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RURAL WATER
ASSOCIATION**

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MOUNTAIN STATE WATER LINE

A Publication of the West Virginia Rural Water Association

Spring 2023

In This Issue

- ◆ **Filter Media Comparison**
- ◆ **Best Management for Cyber Security**
- ◆ **Testing New Style Meters**

WEST VIRGINIA RURAL WATER ASSOCIATION



Spring 2023

Articles and Features



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NRWA

West Virginia Rural Water Association, WVRWA, is a non-profit organization of rural and small publicly owned water and wastewater systems. The vision of the WVRWA is to be the recognized leader and respected voice for water and wastewater systems. The mission or purpose of WVRWA is to provide and promote the highest level of utility service, technical assistance, training, and advocacy for all West Virginia water and wastewater systems.

WVRWA is affiliated with the National Rural Water Association.



President's Message

Craig D. Richards 61 of Vienna

It is with a very heavy heart that we notify everyone of Craig's passing. Craig was dedicated to providing exceptional water and wastewater engineering services to those communities that were his clients and providing technical assistance and guidance to any of the members of the statewide organizations that he so willingly participated in.



Craig was a sincere, honest, dedicated and humble individual who will be sorely missed by those of us who worked with or knew Craig and considered him a true friend.

After a valiant struggle with cancer, Craig went to be with his Lord and Savior on February 19th. He died at home surrounded by his beloved friends and family.

Craig was born the son of John W. Richards and Paula J. Brasseur on September 27th of 1961. As a 1983 graduate of the West Virginia Institute of Technology School of Engineering, Craig began his long and dedicated career as a licensed PE in the state of West Virginia.

In 1988, Craig became an employee of Burgess and Niple, beginning his 34-year tenure with the firm. In that time, he became a valued and loyal employee dedicating his passions to servicing ar-

reas of West Virginia, Ohio, Michigan, and Virginia. His service led to many successes and accolades amongst the engineering community by and large. Craig was the director of the Engineering Section of the firm's Parkersburg, WV office and earned shared ownership with the company. He was the immediate Past-President of the West Virginia Water Environment Association, Chairman of the Vienna Planning Commission, and Secretary/Treasurer of the Northern Panhandle Watershed Council, to name a few. Most recently, Craig played a pivotal role in the development of the West Virginia Infrastructure Report Card- a report that aided Senator Manchin and the US Senate to pass the US infrastructure Bill of 2022.

Craig was the dedicated husband of Vickie, his wife. They were blessed with 37 beautiful years of marriage. Craig and Vickie also raised two daughters- Megan (Lee) Weiss of Marietta, and Katlyn Richards of Parkersburg; and they were blessed with two fun filled grandsons, Henry and Harvey Aston of Marietta.

Craig was passionate about engineering, cars, and being the handyman extraordinaire. Friends and family of Craig would often find him tinkering on one of his beloved Mustangs or taking the car for a drive with his wife,

daughters, and grandsons. He was also an active member of St.

Margaret Mary Catholic Church, sharing a faith that provided him with the comfort and strength he needed in the final days of his life. Those who knew Craig would describe him as diligent, dedicated, compassionate, and honorable.

Craig was preceded in death by his mother and his beloved mother-in-law, Marilyn S. (Darrell) Moore of Parkersburg.

He is survived by his step-father, Michael T. Riley of Parkersburg; his step-mother, Ann Richards of Parkersburg; his father-in-law, Darrell Moore of Parkersburg; his four sisters, Sheila (David) Marra of Clarksburg, Jacquie L. Duley of Parkersburg, Jacquie D. Richards of Vienna and Ann Horton of Parkersburg; and his three brothers, John Paul (Connie) Richards of Washington, John W. Richards of Parkersburg, and Tony Pickens of Wheeling.

Craig's family and friends are creating a memorial fund in his honor and encourages gifts to the Parkersburg Area Community Foundation (PACF) in memory of Craig Richards. Gifts may be mailed to, P.O. Box 1762, Parkersburg, WV, 26102. Gifts may also be made online to: PACF@pacfwv.com with a note that they are in memory of Craig. ■



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WVRWA has teamed up with SunCoast Learning Systems, Inc. to bring online computer-based water and wastewater training to operators throughout the state. Through WVRWA Online Learning, you now have the freedom to learn from home, the office, or your local library. Training can be accessed directly from your personal computer using your internet connection.

Water and wastewater operators registering for e-Learning courses will have a menu of courses from which to choose. We are constantly adding and updating courseware to reflect changing industry needs and regulations. For more information, you can visit www.wvrwa.org or contact the office at 800-339-4513. Some of the available courses are shown below.

Course	CEH Hours	Approved for	Price
Drinking Water Mathematics	10	Water/WW	\$180
Surface Water Treatment	10	Water	\$180
Basic Environmental Chemistry	10	Water/WW	\$180
Small Water Systems I	5	Water	\$100
Chlorinator Systems & Chemical Handling	10	Water/WW	\$180
Water Transmission and Distribution	10	Water	\$180
Practical Personnel Management	7	Water/WW	\$125
Water Utility Calculations	10	Water	\$180
Pumps & Motor Maintenance	10	Water/WW	\$180



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By Todd Grinstead, Executive Director

From Your Executive Director A Legislative Look!

Saturday, March 11, the Session of the 86th Legislature Adjourned Sine Die.

The West Virginia Legislature passed 203 House bills and 129 Senate bills for a total of 332 bills during the 60-day regular session.

Your Rural Water Association legislative team has been hard at work following and working several proposed bills that impact our industry this session.

The team was successful in helping stop a few proposed bills that wouldn't have been good for our members. At the same time, they were effective in promoting a few bills that will make operating and managing a public utility in WV better.

Here are a few of the bills related to our business that made it over the finish line this session.

House Concurrent Resolution 52 (HCR-52)

Resolved by the Legislature of West Virginia: That the Joint Committee on Government and Finance study the financial benefit of raising the threshold from \$25,000 to \$50,000 for the requirement of bids for municipal, public service district, county, and state public works projects; and, be it Further Resolved, That the Joint Committee on Government and Finance report to the Regular Session of the Legislature, 2024, on its findings, conclusions, and recommendations, together with drafts of any legislation necessary to effectuate its recommendations.

Senate Bill 128

Clarifying authority of Governor and Legislature to proclaim and de-

clare state of emergency and preparedness.

Senate Bill 561

Transfers state administration of the West Virginia Drinking Water Treatment Revolving Fund (DWTRF) from the Department of Health and Human Resources to the Department of Environmental Protection.

House Bill 2955

This bill establishes the operation of regional water, wastewater, and stormwater authorities.

House Bill 3189

Creates the PFAS Protection Act. The bill: requires the DEP to identify and address PFAS sources impacting public water systems; requires facilities that have recently used PFAS chemicals to report their use to DEP, requires permits to be updated to require monitoring of PFAS chemicals for facilities that report their use; and requires DEP to propose rules to adopt water quality criteria for certain PFAS chemicals after they are finalized by the USEPA.

House Bill 4828

The purpose of this bill is to provide requirements for the certification of public water systems and wastewater operators who have completed requirements in another jurisdiction and to allow commissioner to determine whether another jurisdiction's certification examination is equivalent to West Virginia in order to exempt applicants from that specific requirement.

House Bill 4865

Clarifies the requirements that the Public Service Commission uses to

enter an order requiring corrective measures up to and including an acquisition of a distressed or failing utility.

To read about the 302 bills that were completed by the WV Legislature this session, go to <https://www.wvlegislature.gov>

In January of this year, a delegation from WVRWA attended the National Rural Water Association, Water Rally 2023 in Washington, DC. Senator Shelly Moore Capito was the keynote speaker for the Rally, speaking to nearly 500 water and wastewater professionals from all across the US, acknowledging the efforts put forth by our industry professionals and pledging her support for the challenges we face every day. Senator Capito is truly a "Friend of Rural Water."

The 24th annual Great American Water Taste Test was held during the Water Rally. Entries were taken from utilities across the nation that had won their state association taste test. We were proud to support the 2022 West Virginia Water Taste Test winner, Putnam PSD, that was crowned "the best tasting water in WV" at our Water on the Mountain 2022 Conference this past August. Even though we feel that Putnam PSD's water was the best tasting water in the nation, we congratulate Pueblo of Zia Community Water System, in New Mexico, for taking first place at the Great American Water Taste Test competition.

We are looking forward to seeing who from West Virginia will give them all a run next year.

Be safe and keep it flowing! ■



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Why Your Utility Should have a Leak Detection Program

Having a comprehensive leak detection program is of vital importance in maintaining the integrity of your distribution system. It should be part of a utility's operation and maintenance plan. Most utilities don't consider doing leak detection until their customers are experiencing low water pressure or have no water at their tap or the inability of the plant to keep up with capacity. Many water leaks will not come to the surface and many lines are in areas of rock formations and allow the water to escape into the ground. Other avenues of escape are storm drains, sewer lines, and river crossings.

There are many reasons why a utility should have a comprehensive leak detection program. One of those reasons is financial justification. Costs for treatment of chemicals and energy that are related to operating the treatment plant and pumping are essential to maintaining good records as well as maintenance of equipment and personnel costs. Having to operate the plant longer increases the costs of system operation and maintenance. If the Utility purchases their water from another system, the costs can be more detrimental. Once the water enters the ground, it is lost revenue that will never be recovered. Regardless of how new the distribution system or how well it is maintained, all systems have water leaks so every utility needs a plan to perform

leak detection.

Another reason is the health and safety of the public. Water can "pond" around the area of a leak, which then becomes contaminated and is no longer safe to consume. If the utility experiences a negative pressure event, it can cause water to be back-siphoned into the main and possibly cause a waterborne disease. By implementing a proactive approach to leak detection, hidden leaks can be found, thereby, reducing the chances and severity of contamination. Also, property damage can be minimized by having a proactive plan for locating leaks.

Money generated by system savings can be applied to system repairs and improvements, an increase in salary for system personnel, possible hiring of additional personnel, if needed, and money to purchase needed equipment and other resources. By locating and repairing leaks, it will enhance the ability of the utility to meet capacity and develop requirements for loan and grant programs for capital improvements to the utility.

All utilities need to perform water audits, at least yearly, to track water loss. Utilities need a meter testing/replacement program to ensure that the utility is not losing significant amounts of water through slow or dead meters. It is also imperative that meters are properly sized so that the amount of water flow is measured properly. Residential and

commercial meters need to be accurate. Large commercial meters and production meters should be calibrated annually to ensure accuracy and accountability. Make certain that the meters are being read.

Valves are a critical component of locating leaks. Valves enhance the ability to isolate sections of your distribution system and you should make certain that your valves are in working order. Another component of a leak detection program is purchasing leak detection equipment, including training your personnel in the use of equipment. Not all water is lost through leaks in the distribution system. Water can be lost from theft via fire hydrants and illegal connections. Utilities should work with local law enforcement and the public to prevent water theft. Examine your pumping practices and make certain that you aren't overflowing storage tanks. Many utilities' unaccounted for water is from excessive tank overflows. Estimate and record water loss due to leaks and hydrant flushing and install check meters at river crossings and other critical locations in your distribution system.

Locating water leaks can sometimes be a difficult and frustrating task. We, at rural water, have the expertise and resources to work with your utility in developing a leak detection program. If you need assistance, please call the circuit rider assigned to your area. ■

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Filter Media Comparison

Filter media is one of the most crucial parts of a water system's treatment process. While most of you may have your filtration where it needs to be, some systems are or need to be looking into producing higher quality water. Systems that have iron, manganese, and hydrogen sulfide, from my experience, have a more difficult time with the filtration process than the systems without these contaminants. Though there are several different ways to remove iron and manganese, I want to compare three different types of filter media that can be used in pressure filters found in a lot of the ground water plants in the state.

1. Greensand

Glauconite, a mineral which forms in shallow marine sedimentary deposits, has been used in filtration since the early 1900s. In the 1950s, Glauconite was coated with manganese dioxide to create what we know as manganese greensand. Greensand needs an oxidizer like potassium permanganate or sodium permanganate to regenerate media for it to work properly. It has a maximum load rate of 5 gallons per minute per square foot. Greensand also must have water at a pH between 6.2 and 8.5. Greensand has a differential pressure maximum of 8 psi. Going above 8psi differential pressure can damage

the media. Greensand is the cheapest of the 3 types of media, costing around \$140 per cubic foot

2. Greensand plus

Greensand plus was created because the demand for traditional greensand was larger than the supply. It uses a silica sand core rather than a glauconite core, which, similar to oil and synthetic oil, makes it more durable and less likely to break down. Greensand plus doesn't require an added oxidizer if prechlorination is used. Just like greensand, greensand plus needs the water pH to be between 6.2 and 8.5. The load rate for greensand plus can be up to 12gpm per square foot. Greensand plus can be used above a 10psi differential pressure without crushing the media, and it also can be used with lower dissolved solids and higher temperatures. Greensand plus is a little more costly than greensand at approximately \$180 per cubic foot.

3. LayneOx

LayneOx is a filter media relatively new compared to greensand and greensand plus. Based off the information I can find, it started being used in filters in the early 2000s. LayneOx requires a pressure filter, so LayneOx has a higher manganese dioxide coating than both greensands and requires less chlorine to regenerate than greensand plus and no alternate oxidizer.

LayneOx has a load rate of 12gpm per square foot like greensand plus, but LayneOx is able to handle the larger load rate with lower quality water. The pH requirement is slightly better than both greensands at 6 to 9. LayneOx media also has two different sizes to choose from depending on the contaminants in the water. LayneOx has a lower differential pressure at 2-4psi. LayneOx is the most expensive media; however, I couldn't find a price per square foot. For new systems, the capability to have smaller buildings and filters with LayneOx can bring the total project price down comparatively to greensand plus. Also being able to use less treatment chemicals and faster backwash can add another savings to the system. If anyone is interested in learning more about LayneOx, I can send you a cost comparison brochure.


Each of the three media types is a quality way to remove iron and manganese from your water, and could be a great fit for your system. Deciding which works best in your system is up to you and your engineers. Based off the information I have gathered from pilot studies done in different plants, greensand plus has been the best overall, but testing should be done at your system to find what works best and is most cost effective. ■



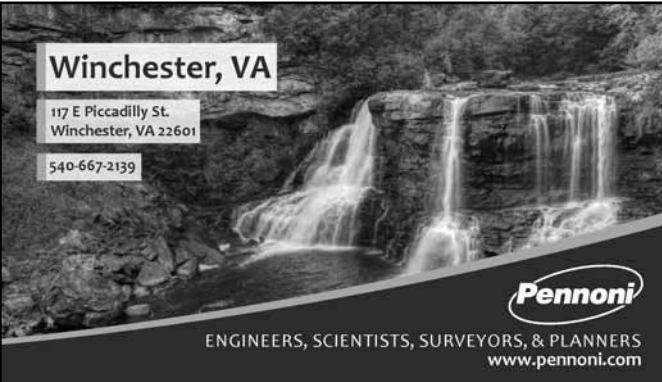
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By Jim Johnson, Wastewater Technician

Best Management Practices for Cyber Security

Like other critical infrastructure, the water and wastewater sector can be a target for cyber criminals. Implementing cybersecurity best practices is critical for water and wastewater utilities. Most cyberattacks require an action by someone working on a computer to get the attack started. This usually involves opening something up that sets off the cyberattack.

Malware is one of the most common types of cyberattack. Malware is activated when a user clicks on a dangerous link that has been planted on a site for the user to attempt to open up. This then installs malicious software to your computer. This can then be used to access data from the computer, steal information from the computer, or disrupt the system, sometimes to the point it becomes inoperable. Malware is a very common hack. Your computer should have a malware defense system installed on it to prevent and fight against these malware attacks.

Phishing is another common cyberattack that is being used today.

Phishing involves sending a mass number of fraudulent emails to an email account. These then attempt to install data that will extract information or financial records.

A computer virus is a type of malicious software, or malware, that spreads between computers and causes damage to data and software. The viruses will disrupt the entire computer system. They spread across the entire system. They lock the computer up so the user has little or no control.

Unwanted pop-up windows appearing on a computer or in a web browser are a sign of a computer virus. Unwanted pop-ups are a sign of malware, viruses, or spyware affecting a computer system. With a virus the computer will sometimes execute things on its own and it can log you out without you wanting to logout. It usually will not let you log back in.

To protect your computer from viruses or malware, you will need to purchase and install trusted antivirus software. You will also

need to install malware protection. Sometimes, you can get one program to do both. Most systems use a separate program for viruses and malware. Another important way of avoiding problems is training. Make sure you and your staff know not to click on any pop-ups that show up on the computer or on a website that they are on or on an email. If you receive a suspicious email, do not open it up. Almost all viruses or malware requires someone to open something up before it can get into the computer system.

There are quite a few people out there that make their living trying to lock up someone's computer. They are looking for a way into the system to either lock it or to extract information. Make sure to have your computer protected. Stay off of websites you do not have to be on in the workplace. Be vigilant as to what you would click on to open up. These policies will help your workplace maintain better cybersecurity. Remember, every computer is vulnerable so have them protected. ■

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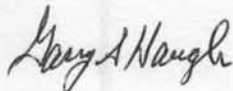
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January 18, 2023

The Town of Cairo is extremely grateful to the West Virginia Rural Water Association for their recent and ongoing assistance to the Town.

Recently, Shawn Strain, Beth Fletcher, Adam Conant and Charlie Cooper were here to assist with our Wastewater department. Shawn, Beth and Adam worked with Mayor Haugh and Wastewater Operator Sarah Rose. Charlie assisted Clerk/Recorder Laurie Bastian with a rate study. They were all extremely helpful and professional. We look forward to working with them in the future.

Again, thank you for providing a much needed resource to small utilities in West Virginia.



Gary S. Haugh
Mayor

"Town of Cairo is an equal opportunity provider and employer."



New Initiative in 2023



In 2023 Extreme Endeavors is starting a new business initiative, our budget is focusing on Research to Lower the Cost of Automation. This involves partnerships with organizations and companies from almost every continent, with benefits being driven back into West Virginia. Due to the material shortages and increase in cost, we thought there has to be a better way, and we want to use our innovation to help you save. We would enjoy talking with you about this new initiative!

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Process Control Testing

Do operators do as much or as little process control testing as needed? I'm not talking just about pH, DO, temp, etc. I'm talking about MLSS, centrifuge test, using a settleometer, looking at you bugs under a microscope on a consistent basis, and running a Total Solids on the sludge. Do you send the samples out for testing? I've noticed a lot of plants do send their samples out to a commercial lab for both permit requirements and also for process control tests.

There's no need for a certified lab at the plant and almost every plant does have the minimum to run these tests, but don't utilize the equipment. If you do currently send your mixed liquor samples out to a lab, how long do you wait for the results? By the time the results come in, it may be too late to make changes to avert trouble in the process. If you land apply or dispose of sludge in the local landfill, how long do you have to wait to get the total solids results back to see if your sludge is above 20% to land apply? I'm not sure about most plants having the room to stockpile sludge until the good results come back.

If you do run the settleability test and a MLSS, that's a great tool for operation. After you run the settleability test and the MLSS, do you

calculate the Sludge Volume Index for the plant? All you need are the results from these two tests listed above and a small calculation and you determine the SVI. Trending the SVI is yet another useful tool that will help the operator see problems coming before they happen and will allow changes to help keep the plant running without upsets.

If you are running the settleability test, make sure that you are using the correct container. The settleometer should be wide mouth plastic or glass and normally hold 1- 2 liters of liquid. Using any other container or tall graduated cylinder, you could be using inaccurate results. The wrong size container could cause the sludge to settle slowly, or too fast, cause the sludge to separate and float to the top of the container.

You would be surprised how much more efficient you can run the process if you know these results in that morning. These results are very helpful when making decisions about wasting or returning sludge, or should you increase or decrease air, extend or decrease mixing times. These tests can also help to possibly being able to decant digesters, if available, to increase sludge production for a better efficiency in the digester. Increased percent sol-

ids feed to the belt filter press is always welcome.

If you don't have all the necessary equipment, check out the pricing and budget for it. You will save money over time by not sending the samples out and you will have those results so much faster that it will help the operation of your plant.

You can reduce the operational costs along with these tests as well. I'm sure the PSD or Town would like to see the landfill bill go down, or the amount of truck loads going to the field decrease over time, blower run time decreasing due to reducing DO levels that are too high can save on the power bill and the maintenance on the blowers.

A Certified Lab License would be helpful, but not needed for the process control tests. With just a little bit of equipment and a few hours twice a week you may be surprised of how much more efficient your plant can possibly run. Also, you can see problems coming sometimes before they become an issue and be able to adjust the process to avoid trouble.

Good process control is another example of sustainability management for the system.

At the end of the day, the more information an operator has, the better their plant will perform. ■



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Operators Remembered

The West Virginia Rural Water Association would like to continue to honor our Water and Wastewater Operators in our great state of West Virginia that have passed. If you know of a Water or Wastewater Operator that has recently passed, please contact Daniel Vestal, ARC Specialist at (304) 667-7659 or dannyvestal@wvrwa.org or your local WVRWA Water Circuit Rider or Wastewater Technician.

William Austin Henry, age 67 of South Fork Road, Moorefield, WV passed away Friday morning, June 10, 2022 at Grant Memorial Hospital in Petersburg, WV.



Born October 15, 1954 in Keyser, WV, he was the son of the late Emmett Gochenour Henry and Alice Virginia Barb Henry. In addition to his parents, he was preceded in death by an infant brother, Andrew and a brother, Danny.

Bill was a graduate of Moorefield High School Class of 1973, a member of the Moorefield Church of the Brethren, where he served on the church board, and attended Kelly Chapel Church of the Brethren.

He was a retired Class 1 Water Plant Operator and worked for the Town of Moorefield for 36 years and the Town of Romney for 8 years.

Atruesportsenthusiast, hewatched the Moorefield Yellow Jackets,

WVU Mountaineers, Pittsburgh Pirates, and the Washington Redskins (Commanders). He was very proud of his granddaughter, who was a member of the Moorefield High School Band and he enjoyed his front porch where he went to read often.

Surviving is his loving wife of 44 years, Rebecca Dawn Davis Henry; son, Willy (Ashley) Henry of Moorefield, WV; daughter, Misty (Robbie) Guard of Auburndale, FL; brother, Sam (Carolyn) Henry of Parkersburg, WV; sister, Nettie Henry of Moorefield, WV; two grandchildren, Austin and Taylor; four step grandchildren; a great-grandson; and a son-in-law, Wayne (Penny) Wolfe of Moorefield, WV.

Michael Floyd Wolfe, age 66, of Belington, WV passed away at his home on Wednesday, October 5, 2022 after a short, but courageous battle with brain cancer.

Mike was born January 23, 1956 in Philippi, WV to the late Dorsey Wolfe and Carrie Mae Wolfe. He married his high school sweetheart, Debbie Diana Wolfe (Stemple) on June 23, 1978.

Mike graduated from Philip Barbour High School in 1976 and started his working career at Alderson Broaddus College before starting his professional careers of many years at Poling Trucking and then at Auvil Homes. He began his



water and wastewater career of many years at Belington, WV and was awarded the Wastewater Operator of the Year there in 2009. He then finished his career as Wastewater Superintendent for the City of Elkins, where he worked for more than twenty years. While there, he was again awarded the Wastewater Operator of the Year before retiring at the age of 65 on April 23, 2021 as a Class IV Wastewater Operator.

During his two sons' early years, he was highly involved in Belington Little League and Jerry West Basketball. If he wasn't working, you could find him outdoors fishing, hunting, watching WVU or Pittsburgh sports, or Gunsmoke.

Surviving is his loving wife Debbie; two sons, Michael Garrett Wolfe of Myrtle Beach and Ryan Barry Wolfe and fiancé Buffie Ward of Belington; two grandchildren, whom he loved dearly, Rylan Ray Wolfe and Michaelan Marie Wolfe; a special Aunt Beck Irvine; cousins, Chris, and Jean Irvine; and brothers, Delmar, Dorsey Jr., Barry and families.

He was preceded in death by his sister, Sandy Moats; brother, Kenny Wolfe; parents-in-law, Robert (Bob) Evans and Janet Stemple; two aunts, Genevieve Godwin and Katherine McVicker; and Uncle Neil Irvine.

After retirement, Mike continued his lifelong hard work caring for his and many of his neighbors' farms. ■



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7			5		9	3		1
3		2		8	6			
				5	1		8	2
			8		2	4		
		5	3	7			1	
	7	1	4		8	2	5	
		8						
9								

The aim of the canonical puzzle is to enter a numerical digit from 1 through 9 in each cell starting with various digits given in some cells (the "givens"). Each row, column, and region must contain only one instance of each numerical. Completing the puzzle requires patience and logical ability.

Answers can be found on page 38.



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7	8	6	5	4	9	3	2	1
3	1	2	7	8	6	5	9	4
4	6	3	9	5	1	7	8	2
1	9	7	8	6	2	4	3	5
8	2	5	3	7	4	6	1	9
6	7	1	4	9	8	2	5	3
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9	5	4	2	3	7	1	6	8



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Testing New Style Meters

The AWWA M6 manual is the standard used for testing meters in West Virginia. The newest M6 Manual is the Fifth edition and it does not contain any information on Electromagnetic and Ultrasonic Meters; however, there is an addendum online that was put out in November of 2018 which does include the new meters. It's titled "Addendum to AWWA Manual M6." You can download the pdf file and print it off for future reference.



The two tables for Electromagnetic and Ultrasonic Meters for Revenue Applications are separated into Type I and Type II. The Standard set for all these types of meters seems to be ANSI/AWWA C715.

If you compare the tables, you will see that Type I covers a size range of ½- to 8-inch meters and Type II covers a size range of ½- to 20-inch meters.

Type I Electromagnetic and Ultrasonic meters are those where LOW FLOW ACCURACY might be a concern and are used in residential and commercial applications.

Type II Electromagnetic and Ultrasonic meters are those where low flow accuracy would not be of primary concern and they are used in commercial applications.

You can see the difference in the charts below concerning the flow rates.

TYPE I

Size	Min. Flow	Quantity	Int. Flow	Quantity	High Flow	Quantity
½"	0.13 gpm	10	0.4 gpm	10	15 gpm	100
1"	0.3 gpm	10	1.5 gpm	10	40 gpm	100
2"	1 gpm	100	5 gpm	100	100 gpm	100
4"	3.5 gpm	300	20 gpm	500	400 gpm	1,000
6"	9 gpm	300	40 gpm	1,000	800 gpm	2,000

Type I would be a meter to replace an older style Compound meter.

TYPE II

Size	Min. Flow	Quantity	Int. Flow	Quantity	High Flow	Quantity
¾"	0.5 gpm	10	4 gpm	10	25 gpm	100
1"	0.75 gpm	10	6 gpm	10	40 gpm	100
2"	2 gpm	100	12 gpm	100	150 gpm	100
4"	7.5 gpm	300	50 gpm	500	600 gpm	1,000
6"	15 gpm	300	110 gpm	1,000	800 gpm	2,000

Type II would replace the large Turbine meters that only flow in the higher range like a booster station that couldn't gravity flow or on a High-Pressure Pump.

One thing I noticed about the testing rates is that it's not going to take as long to test these meters. I always tested the Turbine style meters for at least 3 minutes, but some of these tests seem to only last about 1 minute. Might also save some water.



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When I wrote this article, the M6 – Sixth edition was not available, but you can still download the addendum to the Fifth edition for your records. ■



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By Jerry Dotson, Sourcewater Specialist

The Fifth Unregulated Contaminant Monitoring Rule (UCMR 5)

The Safe Drinking Water Act requires the United States Environmental Protection Agency (USEPA) to establish a list of contaminants that are currently unregulated, known or anticipated to occur in drinking water, and that may require future regulation. The list is published every five (5) years. The list is to contain no more than thirty (30) unregulated contaminants. That is the Unregulated Contaminant Rule, and it requires monitoring by all systems serving a population (population, not service connections) of greater than 10,000 people; and a representative sample of systems serving 10,000 people or less. The USEPA will then make the results of that monitoring available through the National Contaminant Occurrence Database (NCOD). The USEPA provides funds for shipping and testing for small systems; large systems are required to fund their own monitoring. The EPA chooses which small systems will be required to monitor and coordinates monitoring through the States. So,

if you have questions about monitoring, contact the District Office of the West Virginia Department of Health and Human Resources that serves your area. Systems that will be monitored should have already been contacted and arrangements made for sampling.

UCMR 5 was published in December of 2021 and monitoring has begun in 2023, and will continue until 2025. The results are due to be published in NCOD in 2026. UCMR 5 contains twenty-nine (29) Per- and Polyfluoroalkyl substances (PFAS) and Lithium. The PFAS chemicals PFOS and PFOA are included in UCMR 5, but they are expected to begin the regulation process on March 3, 2023. In the meantime, all public water systems that are subject to UCMR 5 have been notified by the USEPA. If an up-to-date email was available, then the system should have received notification by that means during the week of January 18, 2022. If an email was not available for the system, physical letters were mailed via the US Postal Ser-

vice during the week of February 22, 2022. If your system serves a population greater than 10,000 and you have not received notification, you should contact the EPA's contractor, Great Lakes Environmental Center at the UCMR Message Center (UMCR5@glec.com or call 1-800-949-1581). If you are uncertain, contact the contractor asap.

Water systems that will be participating in the monitoring should have received a Customer Retrieval Key (CRK) to establish an account in the Central Data Exchange (CDX) that will provide access to the Safe Drinking Water Accession and Review System (SDWARS5). This account will be used to name users for your system to allow access to the account, receive reminders for deadlines, report your information, receive notifications of any changes or updated information, and receive test results. This portal will provide the communications link between the public water system, the USEPA, and the laboratory.

UCMR 5 monitoring samples

will be finished water only, collected at the entry to the distribution system. Surface water sources, ground water under direct influence of surface water (GWUDI), and mixed sources systems will collect samples four (4) times over a twelve (12) consecutive month period, three (3) months apart. Groundwater systems will collect two (2) times during a twelve (12) consecutive month period, five (5) to seven (7) months apart. Sampling techniques for PFAS chemicals are very stringent. It is vital that sampling protocols are followed to the letter to prevent sample contamination. It is also critical that the laboratory used is USEPA approved and that the proper analytical method is utilized for each test. For small systems, the USEPA will provide the sampling kits and the system will only have to collect the sample and ship it as instructed. Large systems will be responsible to carry out the entire process themselves. A sample collection training video can be found on the UCMR 5 homepage that covers the sample kit, collection, packaging, and shipping. For small systems, the laboratory will post the results within 60 days of sample collection. Once the EPA has reviewed and approved the results, they will

be posted on the SDWARS system. For large systems, the results will be posted by the laboratory the system has contracted for the monitoring within 90 days of sample collection. It is the system's responsibility to ensure the laboratory has posted the results within this time period. The large system will then have 30 days to approve or reject the results. Following the approval or expiration of the 30-day review period, the results will become viewable in the SDWARS system.

The USEPA has also published a document addressing the Health Based Reference Values (HBRVs) for UCMR 5. The document explains the minimum reporting levels (MRLs), the lifetime health advisories (HAs) for PFAS, and health reference levels (HRLs) for lithium. This document will be updated regularly as new information becomes available.

Minimum reporting levels do not really have any health-based effect, but are the minimum level that laboratories may report for the individual constituents. The purpose is to create consistency in the results being reported. The minimum reporting levels for UCMR 5 can be found at this site: <https://www.epa.gov/dwucmr/fifth-unreg->

ulated-contaminant-monitoring-rule.

Health advisories and health reference levels may be established for some chemicals based on the availability of health and toxicological information. The current reference concentrations are based on a reference dose that assumes consumption of the chemical below this dose over a lifetime will not create adverse health effects (some PFAS chemicals have been linked to certain types of cancer). Assumptions have been made concerning body weight and drinking water intake. These levels do not represent regulatory limits or action levels and may not reflect future regulatory actions. On June 21, 2022, a notice was posted in the Federal Register announcing health advisories for four (4) PFAS chemicals. They are 0.004 parts per trillion (ppt) for PFOA, 0.02 ppt for PFOS, 10 ppt for GenX, and 2,000 ppt of PFBS.

Lithium occurs in drinking water naturally; however, there is a great concern for higher levels caused by the improper disposal of Lithium-ion batteries. Lithium-ion batteries are used in numerous commercially sold products. Power tools, computers and other electronics, toys, and electric vehicles are just a

few of the items that utilize batteries containing lithium. When these products reach the end of their battery life, the batteries should be removed and disposed of at either a specific lithium battery recycling location or a household hazardous waste disposal site. They should not be placed in normal household garbage or recycle bins.

There is ample research available on the adverse effects of lithium due to its use in treating certain psychological disorders. There are various side effects that create concern for increased levels in humans, primarily impaired thyroid and kidney functions. For that reason, lithium was included in UCMR 5 with a reference concentration set at 10,000 ppt. Continued research will determine whether or not lithium will be regulated in the future.

Systems who are required to monitor through UCMR 5 will be required to inform their customers and publish test results in their Consumer Confidence Report. To help systems better educate their staff and inform their customers about the constituents monitored through UCMR 5, the USEPA has produced some resources for that purpose. They include:

The UCMR 5 Program Overview

and Fact Sheet <https://www.epa.gov/system/files/documents/2022-02/ucmr5-factsheet.pdf>

Health Based Reference Values for UCMR 5 <https://www.epa.gov/system/files/documents/2023-02/UCMR5-HBRV.pdf>

Questions and Answers: Drinking Water Has for PFOA, PFOS, GenX Chemicals and PFBS <https://www.epa.gov/sdwa/questions-and-answers-drinking-water-health-advisories-pfoa-pfos-genx-chemicals-and-pfbs>

Drinking Water Has for PFAS Fact Sheet for Communities <https://www.epa.gov/system/files/documents/2022-06/drinking-water-ha-pfas-factsheet-communities.pdf>

Drinking Water Has for PFAS Fact Sheet for Public Water Systems <https://www.epa.gov/system/files/documents/2022-06/drinking-water-ha-pfas-factsheet-water-system.pdf>

Technical Fact Sheet: Drinking Water Has for Four PFAS (PFOA, PFOS, GenX Chemicals, and PFBS) <https://www.epa.gov/system/files/documents/2022-06/technical-factsheet-four-PFAS.pdf>

PFAS Explained <https://www.epa.gov/pfas/pfas-explained>

PFAS NPDWR Consultations and Stakeholders Engagements <https://www.epa.gov/sdwa/and->

[polyfluoroalkyl-substances-pfas](#)

Also: The Water Research Foundation (WRF) has published PFAS communications materials. Their “One Water Toolkit” contains materials for utilities to build custom communications materials. <https://www.advancesinwaterresearch.org/awr/library/item/20220709/4033917/>

The USEPA also has the following resources to better information on Lithium:

EPA Provisional Peer-Reviewed Toxicity Value (PPRTV) for Lithium, 2008

- Technical Support Document for the Final CCL 5 - Contaminant Information Sheets, 2022 <https://cfpub.epa.gov/ncea/pprtv/recordisplay.cfm?deid=338974>

- UCMR 5 Information Compendium for Contaminants, 2021, available in the docket at:

<https://www.regulations.gov/document/EPA-HQ-OW-2020-0530-0126>

- Included available lithium occurrence data in water from EPA and U.S. Geological Survey (USGS) studies, along with supporting information considered during the UCMR 5 contaminant prioritization process <https://www.usgs.gov/news/lithium-us-groundwater> ■

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The Importance of Process Control Testing

Process control is possibly the single most beneficial task an operator can do each day in order to maintain compliance of the wastewater plant. These simple tests, observations, and the recording of the data are just as important as taking your required samples each month.

Process control allows you to see at a glance the status of many parameters essential to the operation of the system rather than only relying on results from samples taken days or even weeks earlier. Each test is a snapshot of what is happening within your plant in real time and can be one of the most valuable tools for an operator to help monitor the health of the plant. Daily sight and sound observations can help detect issues both mechanically and biologically before they occur. Without proper maintenance, the process will fail and part of that maintenance is process control testing.

Data from process control tests can be recorded on the ES-59 form supplied to the WVDEP by the WVBPH. The use of this form isn't required by either entity; however, as an operator, how do you make adjustments to your process if you don't have data to know what those changes should be? The ES-59 may not be specifically required, but if you are continually out of compliance, the WVDEP can use the following from your permit, taken directly from the West Virginia State Code, to issue a Notice of Violation.

Appendix A, section II, number 1 reads "Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and

control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the condition of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures....." This means process control and the use of the ES-59 to record the results.

Basic equipment needed for process control is:

1. Your eyes, ears & nose
2. Microscope to observe microbiology in the aeration MLSS
3. Settleometer to determine settling time
4. Sludge Judge
5. Means to test DO, ph, cl2 to ensure compliance with effluent limits, glassware, funnels, filters, vacuum pump, analytical balance, desiccator and oven to determine MLSS and sludge % solids
6. Ability to test ammonia and alkalinity is also quite important.

There are some cheap alternatives to this list if your plant lab doesn't have all the equipment or the budget won't allow for the entire list. From your local pool supply or pet store you can get alkalinity, ph, and cl2 test strips that will allow you to know if you are in the right ballpark with these parameters.

Process control also consists of using your senses of sight, hearing, and smell. Walk through your plant, look, listen, and smell for any changes. This can be the first indication of a problem. Blowers, motors, and belts make noise and a change in pitch or normal operational sound

could indicate a problem. Looking at the color of the MLSS in aeration is an example of sight indication. Experience will tell you what a healthy color and consistency looks like. And never forget the smell! It is a sewer plant, but a healthy plant should not stink.

If you haven't been tracking ph, DO, or CL2 residual daily and making adjustments to stay within limits, how do you know if you will be in compliance or not on sampling day? Although there are parameters that you, as an operator, don't have the equipment to test, it is your responsibility to do what you can with what you have.

Microscopic observation can tell you at a glance the age of the MLSS in aeration. The health of your enzymes is crucial to the whole plant process. We have all seen the poster of microbiology wanted dead or alive; use it or google it if you don't have one. Get to know your bugs. Know who is good, who is bad, and what it means to have each kind in your water.

Process control testing of your activated sludge, pond, or trickling filter system can give you the knowledge of where your plant is now and data trending can help you know where it's going. Different types of treatment facilities may not require all of the equipment and procedures listed above and the list isn't by any means all-inclusive, but it's a good start.

I know all too well how busy things can get and anything not required can get thrown on the back burner, but I cannot stress enough how beneficial it can be to do even just a few of the most basic of these

tests each day. The testing shouldn't take much more than an hour a day and can lessen the chances of non-compliance.

If you have any compliance ques-

tions, please don't hesitate to contact me. I would be happy to pack up my equipment and come spend the day at your plant running some tests and helping you to begin or re-

start your process control program.

Elizabeth "Beth" Fletcher,
WVWRA Wastewater Technician
elizabethfletcher@wvwrwa.org
304-771-4081 ■

RURAL WATER FLEET PROGRAM

The National Rural Water Association has created partnerships with motor groups to offer discounts to utilities around the country. Member utilities should contact their State Rural Water Association to access the Rural Water Fleet Program.

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Fight Back Against I&I

Impossible task? Why even bother with it? These questions have probably come across most of our wastewater operator's minds at one time or another during their career.

If we're honest about it, are there any advantages to fighting back against I&I and does it really matter or affect our systems? Infiltration and inflow (I&I) can have major impacts on our collection systems, wastewater treatment plants, and our budgets. In this article I would like to cover the following:

- basics of what I&I is
- ways that I&I can affect our sewer system
- how to fight back against I&I

With the increase in supplies needed to build and maintain collection systems and wastewater treatment facilities, most systems need to come up with ways to reduce operating cost and maximize the life of their equipment.

The basics of I&I: what exactly is the definition of infiltration and inflow and what do they mean? **Infiltration** is ground water that seeps in through pipe cracks, pipe joint cracks, manholes, and possible lift stations. Infiltration can happen due to age of infrastructure, incorrect

installation of piping, joints, manholes, and, even over time, the soil impact due to weather, movement of rocks, sink holes, tree roots, etc. As you can imagine, this is something that every system deals with and is affected by. **Inflow** is stormwater that enters the sewer collection system through gutters, open drains, foundation drains, and stormwater drain pipe cracks, either from industrial users or residential homes. The following is a diagram to give a better understanding of what I&I looks like and some of the terms associated with it:

Ways that I&I can affect our sewer systems: BOD removal; short circuiting in lagoons; increased wear and runtimes; increased call outs and overtime pay due to overflows; potential of flooding in plant, which could damage electrical equipment; exceeding flow permit limits with possible fines; and the list goes on. Many times, municipalities only relate overflows to I&I issues, but when we look at the list, we can see really quickly that I&I affects many areas of our treatment process and our system's budget.

Let's look at a few of them from the list. As I travel WV, I have heard several times from operators that

their treatment process has issues with **BOD removal**. If your system has I&I issues, then meeting your BOD removal requirements can be a challenge. This could be due to the I&I diluting the influent that is coming into the sewer treatment plant, which makes your influent concentration diluted. **Increased wear and runtimes** on equipment due to the fact that the pumps need to run longer and more grit enters the collection system through I&I causes our pump impellers to wear down faster. **Increased call outs** can also plague a system due to I&I with overflows, pumps overheating due to continuous running, setting off high float alarms, having to go out and run both pumps on hand, or have to send someone out to turn valves on or off due to I&I issues. Call outs also bring more overtime cost, fuel cost, and wear and tear on vehicles used. **Exceeding flow permit** limits due to I&I can bring many other headaches for a system to deal with. There can be fines, paperwork, board meetings, phone calls, visits from DEP, and, you guessed it, more paperwork!

All of the items listed above **can have financial impacts** on our sewer system's operating cost and

budget. A recent article I read from Tennessee showed 45% of the flow in 227 municipalities was due to I&I and an estimated cost of \$118 million annually. In 2014, the EPA estimated that I&I cost \$2 to \$5 per thousand gallons. There are many factors related to whether this is true for your system or not. A couple examples would be chemical usage, types of sludge process, and kWh charge on your electric meters at the treatment plant and the collection system.

How can we fight back against I&I

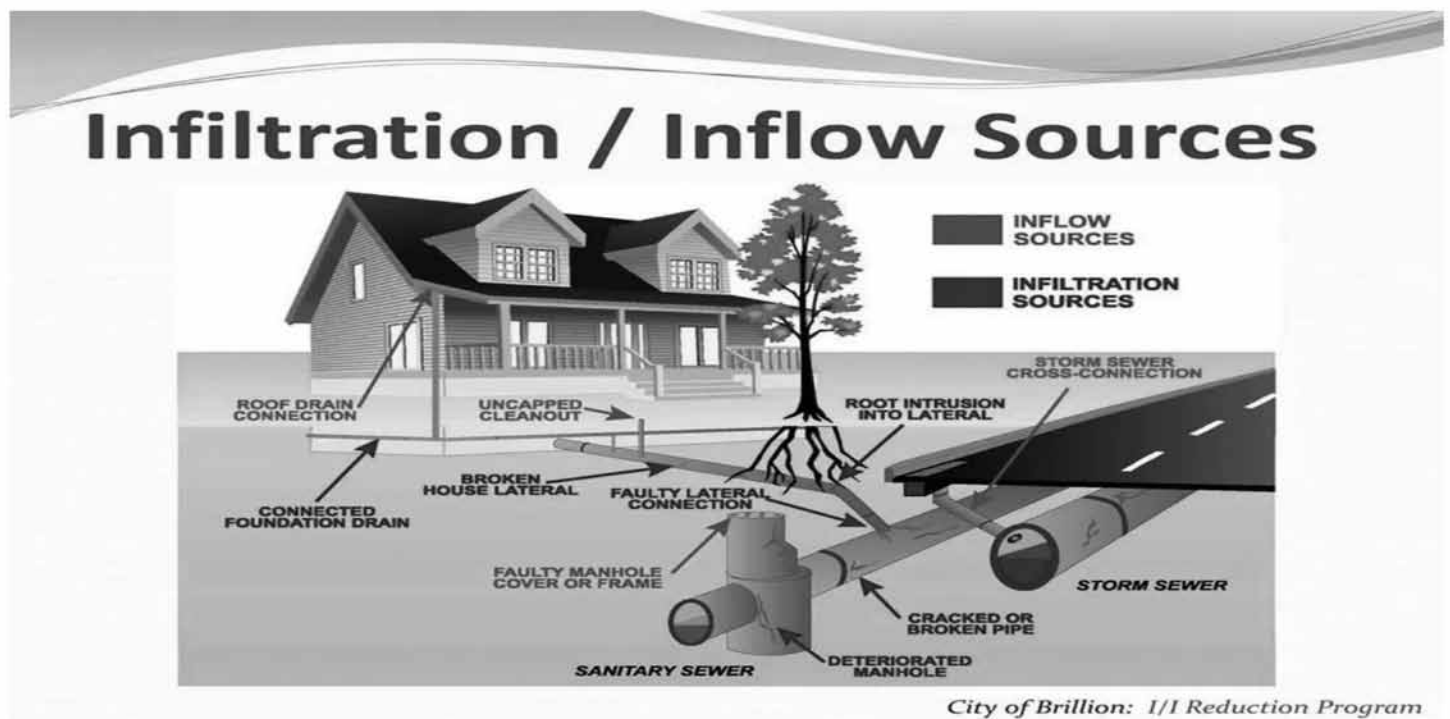
Once you have identified that your collection system has I&I issues, what do you do about it? If we have I&I issues in our system, will it go away? Or should we try to just forget about it? Let's look at a few ways to fight back.

1. Have an **organized plan** in place to address I&I issues currently and going into the future. Appoint someone to be responsible for making an I&I budget each year, coming up with a written detailed plan, and to execute the plan each year. Make it simple with one step at a time, but just start somewhere. Recording is very important to build a plan that will work.
2. **Flushing lines** – routinely flushing main lines, especially ones that may be imperative to the collection system operation.
3. **Line inspection** – invest in a camera that will inspect sewer lines and show where the I&I issues are exactly, which saves a lot of time in locating

I&I.

4. **Manhole checks** – check manholes during dry times and in rain events to see if they are leaking or have excessive flow. Flow meters can help many times to isolate areas that may be problematic.

Infiltration and inflow both cause issues in our collection system, treatment process, and our budgets and both need to have a plan of action in place. This article is just covering a few ways to fight back against I&I; however, there are many new technologies coming out to deal with I&I: acoustic, electrical leak detection, replace pipe in place, repair in place leaks without digging line up, etc. The main idea to take away from the article is to get a plan in place to fight back against I&I. ■



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We would like to give a special thanks to all of our current and former Board Members and Staff who have helped shape WVRWA.

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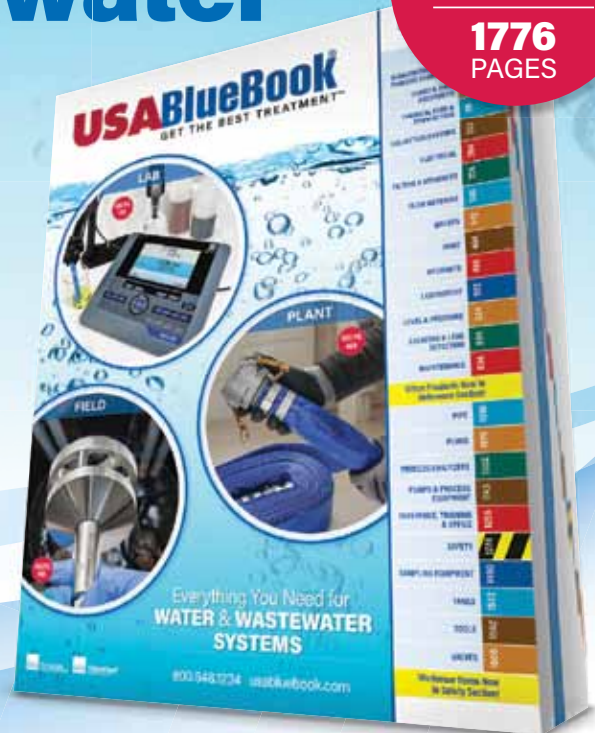
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