions involved can be used to approximate process calculations and support design criteria. The primary reaction results in the transformation of soluble phosphorus to insoluble phosphate as shown below for reactions involving alum and ferric chloride:

$$Al_2(SO_4)_3.14H_2O + 2PO_4^{3-} \rightarrow 3SO_4^{2-} + 14H_2O + 2AlPO_4 \downarrow \quad (1)$$

$$FeCl_3 + PO_4^{3-} \rightarrow 3Cl^- + FePO_4 \downarrow \quad (2)$$

Using these two balanced reactions, the stoichiometric dose requirements can be calculated as follows: In Equation 1, one mole of alum (molecular weight = 594 g) reacts with 2 moles of phosphorus (2 x 31 g). The corresponding alum to phosphorus weight ratio is 9.6:1. Likewise, as shown in Equation 2, the ferric chloride (molecular weight = 162 g) to phosphorus (31 g) mole ratio is 1:1 and the weight ratio is 5.2:1. This implies, if there are no competing reactions or interference, 1 mg/L of P can be removed by dosing 9.6 and 5.2 mg/L of alum and ferric chloride, respectively.

In practice, however, more than the stoichiometric dose is required. The amount of excess chemical needed increases as the target effluent P decreases. This excess chemical enters into a reaction with alkalinity to form hydroxide precipitate.

$$Al_2(SO_4)_3.14H_2O + 6HCO^{3-} \rightarrow 6CO2 + 14H_2O + 2Al(OH)_3 \downarrow \quad (3)$$

$$FeCl_3 + 3HCO_3^- \rightarrow 3CO_2 + 3Cl^- + Fe(OH)_3 \downarrow \quad (4)$$

The minimum solubility of aluminum and iron phosphate is in the acidic range (pH = 3 to 5). Despite the fact most plants are typically operated at higher pH (6.5 to 7.5), full-scale operating data indicate that low effluent phosphorus levels can be achieved without the need to lower the pH with acid. On the other hand, if the influent alkalinity is not adequate to sustain reactions 3 or 4 above, pH decrease can occur resulting in the need to add caustic.

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Other Aluminum Salts

Sodium aluminate can also be a source of aluminum for P removal. Unlike iron salts and alum, it produces alkalinity and is favored in low alkalinity wastewaters. Phosphorus removal can also be achieved by using pre-hydrolyzed salts such as poly-aluminum chloride (PAC) and poly aluminum sulfate (PAS). As the name implies, these chemicals contain pre-formed metal hydroxides and do not suppress pH when added to water. Some studies have indicated that these chemicals are not as efficient in removing P because they do not form fresh HMO floc with high P adsorbing capability.

Ferrous Salt

The main source of ferrous chloride or ferrous sulfate is pickle liquor, a waste product of the steel manufacturing industry. It is an inexpensive source but product quality, particularly heavy metal content is not guaranteed. Ferrous salts must be oxidized to ferric before they can be effective. For this reason, they are typically added to the aeration basin. Several studies have shown that ferric formed by the oxidation of ferrous is more effective in removing P than direct ferric addition. However, the use of ferrous salt could potentially cause poor settling sludge leading to higher effluent TP.

Lime

Phosphorus removal with lime is accomplished at high pH (>10). Typically, enough lime is added to raise the pH to the optimum range. This requires pH adjustment prior to discharge. In addition, the use of lime results in significant sludge production and its handling is wrought with difficulties. For these reasons the use of lime is not favored.

Table 1: Characteristics of Iron and Aluminum Salts

Chemical	Molecular Weight	Commercial Strength (%)	Specific Gravity	Stoichiometric Requirement *	
				Mole Ratio	Weight Ratio
Ferric chloride, $FeCl_3$	162	38	1.5	1:1	5.2:1
Ferric sulfate, $Fe_2(SO_4)_3$	400	45	1.6	0.5:1	6.4:1
Ferrous chloride, $FeCl_2$	127	30	1.4	1.5:1	6.1:1
Ferrous sulfate, FeSO4	152	19	1.2	1.5:1	7.4:1
Alum, $Al_2(SO_4)_3.14H_2O$	594	48	1.3	0.5:1	9.6:1
Sodium aluminate, $Na_2O.Al_2O_3.3H_2O$	218	20	1.5	0.5:1	3.6:1
Polyaluminum chloride (PAC)	134	51	1.4	1:1	4.3:1

* Chemical to P ratio

Chemical Application Points

Chemical addition can be implemented at three potential locations in the mainstream process. **Table 2** summarizes the key features of each approach.

Table 2: Main Features of the Various Chemical Addition Strategies

Strategy	Location of		Key Features
	Chemical Addition	Phosphorus Removal	
Pre-Precipitation	Prior to primary clarifiers	Primary sludge	• Easily incorporated into existing system - low cost • Increased cBOD and TSS removal • Reduced aeration demand • Reduced biological sludge • Increased primary sludge • Reduced substrate for downstream EBPR and/or denitrification process • Reduced P to biological system • Colloidal and particulate COD compete with P for available adsorption sites

Simultaneous precipitation	Prior to final clarifiers	Waste activated sludge	• Easily incorporated into existing system – low cost • Less competing reactions • Significant amount of TP present as soluble P available for removal • Inert solids accumulation in the mixed liquor
Post-precipitation	Tertiary chemical addition following final clarifiers	Tertiary chemical sludge	• Required for very low effluent soluble P (<0.05 mg/L) • Need to add tertiary unit processes – high capital cost • High molar ratio – inefficient chemical use

Dose Determination

As noted previously, **Table 1** provides stoichiometric requirements to precipitate soluble phosphorus only. In practice a higher dose would be needed to satisfy competing reactions with alkalinity and sulfides. **Table 3** shows the reaction hierarchy for commonly used chemicals.

Table 3: Reaction Hierarchy

Reaction With	Aluminum	Ferric	Ferrous
Sulfide	No reaction	1st	1st
Soluble P	1st	2nd	2nd
Alkalinity	2nd	3rd	Limited

Jar tests should be conducted to determine site-specific chemical dose requirements to achieve the desired effluent total phosphorus. In the absence of such information, published data may be used for dose estimation. Using operating data from several plants, **Equation 5** for best fit curve was derived for Fe:Sol.P and Al:Sol.P mole ratios (WEF, 2006).

$$Y = \frac{a}{1 + be^{-cx}} \quad (5)$$

Where

Y = Fe:P or Al:P mole ratio
x = Target effluent soluble P, mg/L
a, b, c = Constants

For iron a = 1.48; b = 1.07; and c = 2.25. For alum a = 0.8; b = 0.95; and c = 1.9. **Figure 3** is the curve for iron salt addition plotted using the above equation. In Region AB, less stringent effluent soluble P levels are achieved with relative efficiency at lower Fe:P molar ratios (lower chemical requirement per unit of P removed). In this region, while reaction with alkalinity does occur, most of the added chemical is involved in P precipitation reaction. As a result, chemical sludge production and alkalinity destruction are relatively low. As shown in Region BC in **Figure 3**, the Fe:P ratio increases sharply as lower effluent soluble P (<0.5 mg/L for the data shown) is approached. Significantly more chemical per unit of P removed (inefficient chemical use) is required as reflected by the relatively flat curve. This region is dominated by reaction with alkalinity resulting in increased sludge production and alkalinity consumption.

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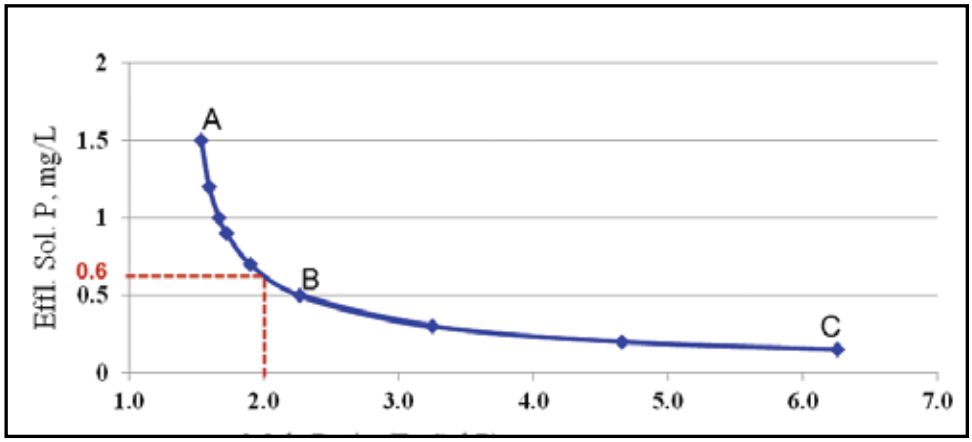

Figure 3: Best Fit Curve for P removal Using Ferric Salt (WEF, 2006)

The following example illustrates one method of calculating chemical requirements for P removal:

Example #1

Plant flow = 5 mgd
Influent TP (TPin) = 5 mg/L
Effluent Soluble P (SP) = 0.6 mg/L

Chemical used: 38% Ferric chloride ($FeCl_3$) solution.
Application point: Prior to secondary clarifier
$FeCl_3$ mol. wt. = 162 lb/mol
Specific gravity = 1.5
Iron content of $FeCl_3$ = 56 lb/mol
Mol. Wt. of P = 31 lb/mol

From **Figure 3**, the required Fe:P mole ratio to reach effluent SP of 0.6 mg/L = 2.0 mole Fe/mol SP

Fe:P weight ratio = (2 Fe:P mol ratio) x (56 lb Fe/mol)/(31 lb P/mol) = 3.6 lb Fe/lb SP removed

$FeCl_3$ needed = (3.6 lb Fe/lb SP) x (162 lb/mol $FeCl_3$)/(56 lb/mol Fe)
= 10.4 lb $FeCl_3$/lb SP removed

Influent total phosphorus (TP) is comprised of particulate and soluble fractions. Most of the particulate phosphorus is solubilized during treatment resulting in an increase in the soluble phosphorous pool available for chemical precipitation.

Sol. P removed = (TPin) – (Effluent SP) = (5 mg/L) – (0.6 mg/L) = 4.4 mg/L
= (4.4 mg/L) x (5 mgd) x 8.34 = 183.5 lb SP removed/d

Dry $FeCl_3$ needed = (10.4 lb ferric chloride/lb SP removed) x (183.5 lb SP removed/d)
= 1908 lb/d

Solution $FeCl_3$ needed = (1908 lb/d)/[(0.38) x (1.5 sp. gr) x (8.34 lb/gal)]
= 402 gpd

Sludge Production

Chemical P removal will result in increased solids production. This could potentially have a significant impact on solids handling facilities particularly if low effluent phosphorus levels are targeted. The two main sources of chemical solids associated with chemical phosphorus removal are metal phosphate precipitate (Reactions #1 or 2) and metal hydroxide precipitate (Reactions #3 or 4). For example, when ferric chloride is used, one mole (162 g/mol) forms one mole of ferric phosphate (151 g/mol) per Equation #2 to form one mole of ferric phosphate sludge. Any ferric chloride (moles) added in excess will enter into a reaction with alkalinity to form ferric hydroxide sludge (107 g/mol) per Equation #4. Using information from Example 1, sludge production can be determined as follows:

Example #2

From Example #1,
SP removed = 183.5 lb/d = (183.5 lb/d)/(31 lb P/mol) = 5.9 moles/d
Per stoichiometric reaction #2, one mole of SP reacts with one mole of ferric chloride to form one mole of ferric phosphate.
Hence,
Ferric phosphate precipitated = 5.9 moles/d
= (5.9 moles/d) x (151 lb/mol) = 891 lb/d

Ferric chloride added in excess of the above reaction will form ferric hydroxide
Excess ferric chloride = (Ferric chloride added) – (Ferric chloride consumed in Reaction #2)
Ferric chloride consumed in reaction #2 (moles/d) = SP removed (moles/d) = 5.9 moles/d
Hence, excess ferric chloride = [(1908 lb/d)/(162 lb/mol)] – 5.9 moles/d
= (11.8 moles /d) – (5.9 moles/d) = 5.9 moles/d
Since 1 mole of ferric chloride forms 1 mole of ferric hydroxide (Reaction #4),
Ferric hydroxide formed = 5.9 moles/d
= (5.9 moles/d) x (107 lb/mol) = 631 lb/d
Total chemical sludge formed = 891 lb/d (ferric phosphate) + 631 lb/d (ferric hydroxide)
= 1,522 lb/d

The above example represents an initial estimate of chemical solids production based on theoretical consideration of simplified chemical reactions. In practice, the associated chemical interactions are fairly complex and the actual solids production depends on site specific conditions. In addition to the chemical solids calculated above, increased TSS removal is likely since the chemicals used for P removal can also coagulate and remove solids that are too light to settle otherwise.

Intrinsic Phosphorus Removal

While chemical P removal and EBPR represent engineered approaches for intentional P removal, limited P removal is integral to many commonly used unit processes. The main purpose of primary clarifiers is to remove settleable solids. In so doing, the P associated with these solids are also removed with the primary sludge. The primary clarifier P removal approximates 10 percent. Likewise P removal occurs in all biological treatment processes even if they are not designed to do so. This is because P is a required growth element and represents approximately 1.5 to 2.0 percent by weight of the biomass. Approximately 1.0 – 2.5 mg/L TP is removed via waste activated sludge.

Design and Operational Considerations

Impact of Mixing

As shown in **Figure 4**, lower effluent soluble P can be achieved by increasing the mixing intensity (G value) at the chemical dosing point. Mixing provides the following benefits:

- Enhanced adsorptive capacity of the HMO floc. High mixing intensity results in a floc with a large specific surface area (surface area per unit volume) and many adsorption sites while low mixing intensity gives rise to low specific surface area and fewer adsorption sites.
- Greater contact between soluble P and the HMO floc resulting in increased adsorption and entrapment.

Solids Capture

Effluent TP is comprised of soluble P and particulate P. From an analytical perspective, soluble P typically includes particles less than 0.45 microns. Particulate P represents P that is solids-associated. As noted above, chemical P removal converts soluble P into particulate P which must be separated and removed from the liquid stream. Therefore, the effluent TP is a function of effluent soluble P and the efficiency of solids capture in the final clarifiers (and filters, if provided). The P content of the effluent solids (with chemical P removal) can be 2 to 5 percent by weight. For example, if a WRRF is able to achieve 0.6 mg/L soluble P via chemical addition, then in order to meet an effluent TP of 1 mg/L, the particulate P cannot be more than 0.4 mg/L (**Figure 5**). This can be achieved by limiting effluent TSS to 15 mg/L (P content of 3%) or less. If the P content of the effluent TSS is 4 percent, the permissible effluent TSS will be 10 mg/L. This example illustrates the importance of ensuring good sludge settleability in order to maximize solids capture in the final clarifiers. It is clear that for a facility incorporating P removal, the effluent TSS may be dictated by the targeted effluent TP level rather than the compliance limit for effluent TSS.

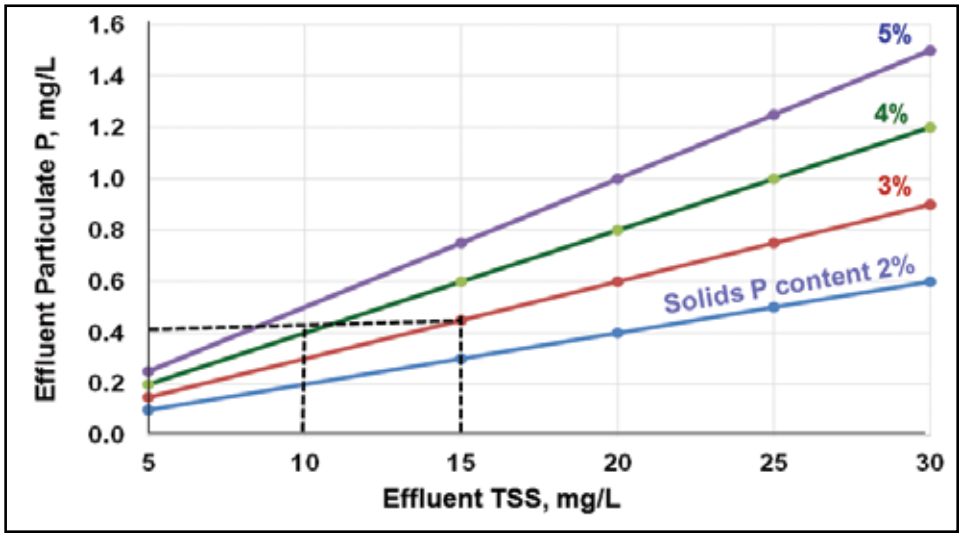

Figure 4: Importance of Good Mixing on Residual Soluble P

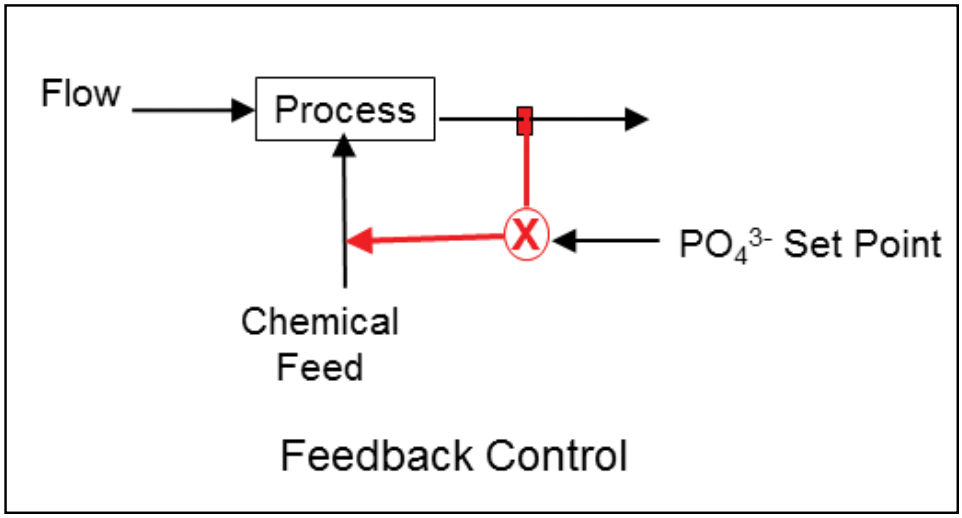

Figure 5: Impact of Effluent TSS on Effluent Particulate P

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Process Control

On-line phosphate analyzers can be used to accomplish chemical P removal process control. A simple feedback configuration (**Figure 6**) entails monitoring aeration basin effluent soluble P and using the information to activate, deactivate, or adjust chemical feed. The outcome of this process control approach, illustrated in **Figure 6**, shows the initiation of pulsed chemical feed (red columns) when the measured soluble P approaches a pre-selected value and the immediate response of this action. This method also allows chemical feed to be delayed until needed thereby taking advantage of P adsorption capability of the recycled chemical solids. The benefits of process control include optimized chemical dose, reduced cost, and avoidance of overly conservative operation to account for the human factor.

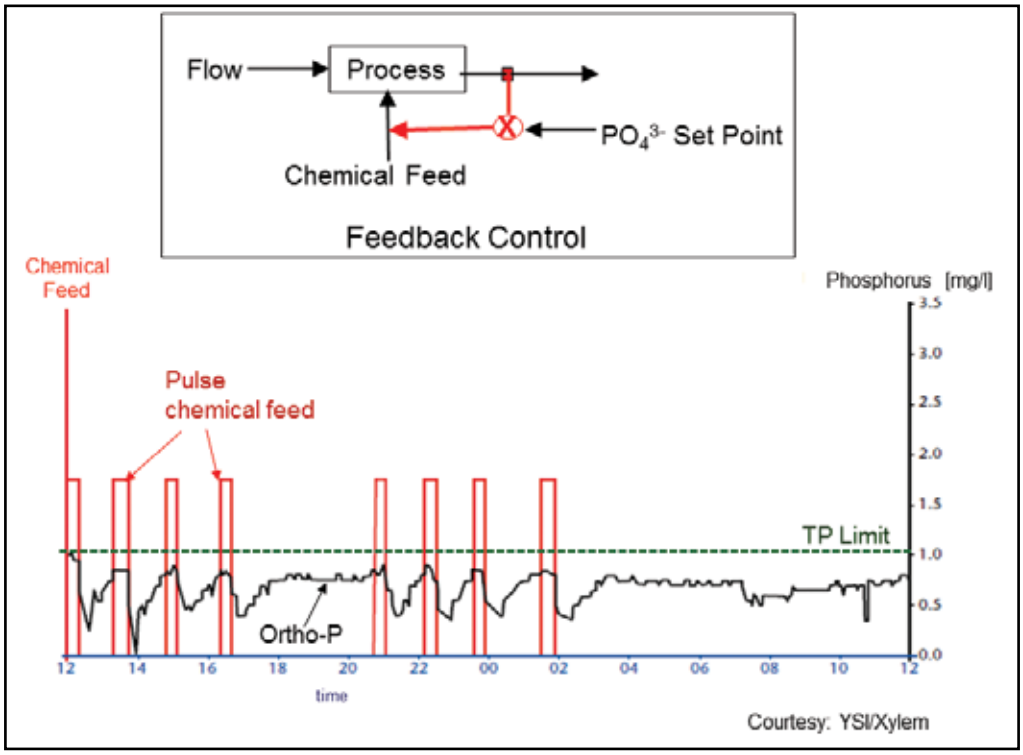

Figure 6: Feedback Control Response

Lessons Learned

The following is a listing of lessons learned that may be of benefit to designers and operators of chemical phosphorous removal systems.

- The kinetics of phosphate precipitation is rapid while the reaction with competing species (alkalinity included) is relatively slow. Efficient initial mixing disperses the chemical quickly and evenly bringing it in contact with soluble phosphorus thereby maximizing phosphate precipitation before initiating the competing reactions. Poor mixing is often compensated for by overdosing because competing reactions occur prematurely before significant soluble phosphorus is precipitated.
- As noted previously, chemical addition will generate additional solids, which will need adequate handling and processing capability.
- Ferric addition to the primary clarifiers triggered high SVIs in at least one WWTP. This effect was attributed to low BOD loading to the aeration tanks and subsequent proliferation of low F:M filaments.
- In simultaneous precipitation, chemical solids generated will accumulate in the mixed liquor and will lower the active biomass fraction (estimated by VSS content). This may require the operating MLSS to be increased leading to higher clarifier solids loading.

- Multipoint chemical addition (pre- and simultaneous precipitation) may optimize chemical dose and provide economic and process benefits. By adding a base load of metal salt to the primary clarifier, it may be possible to reduce the variability of metal salt addition to the aeration basin. The dual feed strategy avoids excessive BOD and soluble phosphorus removal in the primary clarifiers, minimizes buildup of inert solids in the MLSS, and often results in reduced total chemical requirements. Conversely, adding the entire chemical dose at one location may require frequent adjustments to avoid over- or under-feeding.
- When an iron salt is used, the ferric precipitate formed is oxidized to ferric oxide during VSS analysis resulting in a false high mixed liquor VSS content.
- Iron salts and alum will react with alkalinity. If the influent alkalinity is not adequate to support the chemical reactions and nitrification, alkalinity addition (e.g. caustic soda) may be necessary.
- Iron salts have been shown to interfere with UV disinfection by enhancing sleeve fouling and UV absorbance. Nonetheless, many facilities have successfully combined the use of iron and UV disinfection by implementing appropriate operation and maintenance practices such as achieving low effluent TSS, tight control of chemical feed to minimize residual soluble iron concentration in the effluent, and more frequent cleaning of UV lamp sleeves.
- Chemically precipitated phosphorous has not been implicated with secondary phosphorus release during sludge processing operations. Conditions that are likely to solubilize phosphorus from chemical precipitates include low pH and negative redox (anaerobic) environment. Typically, the pH of the sludge is not low enough to trigger release and by maintaining aerobic conditions during sludge storage, low redox conditions can be avoided.
- Chemical solids recirculated with RAS have been found to remove soluble phosphorous through adsorption. Hence, plants terminating chemical feed may continue to observe some P removal until most or all of the chemically precipitated P is washed out of the system. This may take more than one SRT.
- Many facilities use simultaneous chemical precipitation without any detrimental effect on the biological process. However in one case, continuous overdosing of iron was found to inhibit both the biological and chemical processes. Cessation of chemical feed for a few days was reported to have produced a recovery. Overfeeding may be avoided by close monitoring and control of the chemical dose.
- When a chemical facility is provided to supplement EBPR, all effort should be made to optimize EBPR first with chemical addition initiated only on an as needed basis. Indiscriminate and continuous use of chemical can cause inefficient P release and uptake due to competition and/or inhibition. This can lead to chemical P removal becoming the primary removal mechanism with little or no EBPR occurring.
- The number and capacity of chemical metering pumps should be based on turndown requirements during initial years of operations, maximum peak hour demand, and redundancy.
- Chemical P removal can be accomplished by various chemicals. A WRRF considering chemical P removal should screen candidate chemicals by performing side-by-side jar tests and short listing the most promising chemicals for full-scale testing to confirm dose, evaluate multipoint chemical addition, and assess plant wide impacts.
- After optimizing chemical dose, solids capture in clarifiers and filters (if provided) should be maximized to ensure reliable phosphorus removal.
- In order to take advantage of lower costs and new development in the chemical industry, plant staff should explore the use of alternate chemicals periodically. Within practical limits, chemical facilities should be designed to provide the flexibility to switch chemicals.

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Conclusion

Chemical phosphorus removal involves several complex reactions influenced by factors such as chemical dose, soluble phosphorus concentration, pH, temperature, and the extent of competing reactions involving alkalinity, sulfides, and organic matter. When iron and aluminum salts are used, the predominant mechanism is co-precipitation, which occurs simultaneously with metal oxide formation. Entrapment is believed to me a minor mechanism that captures colloidal P (**Table 4**).

Table 4: Mechanisms Involved in Chemical Phosphorus Removal

Target Effluent TP	Phosphorus Removal Mechanisms	Characteristics
1.0 mg/L	• Predominantly stoichiometric • Reaction with alkalinity & co-precipitation play a minor role.	• Relatively constant M:P* ratio • Efficient chemical use - lower chemical requirement for a given P removed. • Limited competing reactions • Lower sludge production & alkalinity consumption • Some buildup of inert solids in the MLSS.
0.5 mg/L	• Increased reaction with alkalinity & co-precipitation. • Limited stoichiometric reaction.	• Increasing M:P ratio • Significant competing reactions • Significant sludge production • Significant alkalinity consumption • Significant buildup of inert solids in the MLSS

* M:P – Metal salt-to-P molar ratio

Chemical addition can be the sole phosphorus removal strategy or it can supplement EBPR. In either case, careful control of the chemical dose reduces costs and minimizes impact on the biological system. While it is possible to estimate chemical dose requirements based on an understanding of the chemical interactions and data from other municipal wastewater treatment plants, jar tests provide valuable site-specific information, which could potentially eliminate large design safety factors to account for unknown conditions. In addition, such tests would allow different chemicals to be evaluated.

Finally, as plant staff will concur, operating conditions at a WRRF are constantly in a state of flux. Steady state is a myth and is never encountered in practice for any appreciable period of time. Providing the right system is a collaborative effort involving designers who bring innovative concepts/ideas to the table, and operators who see a value in such ideas in terms of improved operational efficiency and consistent permit compliance. Engineers must take care in designing chemical feed systems based on a thorough knowledge of site-specific conditions so that plant staff can operate the system to meet permit compliance while avoiding over or under feeding.

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INNOVATIVE STORMWATER SOLUTIONS FOR OHIO

by Rebecca Jacobson, Will Brown, Keely Davidson-Bennett, Ryan Winston & Heather Elmer

Project Overview

The Innovative Stormwater Solutions for Ohio project is developing science-based tools to promote the implementation of Low-Impact Development (LID) system practices to reduce the impacts of stormwater runoff on Ohio's coastal communities and Lake Erie.

The project team is a partnership between the following entities:

- Chagrin River Watershed Partners, Inc.
- Old Woman Creek National Estuarine Research Reserve (Old Woman Creek NERR)
- Ohio Dept. of Natural Resources Division of Soil and Water Resources
- Erie Soil and Water Conservation District
- Consensus Building Institute
- North Carolina State University (NCSU)

The project team and stormwater professionals are collaborating to produce locally verified performance information on innovative stormwater control measures (SCMs). Results from the project will be used to develop credits, incentives, and design guidance for green infrastructure. This NERRS Science Collaborative grant-funded project utilizes a collaborative learning approach in which stormwater engineers, regulators, utility managers, and watershed organizations provide iterative guidance and feedback to the project team on the design, construction, and monitoring of the project's six stormwater LID system sites across northern Ohio. The six project sites are located in Perkins Township, Willoughby Hills, Orange Village, Kirtland (at Holden Arboretum), Pepper Pike (at Ursuline College), and Huron (at Old Woman Creek NERR). Each project site is generating design, construction, and performance information on stormwater LID SCMs including: pervious concrete, permeable pavers, bioretention cells, and rainwater harvesting.

Project sites were selected based on monitoring feasibility, size and scale of the watershed, soil type (specifically poorly draining soils), and educational value. The project team instrumented these sites to measure runoff volume reduction, peak flow mitigation, and other key hydrologic parameters of these innovative green infrastructure practices. We will input the hydrologic data into computer models to determine how these SCMs will perform under climate change influences and future rainfall patterns. The project team is also collecting water quality samples from a bioretention cell and two permeable pavement applications to measure the efficiency of heavy metal, nutrient, and sediment removal efficiency of these practices. The project sites highlighted below are located in the Pipe Creek (Erie County) and Chagrin River watersheds.

Project Site Highlight: Perkins Township

Two pervious concrete parking areas constructed in the fall of 2012 at the Perkins Township Service Complex site are being monitored for hydrologic performance. As part of the redevelopment design plans for the new Perkins Township administrative offices, the Perkins Township Trustees incorporated two pervious concrete parking areas with different designs. One bay of pervious concrete has an underdrain elevated 6 inches above the soil interface to create a sump (i.e. an internal water storage [IWS] configuration), thereby promoting infiltration. The underdrain in the second bay was placed at the soil interface in the other bay. Stormwater engineers from NCSU developed and installed weir boxes for outflow monitoring. The hydrologic monitoring preliminary results are promising.

Preliminary monitoring results include:

- Over the first nine months of monitoring, runoff from the Perkins IWS bay was 51% of the runoff that would be expected from a typical asphalt or concrete parking lot.
- Peak flow rates varied between 0 and 0.5 ft^3/s, with conjugate flow rates of 0-1.9 ft^3/s expected for a similar-sized impermeable parking lot. These outflow rates in the permeable pavement are limited by the flow rate of the underdrain.
- The runoff threshold for this site was 0.3 inches. This means that on average outflow did not occur from the underdrain until rainfall exceeded 0.3 inches.
- A volume reduction of 20% occurred through evaporation and exfiltration of stormwater into underlying soils, despite the site's very low infiltration rates (0.01-0.05 in/hr.)

Pervious concrete parking area at Perkins Township Service Complex

Project Site Highlight: Holden Arboretum

In the fall of 2013, the project team and Holden Arboretum staff constructed two bioretention cells to treat stormwater runoff from the Holden Arboretum Visitor Center parking lot. One bioretention cell was planted with woody plant species and the other with herbaceous species and both cells incorporate 21 inch IWS zones. The total cross section, including 3 ft. of media and 12 inches of drainage rock, was about 5 ft. in depth. The project team is monitoring both bioretention cells to determine if using different vegetation communities will impact hydrologic performance.

Bioretention cell at Holden Arboretum Visitor Center

Preliminary monitoring results indicate:

- No overflow occurred during the nineteen storm events recorded for either bioretention cell.
- Outflow from both bioretention cells has been approximately 40% of the modeled inflow.
- Thus far, the two cells differ in outflow volume by 8%, probably within the monitoring equipment's margin of error. The next year of monitoring will allow us to determine if the deeper roots of the woody cells provide greater hydrologic mitigation.

Project Site Highlight: Willoughby Hills

In the fall of 2013, two bays of permeable interlocking concrete pavers (PICP) were constructed at the Willoughby Hills Community Center and Public Library parking lot. One permeable paver bay is 3,978 ft^2 and the second bay is 482 ft^2 in surface area. The smaller bay of permeable pavers has a higher hydraulic loading ratio (ratio of impermeable drainage area to SCM surface area) draining to it (6.5:1) than the larger bay does (2:1). Additionally, the smaller bay is used for snow storage in the winter, whereas snow is plowed over the back-of-curb of the larger bay. An Ohio EPA SWIF grant funded this permeable pavement installation that treats the stormwater runoff from an existing asphalt parking lot. The project team is monitoring stormwater quality and water quantity at this site.

Permeable paver bay at Willoughby Hills Community Center and Public Library

Preliminary monitoring results indicate:

- Small permeable paver bay
  - Eight outflow producing events were recorded during the initial two month monitoring period.
  - Outflow during each period of snowmelt due to snow pile on the PICP.
- Large permeable paver bay
  - Only three outflow producing events were recorded during the first two months of monitoring.
  - As expected, outflow volumes were higher for the larger bay due to the larger drainage area.
  - Outflow was only related to rainfall events. This was perhaps due to the fact that the majority of the snow was plowed off of the PICP lot.

More details on the design, construction, and performance of these and other LID systems have been reported in case studies available on the project website: *http://crwp.org/index.php/projects/research-projects/nerrs-science-collaborative*

Tools, Trainings & Guidance

Adopting and utilizing a collaborative learning approach allows the project team and participants to share a wide range of knowledge, concerns, and ideas for addressing complex stormwater challenges. Comments, feedback, and local knowledge is welcomed and incorporated into the project's diverse components.

The results and information generated from this project will be used to:

- Promote the use of LID for stormwater management
- Create credits & incentives for innovative stormwater control measure (SCM) usage
- Develop performance expectations
- Guide SCM design
- Generate model local codes for stormwater management
- Develop trainings for stormwater professionals
- Establish case studies of LID implementation and performance in Northern Ohio

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Lessons Learned for LID Design and Construction

OVERALL	PRE-DESIGN	DESIGN	PRE-CONSTRUCTION	CONSTRUCTION
• Proactive communication between all parties throughout all phases • Construction oversight with knowledgeable staff is critical • Construction and design are equally important for performance	• Visit sites before designing plans • While visiting site, locate and ID existing infrastructure and drainage, conduct soil investigation tests if possible • Solicit stakeholder input & involvement • Clarify goals before starting the design phase	• Aesthetic value is important • Clearly specify appropriate construction materials • Design systems with level subgrade to promote exfiltration • Include underdrain cleanouts to reduce sediment build up & facilitate maintenance • Consult landscape & horticulture experts on landscape design and plant selection for bioretention	• Educate site owners, designers, inspectors, contractors, and others about LID purpose & function • Use specific language when advertising projects • Provide supporting information for potential bidders • Hire certified and/or experienced contractors & installers • Review construction plans with designers, owners, contractors, and inspectors	• Permeable paver costs can be significantly reduced by mechanical installation, and increased if curved paver designs are used • Late season permeable paver installation is possible • Wet subgrade and cover newly installed pervious concrete to ensure proper curing and reduce raveling • Proactively communicate with material vendors to avoid errors • If bioretention cells clog during construction, plan for filter bed media settling & surface layer replacement

Current Happenings

In April of 2014, a bioretention cell was constructed at the Ursuline College project site. The project team will monitor water quality and quantity improvements from this bioretention cell. In summer 2014, a permeable paver and rainwater harvesting system will be installed and similarly monitored at the Old Woman Creek NERR.

For more information, please contact:

Chagrin River Watershed Partners, Inc.
440. 975.3870

Old Woman Creek National Estuarine Research Reserve
419.433.4601

Collaborative Learning Group Meeting September 2013

HEXAVALENT CHROMIUM: BEYOND ERIN BROCKOVICH

by Cheryl Soltis-Muth, Supervising Chemist, Northeast Ohio Regional Sewer District

Introduction

Part of my job function as a Supervising Chemist at the Northeast Ohio Regional Sewer District (NEORSD) is to educate customers, visitors, students, and other wastewater professionals about the valuable work performed by NEORSD. My educational activities include various outreach activities, presenting at technical conferences and, of course, tours of the NEORSD laboratory.

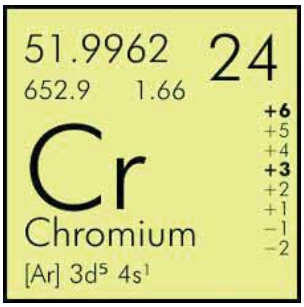
One of the most interesting areas of the laboratory is the instrumentation section. This section of the laboratory houses various automated chemistry analyzers, and other instrumentation, which can analyze multiple chemistries and/or elements simultaneously. These instruments are workhorses, running thousands of samples a year for phosphorus, ammonia, cyanide, and many other important environmental parameters including metals such as iron, zinc, copper, and hexavalent chromium.

You are probably scratching your head and wondering what the heck is hexavalent chromium and how is it different from chrome. This is a very common response; everyone is familiar with chrome bumpers and wheels on automobiles. When I give laboratory tours and mention hexavalent chromium, I get a lot of blank stares. To make this chemical more real to people, I ask, "Have you seen the movie *Erin Brockovich* with Julia Roberts?" Most people respond, "Oh yeah, good movie. She won an Academy Award for that one, right?" I answer"Yes," then add, "The chemical that was making everyone sick in the movie was hexavalent chromium." "Oh," they chorus back to me, and suddenly, hexavalent chromium becomes real for them.

I volunteered to give a talk at the OWEA Plant Operations and Laboratory Analysis Specialty Workshop in May on hexavalent chromium. As I started my research, one thing that became apparent was that on the internet, the name Erin Brockovich is synonymous with hexavalent chromium. As I worked my way through the articles, images, and websites, these are the things I learned about this controversial chemical.

What is Hexavalent Chromium?

Chromium is an element with the symbol Cr and atomic number 24. It is the first element in Group 6 of the periodic table. It is a steely-gray, lustrous, hard, and brittle metal that takes on a high polish, resists tarnishing, and has a high melting point. The name is derived from the Greek word meaning 'color' because of its many colored compounds. Chromium exhibits a wide range of possible oxidation states, +3 being most stable energetically. The +3 and +6 states are most commonly observed in compounds. It follows that in the environment, water treatment processes, and water distribution systems, chromium occurs mostly as trivalent chromium (a.k.a. chromium-3, Cr(III), Cr+3) and hexavalent chromium (a.k.a. chromium-6, Cr(VI), Cr+6). The EPA considers chromium a persistent, bioaccumulative and toxic (PBT) chemical. PBTs are chemicals that are not easily metabolized, do not breakdown in the environment, accumulate in ecological food chain through consumption, and may be hazardous to human health or the environment.



Chromium is a metal with many possible oxidation states.

Chromium is a steely-gray, lustrous, hard, and brittle metal that takes on a high polish, resists tarnishing, and has a high melting point.

The many colored solutions made with chromium compounds.

Trivalent chromium is not considered an essential dietary human nutrient; it is considered a trace micro nutrient for humans and animals. Research has been performed showing the benefits of chromium in the diet, mostly focusing on chromium's effect on diabetes. Chromium can improve the effectiveness of insulin binding and overall insulin sensitivity. Additionally, chromium is concentrated in the cell nuclei and protects RNA from heat denaturation. Chromium has some cellular function and is involved in the structure and expression of genetic information. There is a need for chromium at the cellular level however it is not a vital dietary component. Additionally trivalent chromium is not considered toxic to humans in small doses.

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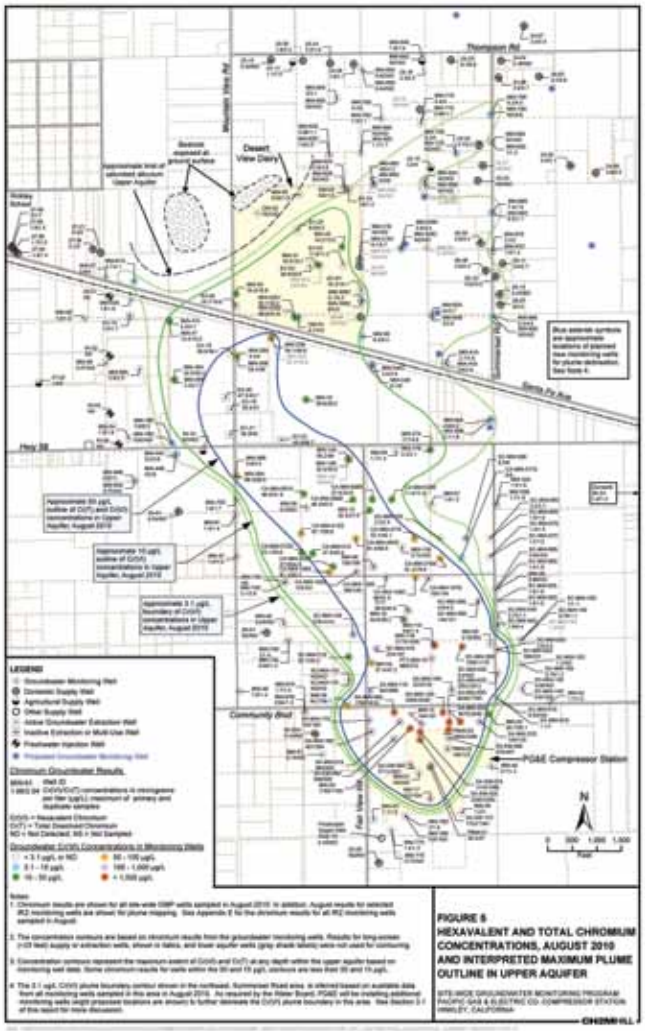
Erin Brockovich (l) and Julia Roberts (r), in "Erin Brockovich" (2000)

Hexavalent chromium is used in industrial settings to make stainless steel, textile dyes, paints, inks, and plastics. It is used in wood preservatives and conversion coatings, as well as in tanneries that produce a variety of leather goods. It can also be formed when performing "hot work" such as welding stainless steel or melting chromium metal. Chromates are also added as anticorrosive agents to paints, primers, and other surface coatings. You might recall that in the bio-flick *Erin Brockovich* (2000), this last cited application is where the Pacific Gas & Electric Company (PG&E), the antagonist of the movie, got into trouble with Cr(VI), and, eventually, with Erin Brockovich herself. PG&E owned a natural gas compressor station located in the town of Hinkley in San Bernardino County, California. Between 1952 and 1966, PG&E used Cr(VI) to fight corrosion in cooling towers there. The wastewater from the cooling towers was discharged to unlined ponds at the site. Some of the wastewater percolated down to the groundwater, resulting in Cr(VI) pollution. An area of groundwater at least eight miles long and two miles wide is still affected by this Cr(VI) incursion to this day. Figure 5 shows a map of the chromium plume from 2010. The action of the movie takes place in the early 1990's. Erin Brockovich, and the law firm she worked for, brought this pollution to the public's attention in 1993 and in 1996, one of the largest class action settlements was paid by PG&E to the residents of Hinkley in the amount of $333 million.



Map of the chromium plume in Hinkley, California. The map from August 2010, shows concentrations of hexavalent chromium in some of the monitoring wells still exceeds 1000 ug/L. (CH2MHILL)

Environmental and Health Concerns

Hexavalent chromium has long been demonstrated to be a human carcinogen when inhaled. Decades of epidemiological studies have shown that occupational exposure of workers to airborne Cr(VI) in various industries including electroplating, chrome pigment, mining, leather tanning, and chrome alloy production, posed increased risks of lung cancer. (Agency for Toxic Substances and Disease Registry (ATSDR) *Toxicological Profile for Chromium* U.S. Public Health Service, U.S. Department of Health and Human Services, Atlanta, GA 1998)

The health effects of Cr(VI) through ingestion, the main exposure route for drinking water, are currently under review at the federal level by the USEPA. From the USEPA website, the Agency noted in March 2010 that it had initiated a reassessment of the health risks associated with chromium exposure and that the Agency did not believe it was appropriate to revise the national primary drinking water regulation while that effort was in process. In September 2010, the USEPA issued the draft paper "Toxicological Review of Hexavalent Chromium" with the stipulation that, "This document is a reassessment of the non-cancer and cancer health effects associated with the oral route of exposure only." As of June 2014, this document and all comments received have been archived by the USEPA.

While the USEPA appears to have tabled this study and no further information can be found about a federal drinking water Cr(VI) maximum contaminant level (MCL), on April 15, 2014, in California, the state's Department of Public Health (CDPH) submitted to the Office of Administrative Law its final proposed regulation establishing the first ever drinking water MCL for Cr(VI) in the country. According to Dr. Ron Chapman, CDPH director and state health officer, "The drinking water standard for Cr(VI) of 10 parts per billion will protect public health while taking into consideration economic and technical feasibility as required by law." The regulation was approved as expected on May 28, 2014, and was implemented in California as a new drinking water standard on July 1, 2014.

Why has the USEPA failed to act? According to their website, it is still unclear to them what the health effects of Cr(VI) in drinking water are. Based on the research, there are many proposed modes of action (MOA) as to why Cr(VI) may be toxic to humans via ingestion, but definitive data and consensus have not been achieved. Two MOAs are simplified and illustrated in Figures 6 and 7. In Figure 6, it is proposed that our digestive tract, with its high acidity, can actually reduce low concentrations of Cr(VI) to trivalent chromium Cr(III). Because of this, our GI tract may serve as an effective barrier to Cr(VI) absorption. The question, however, is how low is low? Also, is the capacity to neutralize Cr(VI) based on weight, gender, age, over-all health? These are questions that must be answered. In Figure 7, the MOA describes the possible biochemistry when the concentration of Cr(VI) is high enough to exceed the GI tract capacity. Excess Cr(VI) has the capacity to enter the cell via active sulfate transporters, and reacts with proteins components and nucleic acids being reduced in the cell to Cr(III). The carcinogenic properties of Cr(VI) are due to the reactions that occur with proteins and nucleic acids within the cell causing mutations.

In our industrialized country, we are exposed to chromium daily. In the atmosphere, chromium is present in particulate form, usually

as particles approximately 1-µm in diameter. It enters ambient air from anthropogenic point sources such as smelters, incinerators, landfilled waste, or road dust. Chromium levels in the air in the U.S. are typically < 0.01 µg/m^3 in rural areas and between of 0.01 to 0.03 µg/m^3 in urban areas (Agency for Toxic Substances and Disease Registry (ASTDR), 2000). In U.S. soil, chromium occurs naturally as it is present in crustal rock. However, chromium is present mainly as the insoluble oxide, Cr_2O_3 and is generally not mobile in soil (ATSDR, 2000). Finally, chromium enters environmental waters from anthropogenic sources including leaching of contaminated soil. Rivers in the U.S. have been found to have from < 1 to 30 µg/L of chromium and lakes usually have < 5 µg/L of chromium (ATSDR, 2000). While chromium indeed occurs naturally, when high levels are present, they can usually be attributed to sources of pollution.

Testing for Hexavalent Chromium

The Northeast Ohio Regional Sewer District has a monthly Cr(VI) monitoring requirement in their NPDES permits at all three of its wastewater treatment plants. Also, our pretreatment program tracks potential dischargers in our service area to ensure they don't send large quantities of Cr(VI) into our system. As stated earlier the EPA considers Cr(VI) a persistent, bioaccumulative, and toxic (PBT) chemical, which is one reason why it shows up in NPDES permits. Monitoring for this chemical protects the health of the plant and, in turn, public health. Based on data from 2013, NEORSD raw influent Cr(VI) concentration averaged 6.98 ppb, with a maximum of 36.92 ppb and a minimum of < 0.60 ppb, while treated effluent concentration averaged 3.72 ppb, with a maximum of 9.13 ppb and a minimum of < 0.60 ppb, for an average treatment removal of 47%.

There are several test methods for Cr(VI) listed in 40 CFR Part 136. For the most recent version of this important resource, the e-CFR website is updated frequently and offers the current version: *http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr136_main_02.tpl*. In Table IB – *List of Approved Inorganic Test Procedures*, for analyte 18, Chromium VI dissolved, mg/L, the procedure specified is 0.45-µm filtration followed by any of the following (NOTE: Only EPA & Standard Methods sources listed):

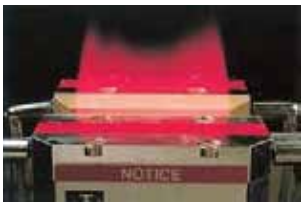
1) AA Chelation-Extraction and Air-Acetylene Flame – 3111 C. (1999) from Standard Methods for the Examination of Water and Wastewater

2) Ion Chromatography – 218.6, Rev. 3.3 (1994) from Methods for the Determination of Metals in Environmental Samples, Supplement I, EPA/600/R-94/111 or 3500 Cr C. (2009) from Standard Methods for the Examination of Water and Wastewater

3) Colorimetric (Diphenyl-carbazide) – 3500 Cr B. (2009) from Standard Methods for the Examination of Water and Wastewater

From 40 CFR Part 136 *Table II Required Containers, Preservation Techniques, and Holding Times*, polyethylene, fluoropolymer, or glass containers may be used for sample collection. The required preservation technique is to cool to ≤ 6 °C. Holding time can be from 24 hours (if the pH is not adjusted) up to 28 days (if the pH of the sample is adjusted to between 9.3-9.7 with an ammonium sulfate buffer solution).

The chelation-extraction flame method (3111 Cr C. from Standard Methods) consists of chelation with ammonium pyrrolidine dithiocarbamate (APDC) and extraction into methyl isobutyl ketone (MIBK), followed by aspiration into an air-acetylene flame. This method allows for detection in the high ppb range.



Typical chromium air-acetylene flame resulting after chelation and extraction using 3111 Cr C from Standard Methods.

The Ion Chromatography methods are slightly different from each other. In 3500 Cr C. from Standard Methods, the sample is filtered, pH adjusted to 9.0 to 9.5 (which preserves the hexavalent oxidation state) and is injected into the ammonium sulfate and ammonium hydroxide eluent stream. Cr(III) is then separated from Cr(VI) by the column. After separation, Cr(VI) reacts with an azide dye to produce a chromogen that is measured at 530 or 540 nm. The cited detection limit for this method is 0.5 ppb. In EPA 218.6 – Determination of Cr(VI) as Chromate Ion, samples are preserved to a pH of > 8. CrO_4^{2-} is separated on an anion exchange column and is derivatized with 1,5-diphenylcarbazide in a post-column reactor then detected spectrophotometrically at a wavelength of 530 nm. The concentration of Cr(VI) as CrO_4^{2-} is calculated using the integrated peak area and the external standard technique. This method has a cited reporting limit of 0.02 ppb with an even lower detection limit.

The colorimetric (diphenylcarbazide) method3500 Cr B. from Standard Methods, is the method run by the NEORSD lab. This method is very specific as it measures only Cr(VI). A red-violet colored complex of unknown composition is produced and colorimetrically determined at 540 nm. The curve ranges from 5 to 500 ppb, with achievable method detection limit ranges from 0.3-0.7 ppb. Since this is a colorimetric test, background correction is possible. This is achieved by measuring the sample in the absence of the color reagent. Any resulting concentration is then attributed to the sample color and subtracted from the sample's concentration that is determined with the color reagent.

Beyond Erin Brockovich

Monitoring Cr(VI), remediating polluted sites, educating the public, holding industries accountable, working with regulating authorities, are all important to the future health of our environment. Depending on the outcome of the health effects review, USEPA may decide to promulgate an MCL specifically for Cr(VI), and the level at which the MCL is set will determine the magnitude of its effect. In California, where an MCL is certain, we can watch how it impacts industry, business, people, and the environment. Further research and collaboration is needed as Cr(VI)'s effects via ingestion need to be determined and agreed upon. New methods for lower detection are being promulgated and investigated.

California is not the only state where Cr(VI) has affected ground water or threatened vital bodies of water. In Ohio there are two well known superfund sites which have substantial levels of CR(IV) contamination. In Lake County, Ohio, the City of Painesville has a 500 acre site that was contaminated with ¾ of a million tons of chromate waste materials. This site is near Lake Erie and the Grand River and the EPA is still monitoring the remediation progress. The second site is a 30 acre landfill site in the Uniontown area of Lake

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Township. This site accepted more than a million tons of coal ash, which is a source of Cr(IV). There is ground water contamination in the area. However the residents living near the landfill were extended public drinking water in 1988, which minimized the threat of exposure. So you could say that in some ways, we've come a long way since the PG&E case in the 1990s, in other ways, we're still treading water and the potential for exposure to CR(VI) still exists.

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ON THE HUNT FOR I/I WITH MICROMONITORS

by John Barton, PE, Phd, Senior Associate, Stantec, and Joseph Kamalesh, Leader Collection System Flow Monitoring Group, Stantec

How many infiltration/inflow investigations (I/I) end up like the search for the Holy Grail? Exhaustive and sometimes intrusive investigations over several months all too often yield little in the way of actionable intelligence. Now imagine being able to pinpoint three quarters of I/I sources in just a few short weeks. And even better, being able to trace your I/I to just a tiny portion of a regional drainage basin.

The capital costs of rehabilitating healthy pipe segments are avoided, the expensive and intrusive dye and smoke testing are greatly minimized and best of all, your problem is solved quickly and efficiently. What began as a pilot program and a leap of faith just a few years ago, micromonitoring is now paying dividends for public works officials in dozens of communities across the country.

In conventional flow monitoring programs, the cost to monitor a location, typically a drainage basin, is approximately $6,000-$10,000 for a six-month wet season. This provides flow data under a variety of storm conditions for a single monitoring point in the sewer system. It helps to identify large regional basins of 100 or more homes with I/I for further sewer surveys, but does not zero in on the actual I/I sources. Hence, it leaves a large footprint to investigate which makes it expansive and expensive.

Stantec has designed an innovative program to isolate the I/I sources using a device called a micromonitor. The micromonitor is a custom-made fiberglass weir insert, attached behind a standard area-velocity probe on a stainless steel mounting band. Due to the redesign, they can be placed in pipe segments with very low flow where conventional flow monitors typically do not perform well. In this way I/I sources can be traced to just a small number of houses. This allows operators, after just a single storm, to know where to look for, and eliminate, the I/I sources.

Micromonitors are best deployed in sub-basins after conventional flow monitoring has indicated high wet weather flow contributions. These devices further segment the basin so that the I/I source can be isolated and identified more rapidly and with greater efficiency.

Installation without need for confined space entry

Micromonitor with area velocity probe

Thus, the micromonitoring approach can speed identification of discrete problem areas at a lower cost while limiting the need for confined space entry and minimizing intrusive investigation techniques such as smoke and dye testing. This approach only needs one storm event to determine if a pipe has I/I sources or not, thus allowing for focused Sanitary Sewer Evaluation Survey (SSES) investigations and targeted remediation.

Over the past two years, Stantec has uncovered several scenarios in which a micromonitoring has been particularly effective:

Finding I/I in Small Section Pipes

Kentucky's Sanitation District No. 1 (SD1) manages the second largest water quality improvement program in Kentucky. Among the many issues faced by SD1—which covers 220 square miles and 30 municipalities—was the prospect of millions of dollars of investment in manhole, pipeline, and lateral rehabilitation. One particularly vexing challenge was the cost, time, and intrusiveness associated with identifying I/I into the sanitary sewers of the wastewater collection system. I/I causes overflows from the sanitary sewers of contaminated water during rain events and excessive hydraulic loads at the wastewater treatment facilities.

In the fall of 2011, SD1 undertook a micromonitoring program developed by Stantec as a new approach to locate the I/I sources. The engineering team designed a pilot test in one watershed basin employing its recently developed micromonitoring devices.

During the pilot program, micromonitoring data was collected in just three weeks, as opposed to 6-8 months for traditional flow monitoring programs. It revealed that 50% of the area studied had very low I/I and could potentially be eliminated from further study. By eliminating these reaches from future rehabilitation, SD1 saved more than $250,000 in scheduled rehabilitation work. This represents more than a 5:1 payback on the $45,000 cost of the micromonitoring. As a result of this pilot study, SD1 proceeded with micromonitoring on all priority I/I basins in their system.

The success in each of these basins has confirmed this as a fundamental and permanent change to SD1's approach to I/I investigations. Rich McGillis, Director of Collection Systems for SD1 explained that had he taken a traditional route and launched an SSES investigation, the budgetary and community impact would have been considerable.

SSES work which requires internal and external testing of all plumbing connections and testing for foundation or window well drains can cost in the range of $800 to $1200 per house. Before micromonitoring, SD1's initial plan had been to perform investigations in every single house-hold in an I/I basin; some 150-500 homes in each basin. Even before actual ground work commenced considerable time and money must be spent for public meetings, letters to home owners, coordination with home owners, etc. SD1's initial cost estimate for the comprehensive rehab in the five priority areas was totaling more than $14 million.

A case in point: data from one SD1 basin showed high I/I to a regional flow monitor. But the use of just six micromonitors, moved during several rain events, revealed that almost all of the I/I was coming from two separate sections of sewer on just one street. District workers then dye and smoke tested a small area and discovered a group of homes with downspouts and driveway drains that were directly tied to the sanitary sewer.

A hydraulic model often relies on an assumption that I/I in a regional meter is sourced by a 50/50 private-public split and is spread evenly over the entire basin. But in this case, almost all of the I/I was coming from a very small number of private source connections.

Finding I/I at the Top of the Basin

On a second basin, a regional meter collected flow from two drainage areas. During a storm event in October 2011, 2,600 gpm peak of water flowed through the 15-inch pipe, a finding consistent during several storms.

The entire area was slated for rehabilitation. But first, SD1 took a micromonitor detour. Twenty-three micromonitors were placed in upstream sections of pipe to narrow the problem area and isolate the sources. The result: almost half of the peak flow was coming from just one upstream section. In fact, three of the micromonitors picked up 2,000 gpm coming from one extreme upper end of the basin. In other words, about half of the I/I was emanating from just 5% of the basin. Further investigation again revealed connected downspouts to be the source of the problem.

This exercise further underscores the shortcomings of building hydraulic models by distributing excess flow from a regional meter evenly across an entire basin. It can and does lead to rehabilitation across a much larger region than necessary, or the decision to add capacity to a treatment plan, when other far less costly solutions are available.

Finding I/I from Sources not Directly Connected to Pipes

In Lucas County, Ohio septic systems from a group of spread out, small subdivisions were brought into the County collection system by a series of seven interconnected pump stations. The area included approximately 200 homes over 675 acres. Each of the tributary areas to the pump stations were small, consisting of several independent sections with just a few homes. Field crews had searched for I/I sources with traditional dye and smoke testing, with no indication of the origins. The County heard about micromonitoring and saw this as an opportunity to determine which of the isolated areas were the source of the I/I. The micromonitoring was conducted in two phases in the spring of 2013 and involved 14 sites or micro-basins. Results demonstrated that the majority of the I/I occurred after the rainfall from a few of the microbasins along Lake Erie. The next step was to undertake a CCTV investigation, but with a twist.

Normally, CCTV is completed during dry weather to best search for, and code, cracks and fractures in the pipes when water levels are low. In this case, Stantec recommended CCTV during rain events to better determine where clear water was rushing into the system through the service laterals or pipe

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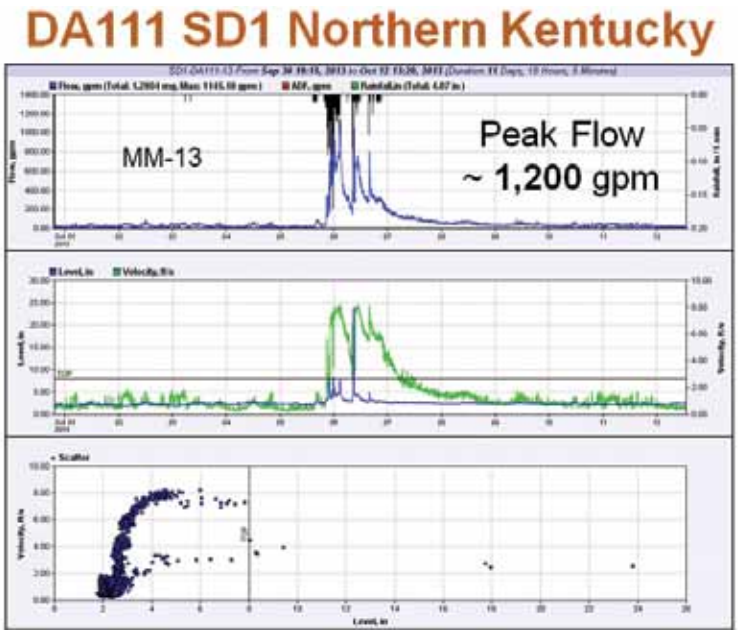
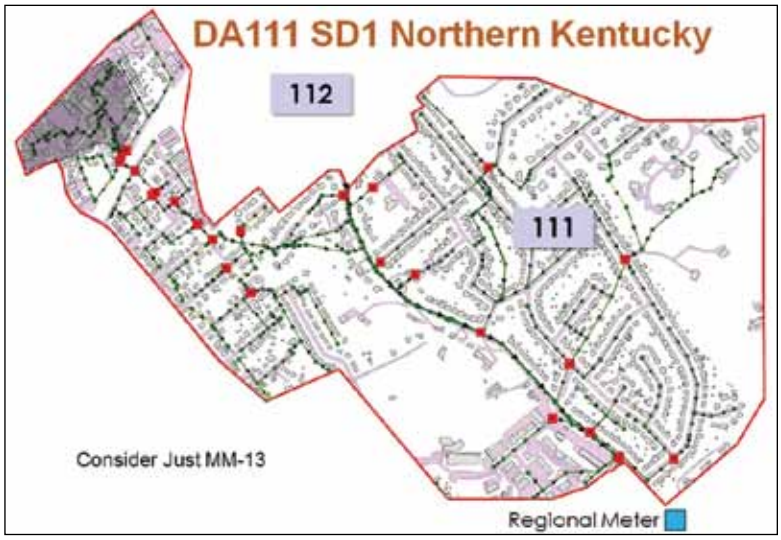
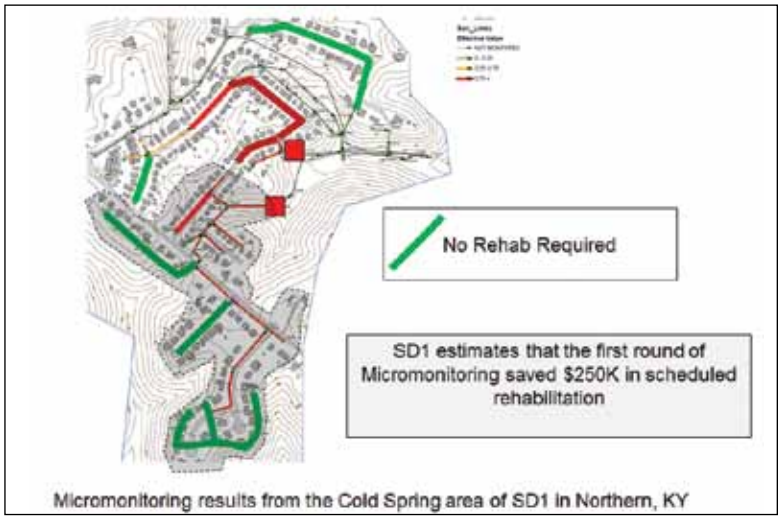


Graph indicates that approximately 2,000 gpm of the 2,600 gpm peak water flow is coming from just a few sources in the extreme upper reach of the basin.



23 micromonitors in this area revealed that half of the I/I was emanating from just 5% of the basin.



During the pilot program in Kentucky, micromonitoring revealed that 50% of the area studied had very low I/I and could potentially be eliminated from further study. By eliminating these reaches from future rehabilitation, SD1 saved more $250,000 in scheduled rehabilitation work

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defects. This was a bit of a stretch for a CCTV crew which is normally only called out in dry weather. The CCTV identified several service laterals with excessive amounts of clear water pouring into the collection system. As the sources were not near the mainline, normal dry-weather CCTV would only have coded the service connection as a normal active tap. As a result of this process, only a few individual properties will be investigated in detail. This two-step process micromonitoring and wet-weather CCTV is very powerful combination that is expected to increase in popularity.

Narrowing the Search

As with the example above, micromonitoring is best used to narrow a search and keep intrusive dye and smoke testing on private properties to a minimum. In Milford Center, a small community west of Columbus, micromonitoring revealed that 73% of the I/I was coming from just one street. Smoke and dye testing was completed and helped to rule out several sources, but did not reveal the main source. For example, one five unit apartment building did have gutter downspouts feeding into the ground, but there was no storm sewer in this location. Dye testing, however, did not reveal a direct connection to the sanitary sewer. Further investigation is needed. In this case, however, this one street of Milford Center identified by the micromonitoring has a very small group of buildings to study, saving time and costs.

Micromonitoring is therefore deployed to zero in on a problem areas while greatly reducing the need to implement more traditional SSES services. The micromonitor has shown its use can drive down costs and the number of private property investigations by more efficiently locating potential sources of leaks and other system deficiencies.

This new approach to a public works imperative means municipalities can spend less on investigation, leaving more of strained budgets to correct water system deficiencies or increase capacity.

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CITY OF TROY WASTEWATER TREATMENT PLANT

by Mitch Beckner, Assistant Superintendent, Troy Wastewater Treatment Plant

The Troy Wastewater Treatment Plant (WWTP) is located at 1400 Dye Mill Road on a 40 acre site at the southeast corner of the city. The plant is designed to treat an average flow of 7.0 MGD of domestic and industrial wastewater with provision for future expansion to 18 MGD. The plant's collection system provides service to over 22,000 people in a 3,730 acre area. Over 122 miles of sanitary sewer is used to transport wastewater to the plant. The wastewater from the northern half of the city is collected by the Miami River Interceptor and flows by gravity through a 42-inch re-enforced concrete pipe (RCP) to the treatment plant. Sewage from the central and southern parts of the city is carried to the plant by a 30-inch diameter RCP. Raw wastewater from the two gravity sewers meets at a manhole at the Northwest corner of the plant and begins its' progression through the treatment process. In addition to serving domestic users, the Troy WWTP provides treatment to several permitted industrial users. These industries contribute approximately 20 to 30% of the plant's total flow.

PLANT PERSONNEL

The City of Troy currently employs a staff of 8 people who are dedicated to keeping our surface and ground water safe and protecting one of the Earth's most valuable resources.

HISTORY OF THE PLANT

Troy first attempted sewage treatment in 1939. The first plant, which was known as the South Plant, was located on the current site. The 1939 facility was designed to provide an intermediate degree of wastewater treatment by the addition of chemicals and precipitation. The major components were a grit channel, comminutor, raw sewage pumps, chemical flocculator, settling tanks, sludge digester, and a vacuum filter. In addition to the treatment structures, the Administration Building served as the location for pumps and electrical equipment.

By the early 1950's, the City had grown to the point that the existing treatment facility was organically and hydraulically overloaded. Additional treatment capacity was necessary. As a result, the plant was modified in 1952. This upgrade provided secondary treatment for a flow of 2.8 MGD and consisted of a detritor unit, two circular primary clarifiers, two trickling filters, and the expansion and conversion of the existing primary tank to a secondary settling tank. A new anaerobic digester was also added at this time. The existing digester was converted to an unheated secondary digester for storage of the sludge from the primary anaerobic digester. The anaerobically treated sludge was transported to a sanitary landfill.

By the late 1950's, increased population in the Troy area was beginning to overload the South Plant. The City determined that it would be beneficial to construct a new treatment facility on the north side of the city to relieve the overloaded sewers leading to the south plant. The North Pollution Control Plant, located east of the city between the Old River Channel and State Route 504, was placed into operation in 1960. The newly constructed Miami River Interceptor diverted wastewater from the northwest and northeast sections of the city from the South Plant to this treatment facility. The North Plant was designed as an extended aeration process with a capacity of 0.70 MGD. The main features of this facility were an air degritter, comminutor, raw sewage pumps, aeration tanks, sedimentation tanks, and chlorination facilities. The plant outfall was extended to the Old River Channel.

The 1960 upgrade primarily served to bring the plant into compliance with the Clean Water Act. The basic upgrade during this period was the construction of chlorination facilities. The facilities were designed to allow a portion of the contact period to take place in the 20-inch outfall sewer that extended east, across Dye Mill Road, to the Miami River.

By 1971, due to population growth, increased industrial waste flows, and high rates of groundwater infiltration, the North Plant was operating at well above its design capacity. Wastewater flows to the South Plant were also approaching design capacity. Proposed extensions to the sanitary sewer system were impossible without expansion of the wastewater treatment facilities. A preliminary engineering report by Dalton-Dalton-Little-Newport recommended the construction of a new waste water pollution control center designed to treat the entire city's wastewater flow through the year 1990.

The existing South Plant site was chosen as the location of the new wastewater treatment plant and thirty-three acres of land were acquired adjacent to the original seven acres. Construction of the new treatment plant began in 1973 and was completed in 1975. Major new structures included the Raw Sewage Pump Station, Comminutor and Degritter Building, Primary Clarifiers, Aeration Tanks and Aeration Blower Building, Secondary Clarifiers, Chlorine Building, Sludge Processing Building and outfall sewer. Original South Plant structures retained included the Secondary Clarifiers, which were converted for use as the Chlorine Contact Tank; Primary Clarifiers which were converted to Sludge Thickeners; Primary and Secondary Digesters which were converted to Sludge Storage Tanks; and the Administration Building. The North Plant was renovated and a new 18-inch force main to the South Plant was constructed. All treatment units at the North Plant, except the comminutor and degritter, were abandoned.

In 1990, Jones & Henry Engineers, Inc. evaluated the Zimpro wet-air oxidization process that was installed in the 1975 plant expansion. Although the unit was found to be in good condition at the time, major unit failures, new EPA regulations, and the operating cost resulted in elimination of the Zimpro process in 1994. The City contracted Wheelabrator Clean Water Systems, Inc. (WCWS) to install and operate a lime-stabilization process, known as Bio-Fix® in the existing Sludge Handling Building. WCWS is responsible for dewatering the liquid sludge using a belt filter press, processing the sludge with lime, and applying the finished product to approved sites. In addition, Jones & Henry Engineers, Inc. evaluated the wastewater treatment facilities to provide recommendations to ensure the plant's ability to continue operations effectively and comply with the regulatory agency's requirements. As a result of this J&H study, an Influent Pumping Station, including grit and screening removal and flow equalization tanks, was constructed in 1995. The Influent Pump Station had two sets of screw pumps with the capability of adding two additional sets of pumps. The components of the station had an average daily design flow of 9.8 MGD with a peak daily demand of 18.0 MGD. Construction also began on a 42-inch trunk sewer extending from the North Plant to the new Influent Pump Station.

In February of 1997, the 42-inch trunk sewer was completed and placed on-line, eliminating the use of the North Plant as a

pumping station. In November of the same year, the North Plant pump building was demolished and back-filled. Also in 1997, modifications were made to the chlorine contact tank and ultra violet disinfection equipment was installed. This greatly reduced the need for hazardous chlorine gas and made it easier to meet increasingly strict EPA effluent quality requirements.

In 1999, an additional set of screw pumps was installed at the Pretreatment Building. This provided back-up and additional flexibility. A second Parkson mechanical screen was also added at this time. Also completed in 1999 was the installation of a sludge mixing pump and positive displacement blower designed to improve sludge quality and assist in odor control. Sludge process electrical improvements replaced the rapidly deteriorating existing system and laid the groundwork for additional modifications.

Plant personnel also upgraded the air diffusers in the plant's activated sludge aeration system in 1999. The existing intermediate bubble diffusers were replaced with fine bubble diffusers that provide more efficient treatment, lower utility costs, and the continuation of adequate treatment until further expansion and upgrades can occur.

In 2000 an upgrade and expansion included conversion of the plant's old oxidized sludge storage tank for use as a primary sludge storage tank. Also, two additional final clarifiers were constructed, the two existing clarifiers were refitted, and mixed liquor, return and waste sludge, clarifier effluent, primary sludge, and skimming lines were rerouted. This expansion increased effluent quality by increasing detention time in the final clarifiers, reduced tank maintenance requirements through the addition of automatic algae sweeps, and provided additional flexibility while performing required maintenance tasks. Modifications to the sludge storage tanks and piping should help increase the solids concentration of the raw sludge to 3%.

In 2001, the WWTP underwent odor control modifications of its Raw Sludge Storage Tank. The tank walls were raised to add additional storage capacity and a flat aluminum cover was installed. A carbon absorption air scrubber was installed that is capable of processing 3,000 sCFM of the air from between the new tank cover and the liquid surface of the storage tank.

In 2010, the City of Troy began to investigate the idea of increasing plant automation with the end goal of reducing overall Operations and Maintenance costs through the reduction of staff. The plant had been staffed 24 hours a day, 365 days a year. The upgrade would reduce staffing to one shift, seven days a week. Improvements are nearly complete and include the automation of various procedures that had been carried out by plant staff during second and third shifts, the addition of monitoring data inputs to the plants existing SCADA system, expansion of the SCADA systems alarming capabilities and the addition of a staff notification system.

CURRENT CONFIGURATION

The most recent upgrade occurred in 2005 with the construction of two additional primary clarifiers and two additional aeration tanks. This expansion allowed the plant to biologically treat flows up to 18 MGD having suspended solids and 5-day BOD concentrations of 200 mg/L. Hydraulically; the Troy WWTP will be able to handle flows of up to 30 MGD.

DESIGN DATA

Service Population:	22,000
Number of employees:	8
Design Flow:	7.0 MGD
Average daily flow:	5.7 MGD
Peak flow:	18.0 MGD
Annual operating cost:	$1.75 Million/year or $841 per million gallons treated.

The plant's discharge limits are determined by the Ohio Environmental Protection Agency in accordance with the Federal Water Pollution Control Acts. Limitations on flow, pH, dissolved oxygen, ammonia, solids loadings and other parameters are set by the plant's National Pollutant Discharge Elimination System Permit and monitored closely by laboratory personnel. The effluent limitations are summarized below:

Final Effluent Limitations

SS: 30-day mean of 27 mg/L and a 7-day mean of 40 mg/L

CBOD: 30-day of mean 14 mg/L and a 7-day mean of 21 mg/L (Mar – Nov)
30-day mean – 23 mg/L and a 7-day mean of 34 mg/L (Dec - Feb)

Ammonia: 30-day mean of 2.7 mg/L and a 7-day mean of 4.0 mg/L (June –Sept)
30-day mean of 7.8 mg/L and 7-day mean of 12.0 mg/L (Oct – Nov) (Mar – May)
30-day mean of 13.0 mg/L and a 7-day mean of 20.0 mg/L (Dec – Feb)

Fecal Col.: 30-day mean of 1000/100 mL and 7-day mean of 2000/100 mL

DO: 5.0 mg/L minimum

pH: Between 6.5 s.u. and 9.0 s.u.

O&G: Not to exceed 10 mg/L at any time

Silver: 30-day mean of 3.0 ug/L (Daily maximum of 22.0 ug/L)

Copper: 30-day mean of 48 ug/L (Daily maximum of 101 ug/L)

This process is designed to ensure that waste products are removed from the water, thus minimizing threats to fish and wildlife, and preserving the quality of receiving waters for public recreation.

Mitch Beckner, Assistant Superintendent
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IMPORTANCE AND MECHANICS OF ASSET MANAGEMENT FOR COLLECTION SYSTEMS

by Steven D. Sanders, PE, Burgess & Niple and Daniel R. Johnson, PE, Burgess & Niple

The term "asset management" is much in vogue in the context of public infrastructure. This increased focus on the structured and systematic management of collection system assets stems from a need to balance fiscal constraints with the demand of increasing collection system complexities in a world where "doing more with less" is an unpleasant reality.

Most utility operators are overwhelmed with the prospect of developing an asset management program because they don't think they can afford it. Yet, most utility operations are already implementing some portion of an asset management program. They just refer to it as something else.

Regardless of what it's called, the key is to develop a systematic approach and get started. In the end, the up-front costs will result in decisions that render net savings.

What is Asset Management?

Asset management involves decision-making, planning, and control over the acquisition, use, safeguarding and disposal of collection system assets. The goal is to maximize service delivery benefits and minimize risks and costs over the life of all assets.

An asset management program is the linchpin that combines operations and maintenance with capital planning and programming. The benefits of a formal program include better communication, coordination, cooperation, decision-making, performance management, and use of public funds.

The changing landscape of today's utility operations supports the need for an increased focus on asset management. These changes include:

- Aging infrastructure that needs intensive repair and replacement
- Ongoing regulatory challenges, including the need to balance priorities among multiple compliance endpoints
- Workforce challenges, such as an aging workforce and difficulties in recruiting and retaining qualified collection systems staff
- Uncertainty about future federal and state funding
- Competing local priorities that can place utility priorities near the bottom
- A dwindling resource base in many communities

Addressing the 7 ½ Questions of Asset Management

Any asset management program needs to address what we call the 7 ½ Questions of Asset Management. The questions include:

1. What do we own and where is it?
2. What condition is it in?
3. What is its remaining service life?
4. What are these assets worth?
5. What do we spend and what should we spend/invest?
6. What is the gap?
7. How do we get sustainable infrastructure?

7 ½. How resilient is our infrastructure?

Knowing the answers to these questions can mitigate premature asset failure and reduce risks associated with the consequences of failures. Having this information can also help accurately predict future expenditures through a better understanding of asset life and capital investment needs. Any asset management system needs to address a variety of decision-making inputs, outputs, governance, business systems, people, processes, data, tools, and partners in the context of the collection system.

The first three questions are driven by a "Bottom-Up" approach. Field investigations answer the location, condition, and life expectancy questions. The remaining 4 ½ questions are driven by a "Top-Down" approach focused on engineering, financial, and managerial decision-making.

The last question is a partial question. It reflects developing concerns about how fast infrastructure, especially collections systems and wastewater treatment plants, will be able to recover operationally from disasters and extreme weather events.

The Bottom-Up Approach

The Bottom-Up approach provides a focus on collecting the right information, for the right reasons, at the right time, with the goal of helping utility managers make the right decision throughout the lifecycle of an asset.

What do we own and where is it? A key step in this process is the development of a reliable and assessable collection system inventory registry. The ability to maintain, repair, renew, and replace collection system assets starts with accurate information. Consideration should be given to asset data that includes unique asset identification, material, year installed, anticipated useful life, replacement cost, and relative condition.

Much of this data may exist in legacy systems maintained by the utility. The goal should be to validate the existing information, supplement it with continuous day-to-day data collection, and align the combined information with the utility's operations and planning initiatives.

What condition is it in? This question should be addressed in terms of the three types of condition assessments: physical, demand, and functional.

- A physical condition assessment looks at the physical state of the collection system, which may or may not affect its performance.
- Demand condition assessments examine collection system asset capacity over the long term. Assets must be utilized effectively in order to provide the maximum return on funds invested and to deliver the required levels of service.
- Functional assessments deal with the suitability or fitness of the asset.

Methodologies to determine which collection system components require inspection and to establish frequency of inspection should be given priority.

What is the remaining asset life? This metric is paramount for a capital improvement program. It is important for utility managers to understand that a long remaining useful life doesn't necessarily mean the collection system asset is in good physical, demand, or functional condition. On the other hand, a segment of sewer pipe with a negative useful life doesn't always mean it needs to

be replaced. For example, a pipe might meet its required level of service or continue to be used with maintenance and/or an enhanced inspection schedule.

One of the key advantages of an asset management approach is developing an understanding of the life-cycle of an asset, allowing managers to determine when proper maintenance could defray expensive capital improvements.

The remaining life question is a key question in which the "Bottom-Up" approach meets the "Top-Down" approach. The utility industry continues to research, develop, and refine a variety of tools and algorithms in the form of asset deterioration models and survival curves. This "Top-Down" approach will be an important contributing factor in successfully addressing the remaining life question.

It is also important not to discount the experience, knowledge, and insightfulness of field operations staff regarding a Bottom-Up approach to addressing the remaining life question. Their day-to-day experiences in condition assessment and deep understanding of failure modes should be incorporated into addressing these questions.

The Multi-Model Asset Management Business Model

An asset management approach should be flexible, meeting the individual needs of each utility based on system knowledge, budgets, and social inclinations. Figure 1 shows the Asset Management Business Model which outlines the tools and applications that are available. Depending on the goals and objectives of the individual asset management program, the utility might have some of the support applications or all of them.

Figure 1 illustrates an integrated management systems approach. As previously mentioned, many organizations are already involved in the day-to-day activities that constitute asset management. Building on these existing activities can reduce the effort and expense involved in maintaining an asset management program. This systematic approach can be tailored to utility budgets. Data acquisition, maintenance and capital improvement decisions can be prioritized providing the most functional increase in service to customers for limited funds.

GIS will continue as the long-term platform and tool for asset management information systems. Linking mapping images to the physical asset register, linking the asset register to capital works system, and providing support for maintenance management functions are all enhanced with GIS capabilities.

It is important to remember that the functionality and degree of sophistication of the information system should be appropriate for the nature, size, and complexity of collection system assets, and the capacity of the municipality or utility department. For small portfolios, a small spreadsheet could be adequate, whereas sophisticated (and relatively expensive) information systems are adopted by communities with extensive collection system portfolios and the resources to manage the system.

Moving From Reactive to Proactive

One goal in determining management priorities is having an understanding of the chances and impacts of failure. **Figure 2** is a diagram of a Typical Deterioration Curve which clarifies the operational advantages of an evidence-based approach to asset management focused on proactive, preventative, and predictive decision-making.

Figure 3 shows how using proactive asset management can prolong the expected useful life of an asset. This is done by repairing/replacing/rehabilitating an asset before it reaches failure, but not too far in advance so that you can get the most use out of that asset.

Identifying critical collection systems assets is often the first step in managing asset risk. It is necessary to have some form of measurement of the consequence of failure, and therefore an indicator of the "criticality" of the assets. Potential consequences of failure include: public and municipal employees' health and safety, financial loss, service delivery performance issues, and environmental impacts.

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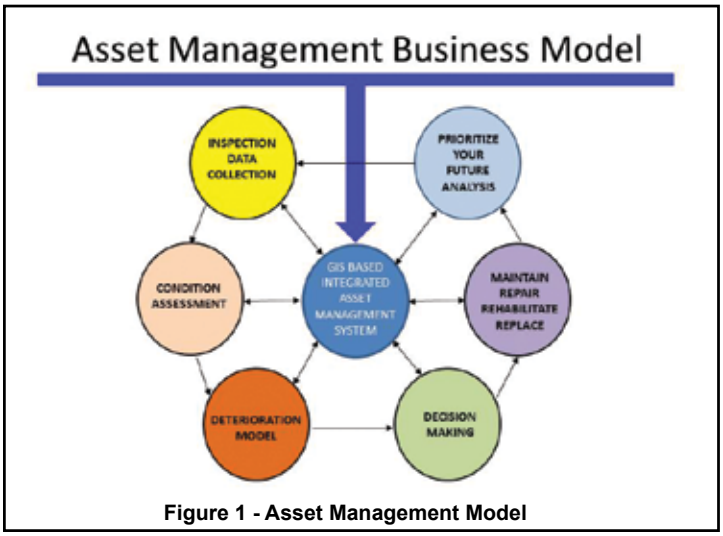

Figure 1 - Asset Management Model

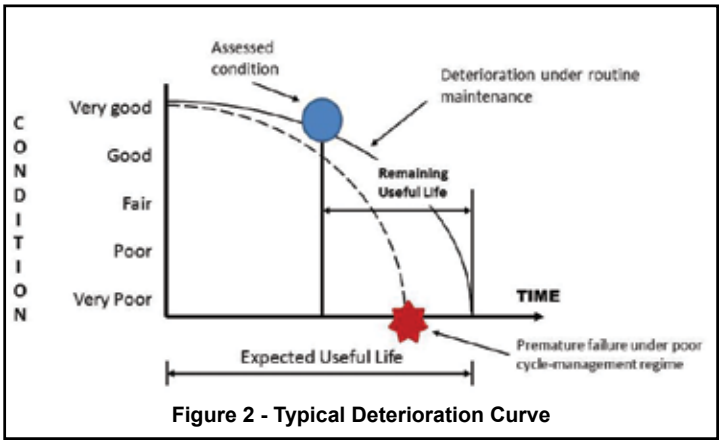

Figure 2 - Typical Deterioration Curve

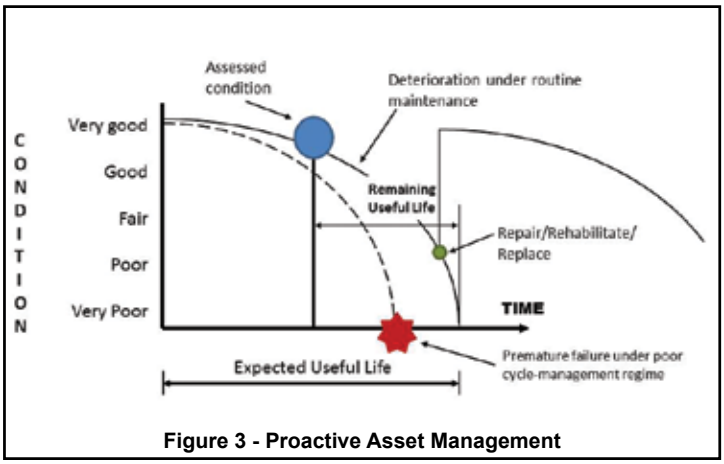

Figure 3 - Proactive Asset Management

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A better understanding of risks and impacts enable the following:

- Focusing on the level of detail and accuracy of data collection
- Crafting focused maintenance responses
- Prioritizing asset renewal
- Prioritizing asset-level risk mitigations
- Measurement of the overall risk exposure

An asset management program should provide the information needed to weigh the relative merits of various choices with potentially risky outcomes.

Conclusion

Asset management is more of a day-to-day management philosophy than the purchase of a new software platform or the development of a report. While tools and summary reports are important to improve organizational knowledge and decision-making, what utility managers most often need is to define a step-by-step programmatic approach that works within their fiscal limitations.

The key is to get started – or recognize that you have started – and work continuously to improve the way assets are managed. Asset management practices can fully support a long-term, sustainable approach to collection system decision-making in a way that will benefit utilities, and ultimately, their customers.

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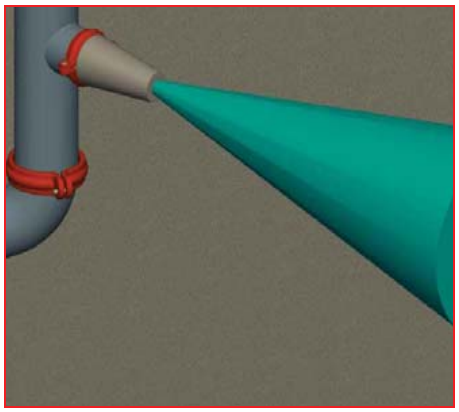

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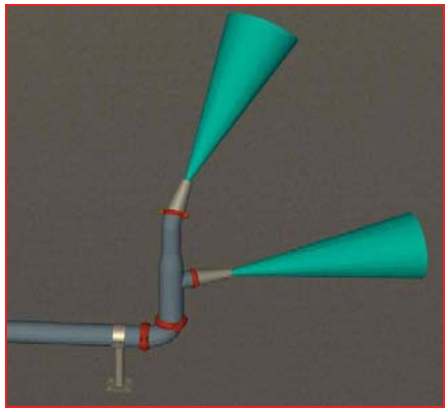

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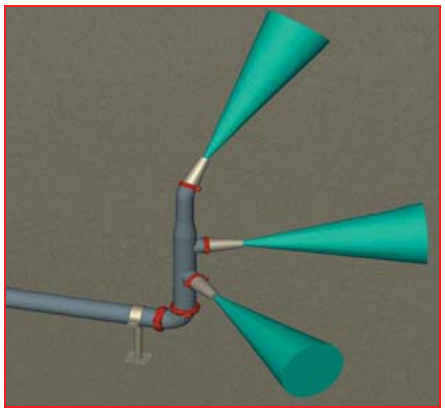

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