




MOUNTAIN STATE WATER LINE

A Publication of the West Virginia Rural Water Association

Spring 2025

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- ◆ **Safety Precautions for Water Operators**
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Spring 2025

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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.

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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.

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By Todd Grinstead, Executive Director

From Your Executive Director Corporate Partners are a Vital Component of our Emergency Response Efforts.

In the wake of the recent storms that have impacted our communities drinking water and wastewater systems, our hearts go out to all those affected. These events have left many facing uncertainty, and hardship — and during times like these, our commitment to compassion, action, and community resilience becomes more important than ever.

At the Association, we are prepared and committed to mobilizing all available resources to support response to a system in need.

Our team works closely with local partners, volunteers, and community leaders to ensure that no one is left without the basics of life.

I want to acknowledge and thank our partners that have stepped up in times of need. We are incredibly grateful for the ongoing support from individuals, businesses and agencies who have reached out with

offers of help. Their compassion fuels our mission and allows us to respond swiftly and effectively.

In our emergency response efforts to provide water to systems impacted by recent severe weather, we were able to deploy our mobile water treatment plant and manpower to help systems provide water to their communities.

This effort would have been extremely difficult if it weren't for some of our key partners that contributed essential materials and equipment that enabled us to complete our mission safely and efficiently. Their willingness to donate resources and coordinate logistics have played a vital role in responding to the call for help.

A special thanks to;

- C2G Engineering
- CITCO Water
- Trombold Equipment
- West Virginia Emergency


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Each of these companies and organizations exemplifies what it means to be a good citizen. Their partnership has not only enabled us to complete a successful response, but has also strengthened our ability to serve our communities in the future

We are sincerely grateful for their belief in our work, and we look forward to continuing these meaningful partnerships as we move forward.

I would be remised if I didn't acknowledge our incredible WVRWA staff, who tirelessly go above and beyond to help to serve our communities while sacrificing their time away from their homes and families during these unfortunate times of need.

Thank you for helping us turn our vision into reality. Together, we are making a difference. ■



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Operators and a Day in the Treatment Plant

In the grand drama of environmental stewardship, where most folks only see what flows from their faucet, there stands a group of unsung heroes: the water and wastewater treatment operators. Some say these individuals can turn mucky puddles into sparkling marvels. Armed with little more than wrenches, gauges, and a bit of humor. Welcome to a day in the life of these water warriors!

A Morning Mug (of Water, Naturally)

Operators greet each day with a cup of coffee in one hand and a clipboard in the other, ready to tackle challenges before most people open their eyes. While others have their morning jogs, operators might be “running” checks on pumps, valves, and chemical levels. After all, who needs a treadmill when your daily steps involve piping?

Masters of the Control Room

The control room is our operators’ kingdom—a place where beeps and screens are like orchestras and bright canvases to an operator. It’s like Mission Control, only the mission is making sure folks upstream have clean showers and those downstream aren’t cursing yesterday’s dinner. Armed with peculiar jargon, operators ensure that every molecule is right where it needs to be. Think of it as a symphony, each lever pull is a note that keeps the harmony of H₂O intact.

In the Trenches—Literally

Don’t let the title “operator” fool you into thinking it’s a desk job. From de-clogging pipes that prefer hoarding sludge to wrestling with machinery more stubborn than a mule on strike, operators are

hands-on problem solvers. Each task is an exercise in patience, resourcefulness, and sometimes creative language choices best left unreported at family dinners.

The Intricacies of Wastewater Wizardry

It’s said that everything flows downhill, but we know the truth: it all lands here! Treating wastewater isn’t just a job, it’s a fine art. Who else could turn yesterday’s taboos into tomorrow’s treasures, all while keeping a straight face? With a metaphorical wand—often a screwdriver—operators transform questionable liquids back into nature-ready water, and sometimes, even laughter about the absurdity of it all.

Fun Facts and Food for Thought

- Got grit? You bet. It takes a special kind of devotion (and perhaps a slightly warped sense of smell) to keep going day after day.
- The average operator walks the plant floor more miles in a day than some people do in a week, all in an effort to keep the ecosystem—and the paycheck—flowing.

So, here’s to you, the water wranglers and pipe whisperers. May your pumps remain primed, your samples always clear, and your coffee pot perpetually full. Next time you raise a glass of water, remember, it’s a testament to the dedication of treatment plant operators who transform the mundane into the miraculous, every single day. Cheers! See you in class! ■

Water and Wastewater Operations Solutions



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Who We Are

Apex is a trusted partner in the water/wastewater industry, offering comprehensive support for your operational needs. Whether you're looking for temporary assistance or long-term solutions, Apex is here to ensure your facility runs smoothly and in compliance with all regulatory requirements.

Mission

As an award-winning engineering and environmental service, we know the struggles of the water/wastewater field. From the shortage of operators to the demanding permit requirements it can feel a bit overwhelming. Apex can help with operations and maintenance challenges at your water/wastewater facility.

We Can Help

Our goal is to provide essential operating services that keep your facility compliant and running efficiently. With experienced Certified Operators and a commitment to excellence, we are your trusted partner for water/wastewater management.

Contact Us

Let Apex provide the solutions you need to keep your facility running smoothly.

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- **Compliance Assistance and Permitting:** Navigating water and wastewater regulations can be complex. Our expert team provides comprehensive compliance assistance, ensuring your operations meet all local, state, and federal requirements. With a full engineering staff on hand, we monitor permit changes and offer tailored solutions to help you adapt seamlessly, minimizing risk and promoting sustainability.



The Importance of Managing PFAS

Per- and polyfluoroalkyl substances (PFAS) are found in a wide range of industrial and consumer products, from firefighting foams to textiles to beauty products. PFAS compounds are valued for their unique chemical qualities, which are used to imbue products with oil and water repellent surfactant qualities, chemical or heat resistance and non-stick surfaces.

However, over the last few decades, there has been growing concern about the long-term impact of

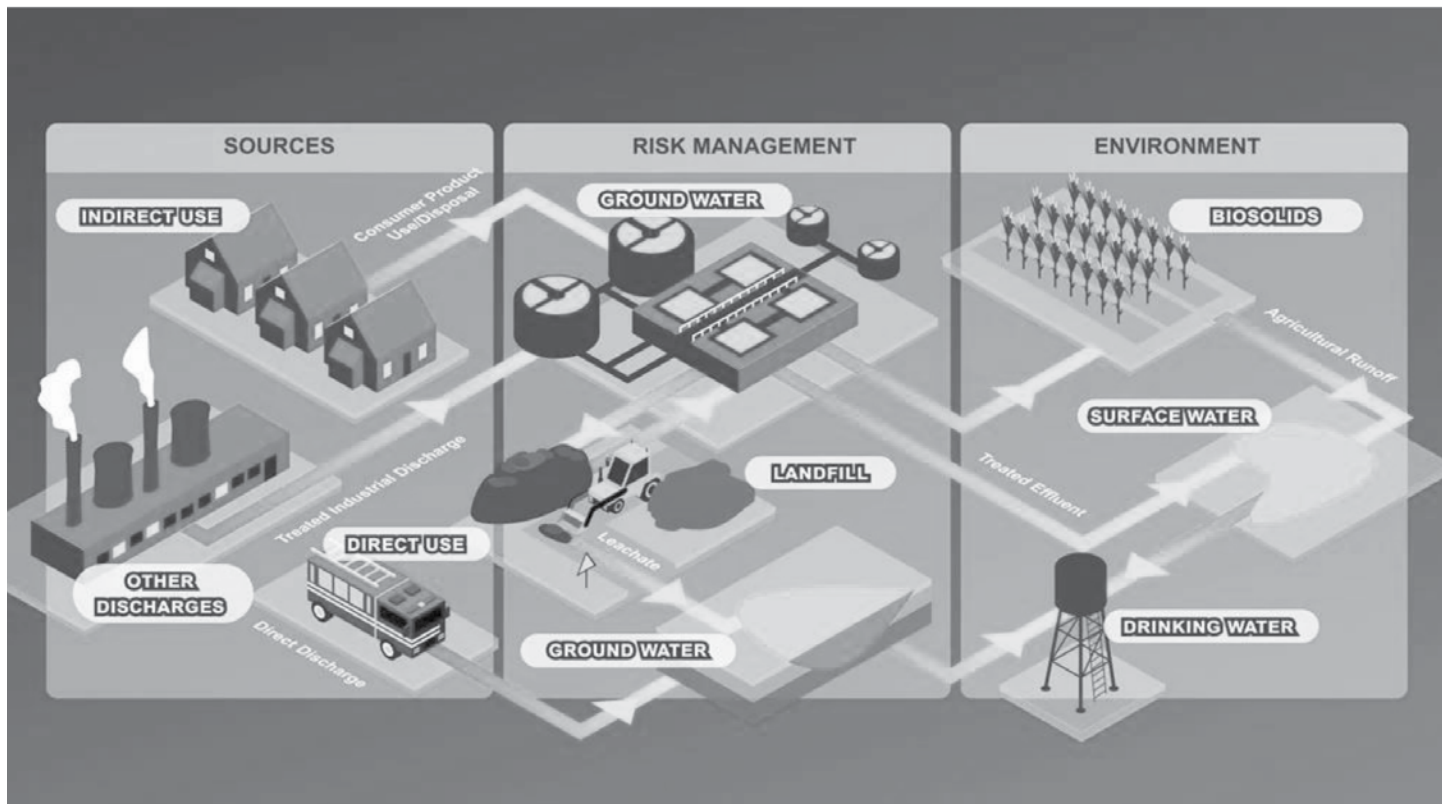
some PFAS on human health and the environment. PFAS are known as “forever chemicals” because they are very persistent in the environment. PFAS contamination can enter the environment through industrial waste streams, municipal waste, agricultural runoff, and runoff from military bases or airports using aqueous film-forming firefighting foams (AFFFs). PFAS chemicals are now widely found in groundwater, surface water, soil, and biological tissues of plants and wildlife around

the globe, even in remote Arctic and Antarctic locations.

In April of 2024 the EPA set limits and regulations for PFAS “forever chemical” for the Water Industry. The new MCLs will go into full effect in 2029.

This is why it’s crucial that we must sample, monitor and treat for PFAS. Please don’t hesitate to reach out to West Virginia Rural Water and ask for help.


Charlie Cooper
Emerging Contaminants ■



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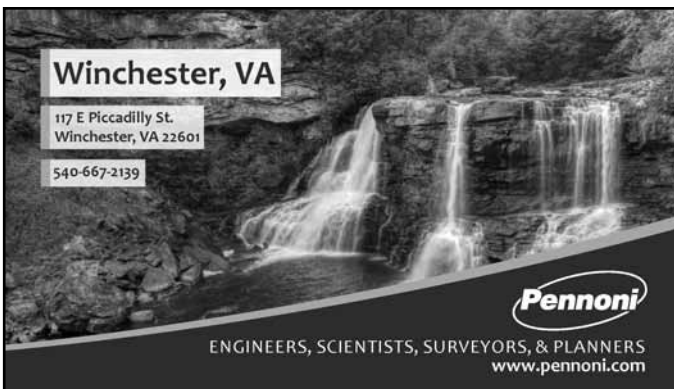


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The GWUDI Protocol

Ground Water Under Direct Influence of surface water (GWUDI) is a ground water source (a well, spring, mine, or other groundwater source) located where it will receive recharge from surface water. Because of the inclusion of surface water in the ground water source, it may be susceptible to contamination risks not typically found in a source that is only groundwater. For that reason, groundwater sources are required to be perform a GWUDI evaluation. GWUDI evaluations should be performed on all new groundwater sources, any groundwater source that has not previously been evaluated, or when the system is notified by the West Virginia Health Department, Source Water Assessment Protection Program Office that an updated evaluation is being required. Some groundwater systems in West Virginia have been required to performed GWUDI determination testing recently because their current evaluation was performed more than twenty years ago, and an update is required to determine if conditions have changed. If a system is determined to have a GWUDI source, the Surface Water Treatment Rule requires the system to provide adequate filtration and disinfection, and requires increased monitoring. By statute, a GWUDI is at minimum a Class II system but may be higher depending on the population served. In some cases, the utility may decide to develop a new source rather than upgrade their treatment to satisfy the GWUDI requirements. However, this can be risky simply because they may be in an area where it is difficult or im-

possible to establish a non-GWUDI groundwater source. For instance, if the utility is in a region known to have karst geological structure, drilling another well may be a waste of money and effort.

Information about GWUDIs is available at the WVHD website: <https://oehs.wvdhhr.org/eed/source-water-assessment-wellhead-protection/groundwater-under-direct-influence-of-surface-water-gwudi/>.

The GWUDI protocol used to determine if a source is a GWUDI utilizes total coliform and E. Coli counts along with temperature, pH, and turbidity data. Each source must be sampled individually and sampling requirements vary based on the system type, population served, and environmental conditions. First, the source is assigned to one of three Groups. The Groups are Low Risk Sources, Moderate Risk Sources, and High Risk Sources. The Group assignment will be made by the Source Water Assessment Protection Program personnel. The Group assignment will determine what sampling protocol will be required for that particular source. The difference being the number of bacteriological samples required for that source and if the system has to collect wet and dry weather samples. Samples can be analyzed by a State laboratory or by a certified private lab. The person taking the samples needs to make certain the laboratory knows the samples are for a GWUDI determination. Either the utility or the laboratory must submit the results to the WV Health Department at the Source Water Assessment Protection Program, Office

of Environmental Health Services, 350 Capitol Street, Room 313, Charleston, WV 25301-3713. There the results will be reviewed and the determination will be made. If the bacteriological data is inconclusive, other means will be used for the final determination.

If the evaluation reveals there is no connection between the groundwater source and surface water it will be considered Non-GWUDI, and minimum treatment will include disinfection, and an approved disinfection contact time. If, however, the evaluation test provides indicators, (e.g. such as temperature changes or the presence of coliform bacteria) that reveal the influence of surface water, then the source will be classified as GWUDI. When a source is classified as GWUDI, the utility will be notified by the WV Health Department in writing. Upon notification the utility will be required to comply with the requirement of the Surface Water Treatment Rule with filtration, disinfection, monitoring, and proper operator certification. Within eighteen months of the notification the utility must either comply with the rule, abandon the source, or rehabilitate the source to a place where the surface water infiltration is eliminated. For questions regarding the GWUDI evaluation process you can go to the WV Department of Health, Source Water Assessment Protection Program website at the link above, or you can call their office at 304-356-4298. You can also contact your WVRWA Sourcewater Specialist at jerrydotson@wvrwa.org or call 304-483-3497. ■



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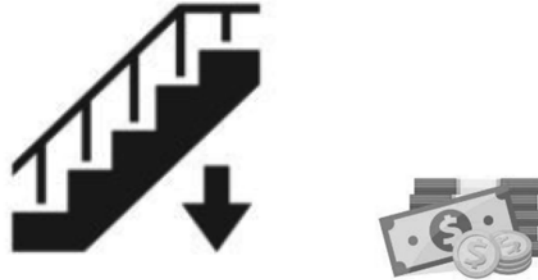
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Stepped Rate Structure



In West Virginia, all the rates I've looked at have reduced the price per 1,000 gallons when the customer uses more water. Most of the stepped rate structures have on average four different steps. The First Step is usually used for the 5/8" meters and is easy to see that the minimum usage is two or three thousand gallons. The way to tell is by doing a little math.

The "MINIMUM CHARGE" area contains the minimum dollars billed for the customer's meter size. As you know most Residential meters are 5/8". Using the Minimum Charge below a person can figure out the gallons covered by the rate structure above it.

Ex..... $\$20.28 / \$10.14 = 2,000$ gallons.

RATES (Customers with metered water supply)

First	2,000 gallons used per month	\$10.14 per 1,000 gallons
Next	4,000 gallons used per month	\$ 8.45 per 1,000 gallons
Next	4,000 gallons used per month	\$ 7.92 per 1,000 gallons
Over	10,000 gallons used per month	\$ 7.40 per 1,000 gallons

MINIMUM CHARGE

No minimum bill will be rendered for less than the following:

5/8	inch meter	\$ 20.28 per month
3/4	inch meter	\$ 30.42 per month
1	inch meter	\$ 50.70 per month
1- 1/2	inch meter	\$101.40 per month
2	inch meter	\$162.24 per month

A person must do this math for every size meter used in the water system.

I'll do the 2" below so you can better understand the process.

$\$162.24$ minus the 1st step of $\$10.14 \times (2,000 / 1,000) = \$162.24 - \$20.28 = \141.96
(2,000 gallons)

\$141.96 minus the 2nd step of \$8.45 X (4,000 / 1,000) = \$141.96 - \$33.80 = \$108.16
(6,000 gallons total)

\$108.16 minus the 3rd step of \$7.92 X (4,000 / 1,000) = \$108.16 - \$31.68 = \$76.48
(10,000 gallons total)

Since the last step is for all over 10.000 gallons I will do it a little differently.

$\$76.48 / \$7.48 = 10.22459$ $10.22459 \times 1,000 = 10,225$ gallons

Add the gallons from each calculation together to get the total gallons covered by the 2” Minimum Charge. 2,000 + 4,000 + 4,000 + 10,225 = 20,225 gallons

So when the customer pays the minimum charge of \$162.24 they would be getting 20,225 gallons of water.

This number must be used in the Billing system setup for the 2” meter. Most systems charge by 100 gallons or 1,000 gallons. Either way, I would round the number to the nearest 100 before putting it into the billing system.

The Billing system would look something like the example below for the two meters we calculated.

5/8” Meter

Minimum \$20.28	Covering 2,000 gallons
Next 4,000 gallons	\$8.45 per 1,000 gallons
Next 4,000 gallons	\$7.92 per 1,000 gallons
All over 10,000 gallons	\$7.40 per 1,000 gallons

2” Meter

Minimum \$162.24	Covering 20,200 gallons
All over 20,200 gallons	\$7.40 per 1,000 gallons

When a new tariff is received the PSC doesn’t give you the minimum gallons covered for each meter but it is a requirement for the billing system to work properly. Most new management personnel are pretty slick on a computer, but if the billing program isn’t set up properly it can cause many different problems which will take a lot of time to fix when confronted with them.

I hope this article wards off some of those problems and it makes your job a little easier.

JOIN WVRWA

Safety Precautions for Water Operators

Water operators play a critical role in ensuring the safety and quality of drinking water and wastewater treatment. However, this profession comes with significant hazards that can impact health and safety. Understanding these risks and implementing strict safety measures can help prevent accidents and long-term health complications.

Common Hazards for Water Operators

1. Chemical Exposure

Water treatment facilities use chemicals such as chlorine, ammonia, and sodium hydroxide, which can be hazardous. Inhalation or direct contact can cause respiratory issues, burns, or poisoning.

2. Confined Spaces

Operators often work in confined spaces like tanks, wells, and trenches, where there is a risk of oxygen deficiency, toxic gas buildup, and entrapment.

3. Slip, Trip, and Fall Hazards

Water treatment plants have wet and slippery surfaces, leading to falls that can cause serious injuries.

4. Machinery and Equipment Risks

Operators work with heavy machinery, including pumps, compressors, and conveyor systems. Improper handling can result in severe injuries such as crushing, amputation, or electric shock.

5. Electrical Hazards

Water treatment facilities involve electrical systems that, if improperly maintained, can lead to electrocution or fires.

6. Extreme Weather and Environmental Conditions

Water operators working outdoors may face extreme heat, or cold, increasing the risk of heatstroke or hypothermia.

Essential Safety Precautions

1. Proper Use of Personal Protective Equipment (PPE)

Operators should wear gloves, safety goggles, respirators, steel-toe boots, and chemical-resistant clothing when handling hazardous materials.

2. Confined Space Safety Protocols

Before entering confined spaces, operators must follow OSHA's confined space entry procedures, including air monitoring, ventilation, and the use of harnesses and lifelines. OSHA standards should also be utilized when shoring trenches.

3. Slip-Resistant Surfaces and Fall Protection

Facilities should have non-slip flooring, proper drainage, and railings. Operators should also wear slip-resistant footwear and use fall protection equipment when working at heights.

4. Safe Handling of Chemicals

Workers should be trained in chemical handling, including proper storage, labeling, and emergency response procedures for spills or exposure incidents.

5. Proper Ventilation and Air Monitoring

To prevent toxic gas exposure, work areas should have adequate ventilation, and operators should use gas detectors before entering con-

finied spaces.

6. Regular Equipment Maintenance and Training

Operators must receive training on machinery operation and undergo regular inspections to prevent malfunctions and accidents.

7. Electrical Safety Training

Operators should be trained to recognize electrical hazards and use proper lockout/tagout (LOTO) procedures before working on electrical equipment.

9. Emergency Preparedness and Response

Facilities should have clear emergency response plans for chemical spills, fires, equipment failures, and medical emergencies. Operators should regularly participate in emergency drills.

10. Weather Preparedness and Protective Measures

For outdoor work, operators should wear appropriate clothing, stay hydrated, take breaks in shaded areas, and monitor weather forecasts to avoid hazardous conditions.

The role of a water operator is vital but comes with inherent risks. By understanding potential hazards and following stringent safety protocols, operators can safeguard their health while ensuring the public receives clean and safe water. Employers must prioritize workplace safety, provide proper training, and enforce protective measures to minimize risks. A proactive approach to safety can prevent accidents and create a safer working environment for all water operators. ■

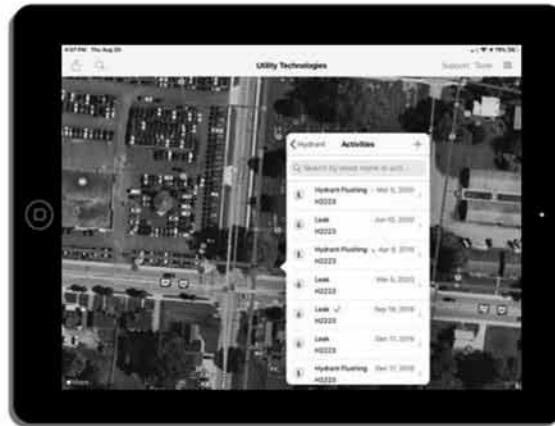
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Why Drinking Bottled Water Can be Much Worse for You than Tap, According to New Research

“**T**he FDA hardly has any regulations at all for bottled water.”

Bottled water first became popular in the United States in the 1970s and 1980s, with many brands aligning themselves with health and fitness. Today, 96% of Americans buy bottled water and nearly one in five only drink bottled water. However, a growing body of research has found that bottled water has its own challenges — and regular tap water may be better in most situations.

A recent scientific paper published in *BMJ Global Health* argues that tap water in the U.S. is almost always a healthier choice than drinking bottled water. The paper notes that “misunderstandings about the safety and potential risks of bottled and tap water persist,” adding that “tap water is generally safe, inexpensive, convenient, and eco-friendly.” But tap water has gotten its own share of criticism lately, raising a lot of questions about why it may be a better choice than its bottled counterpart. Water safety experts explain what’s behind this.

Why might tap water be better than bottled water?

The biggest reason for tap water being safer than bottled water is regulations imposed by the government, says Gerald Kauffman Jr., PhD, director and associate profes-

sor at the University of Delaware Water Resources Center. “Tap water is regulated by the Environmental Protection Agency, and that protects the health of the tap water that we drink,” he says.

Congress passed the Safe Drinking Water Act in 1974, which regulates the country’s drinking water supply. The act requires public water systems to follow standards laid out by the EPA, including monitoring the water and publicly reporting on findings. The Safe Water Drinking Act also requires municipal water systems to provide annual water quality reports to users. But the standards are not the same for bottled water. “There are more standards and regulations for water coming out of your tap than for bottled water,” says John Rumpler, clean water director and senior attorney for Environment America.

While tap water is regulated by the EPA, bottled water is regulated by the Food and Drug Administration (FDA). “The FDA hardly has any regulations at all for bottled water,” Kauffman says. Bottled water is also significantly more expensive than tap water, he points out. Recent research has even found that plastic from water bottles leaches into the water, which can contain 240,000 detectable plastic fragments per liter. Of those fragments,

90% were nanoplastics, tiny pieces of plastic linked to a range of health issues, including heart disease and cancer.

But tap water isn’t perfect, either. A study published in 2023 detected the presence of per- and polyfluoroalkyl substances (PFAS), aka forever chemicals, in about 45% of U.S. drinking water samples. Another 2023 study detected the presence of contaminants like arsenic, fracking fluids, lead, nitrates, chlorinated disinfection byproducts, and uranium in some municipal water systems.

What water safety experts recommend for clean, safe drinking water

While tap and bottled water isn’t perfect, experts say drinking from the tap is usually the better choice. “By and large, tap water is safe,” Kauffman says. “I drink tap water.”

Stapleton agrees. “Tap water has gotten a bad reputation with the rise, availability, and advertising of bottled water. However, tap water has been demonstrated to be a better choice,” she says. “It is less expensive, more environmentally friendly — especially considering bottle production, processing, packaging, distribution, and disposal — and is consistently regulated at the state and federal level.”

By Korin Miller Published on January 12, 2025 ■



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National Rural Water Association is an equal opportunity provider and employer. This material is based upon work supported by the Rural Utilities Service, United States Department of Agriculture.

The Impact and Recovery from Devastating Flooding on Wastewater Treatment Plants & Collection Systems in Rural West Virginia

Flooding is one of the most destructive natural disasters affecting infrastructure across the United States, and rural West Virginia is no exception. With its mountainous terrain, heavy rainfall, and proximity to rivers, West Virginia's wastewater treatment plants (WWTPs) and collection systems are highly vulnerable to severe flooding events. These disasters not only damage critical infrastructure but also pose significant risks to public health and the environment. The recovery process is often long and challenging, requiring substantial resources and strategic planning.

Impact of Flooding on Wastewater Infrastructure

When floods strike rural West Virginia, wastewater treatment facilities face multiple threats. Rising waters can submerge essential components such as aeration tanks, electrical control systems, and disinfection units, leading to severe operational disruptions. Many rural treatment plants rely on lagoon-

based systems, which are especially prone to overtopping and contamination when flood waters mix with sewage. As a result, untreated or partially treated wastewater can be released into nearby rivers and streams, exacerbating environmental pollution.

Collection systems also suffer from the effects of heavy flooding. Inundated sewer lines and manholes allow large volumes of floodwater to infiltrate the system, overloading its capacity and causing sanitary sewer overflows (SSOs). These overflows can lead to raw sewage spilling onto streets, into homes, and contaminating local waterways, increasing the risk of waterborne disease outbreaks.

Public Health and Environmental Concerns

Flood-related damage to wastewater infrastructure creates serious public health hazards. Contaminated floodwaters can spread bacteria, viruses, and chemicals, threatening both human populations and aquatic ecosystems. Rural communities in

West Virginia, many of which rely on private wells for drinking water, are particularly at risk of cross-contamination. When floodwaters carry untreated sewage into groundwater sources, residents may be exposed to dangerous pathogens such as *E. coli*, *Giardia*, and norovirus.

Additionally, sediment and debris carried by flood waters can clog treatment systems, reducing their efficiency and increasing the cost of recovery. The long-term environmental consequences of untreated sewage discharges include reduced water quality, fish kills, and habitat destruction, making it even more critical for wastewater utilities to implement effective flood mitigation strategies.

Challenges in Recovery and Restoration

The recovery process for wastewater treatment plants in flood-affected rural areas of West Virginia is complex and resource-intensive. Limited funding, aging infrastructure, and a shortage of skilled personnel make it difficult for small

utilities to rebuild quickly. Many wastewater facilities operate on tight budgets and struggle to secure federal or state assistance for necessary repairs.

Emergency response efforts typically focus on restoring essential services as quickly as possible. This may involve temporary bypass pumping, repairing damaged electrical components, and removing debris from treatment basins. However, long-term recovery often requires significant investments in infrastructure upgrades, such as raising control panels above flood levels, installing more resilient piping materials, and reinforcing treatment lagoons with protective barriers.

Mitigation Strategies for Future Resilience

To reduce the impact of future flooding events, wastewater utilities in West Virginia must prioritize proactive resilience measures. Some key strategies include:

1. Elevating Critical Infrastructure – Raising electri-

cal systems, backup generators, and control rooms above known flood levels can help prevent catastrophic failures during flood events.

2. Improving System Capacity – Expanding the hydraulic capacity of collection systems and treatment facilities can help mitigate the risk of overflows.

3. Installing Backup Power Solutions – Ensuring treatment plants have reliable backup power sources, such as generators or solar arrays, can keep essential systems operational during extended power outages.

4. Strengthening Stormwater Management – Enhancing stormwater infrastructure, such as retention ponds and improved drainage channels, can reduce the likelihood of excess water overwhelming wastewater facilities.

5. Securing Emergency Funding and Resources – Establishing financial reserves and applying for grants from agencies such as FEMA and the EPA can help wastewater utilities recover more quickly after a disaster.

Conclusion

The devastating effects of flooding on wastewater treatment and collection systems in rural West Virginia highlight the urgent need for improved resilience and disaster preparedness. While recovery efforts can be costly and time-consuming, investing in infrastructure improvements and emergency response strategies will help safeguard both public health and the environment. By taking proactive measures today, wastewater utilities can reduce the impact of future floods and ensure the continued reliability of essential services for rural communities. ■

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The Growing Challenge of Finding Water Operators: An Overlooked Crisis

Water operators play a critical role in ensuring the supply of clean, potable water to communities across the globe. They manage treatment plants, monitor water quality, repair infrastructure, and ensure that water reaches consumers in a safe and efficient manner. However, the task of finding skilled water operators is becoming increasingly difficult. This shortage is not only a staffing issue but also a public safety concern, as it threatens the sustainability of water systems and the health of populations that rely on them.

The Scope of the Crisis

The need for qualified water operators is escalating, driven by a variety of factors, including aging infrastructure, increased water scarcity, and a growing demand for clean water due to population expansion. In many regions, water systems are aging and require constant maintenance. Operators are essential in ensuring that water treatment plants function efficiently, and contaminants are removed effectively. The challenge arises when there are simply not enough skilled professionals available to fill the roles.

According to the American Water Works Association, the U.S. alone is facing an impending shortage of more than 30% of the water utility workforce in the next few years. In some areas, the gap between the demand for operators and the available workforce is already significant.

Many utilities report difficulty in hiring and retaining qualified individuals to work as water operators, despite the crucial nature of their jobs.

Why is it So Hard to Find Water Operators?

1. **Aging Workforce:** One of the main reasons for the shortage is the aging workforce in the water industry. Many experienced water operators are approaching retirement age, and younger generations are not filling the gap at the same pace. Water operation is a highly specialized field, and the level of expertise required means it takes years of experience and training to become proficient. There is a significant gap between the older generation of workers retiring and the younger workforce coming in.

2. **Lack of Awareness and Interest:** Water operations are often overlooked as a career path by younger generations. The industry struggles to attract new talent due to a lack of awareness about the profession and its importance. Many young people are unaware of the vital role water operators play in maintaining public health and infrastructure. Additionally, the profession does not receive the same level of attention or recognition as other technical fields, like engineering or IT, which can deter individuals from considering a career in water management.

3. **Training and Certification Requirements:** Becoming a certified

water operator typically requires specific educational qualifications, hands-on experience, and passing rigorous exams. For many potential candidates, the lengthy certification process and the initial time investment can seem daunting. Many utilities are left struggling to fill positions with candidates who have the necessary training and qualifications.

4. **Compensation and Job Conditions:** Although water operators provide an essential service, their pay and working conditions often do not reflect the critical nature of their jobs. In some regions, water operators are not compensated at the level they deserve, making it harder to attract and retain talent. Job conditions, including shift work, on-call hours, and the physically demanding nature of the work, can also deter potential applicants.

5. **Rural and Remote Areas:** Water operators are in high demand in rural and remote areas, where it is even harder to attract qualified candidates. These areas often face additional challenges, such as fewer amenities, less access to training opportunities, and lower pay scales compared to urban areas. The difficulty in attracting operators to these regions exacerbates the issue, leading to more strained water systems.

The Consequences of a Shortage of Water Operators

The shortage of water operators is not just an inconvenience; it has significant public health and environ-

mental implications. Without sufficient staff to maintain and operate water systems, communities could face:

Water Quality Issues: Operators are responsible for ensuring that water is treated to meet safety standards. A shortage of operators increases the risk of contamination, waterborne diseases, and unsafe drinking water.

System Failures: Water treatment plants and distribution systems require constant monitoring and maintenance. With insufficient staff, systems may become vulnerable to breakdowns, leading to interruptions in water supply and potentially expensive repairs.

Increased Workload for Existing Operators: The shortage forces existing operators to take on more responsibilities, leading to burnout, higher turnover, and a further exacerbation of the problem.

Regulatory Non-Compliance: Water utilities are subject to strict regulations, and failing to meet compliance standards can result in penalties. A lack of trained operators can lead to missed regulatory

requirements and potentially costly fines.

Potential Solutions

Addressing the shortage of water operators requires a multifaceted approach:

1. **Promoting the Profession:** Raising awareness about the importance of water operators and the career opportunities in the field is essential. Educational programs and outreach campaigns can help attract young people to the profession, while highlighting the rewarding aspects of the job, including job stability and the sense of contributing to public health.

2. **Expanding Training Opportunities:** Offering more accessible training programs, apprenticeships, and certification opportunities can help ease the entry barriers for aspiring water operators. Partnerships between utilities, vocational schools, and government bodies could help create streamlined paths into the profession.

3. **Improving Compensation and Working Conditions:** To attract and retain skilled workers, utilities

must address compensation issues and improve working conditions. Competitive pay, better benefits, and improved workplace environments could make water operations a more attractive career choice.

4. **Automation and Technology:** The integration of modern technology and automation can help alleviate some of the pressure on water operators. However, this should not be seen as a replacement but rather as a tool to assist operators in their daily work and increase their efficiency.

Conclusion

The shortage of qualified water operators is a growing crisis with far-reaching implications for public health, safety, and infrastructure. Addressing this issue requires a concerted effort from government bodies, utilities, and educational institutions. By investing in workforce development, improving the working conditions of operators, and raising awareness about the importance of the profession, we can begin to close the gap and ensure that clean water remains available to everyone, everywhere. ■



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Types of Decentralized WW Treatment

Having a hard time with the budget for expansion of your current wastewater system? Looking for ways to meet the new budget or cut the cost of existing project estimates? Have you considered decentralized wastewater treatment system? Decentralized system may be your answer to your systems challenges now and in the future. Decentralized systems are great when the possibility of hooking into a centralized system is not an option. In the following article we will look at some **types** and **benefits** to installing a decentralized wastewater treatment (DWWTP).

First let's establish a basic definition for what is a decentralized wwtp. Decentralized treatment is focused on collecting, treating and dispose of sewer locally and not through a centralized treatment system. Decentralized is not a certain type of treatment but rather the location of the treatment being locally focused on that community and it's needs. A decentralized treatment system can and has been used in HOA's, businesses, parks, camping grounds, small communities and anywhere there is a need for sewer treatment that can't be tied to a centralized system. A decentralized system may be your best for treatment due to cost of infrastructure to tie into a centralized system. In the following article we will focus on 2 biological treatment options for a decentralized system: **Suspended**

growth and attached growth.

Now that we have established what decentralized wastewater treatment are and biological treatment options, let's look at a few types of treatment options under each category.

1. **Suspended growth treatment options**

- a. **MBR (membrane bioreactor)** - Simple put MBR's are a hybrid treatment using aeration and microfiltration. MBR's have a small footprint and high-quality effluent and are a great option for those that have strict permit limits on discharge and or they need to reuse their effluent for non-potable applications. Non-potable examples: gardening, watering yards, washing vehicles etc. MBRs are becoming more popular in areas of strict effluent quality example: small streams where native fish thrive. With MBRs small footprint this is a great treatment option for a decentralized system.
- b. **CAS (conventional activated sludge)** - The most common of all sewer treatment systems CAS can be used also in a small footprint design which can work well for HOAs, small towns and communities. CAS sys-

tem using aeration, degradation and settle of sludge. A decentralized CAS treatment for small communities would be called a package plant. A package plant is basically using aeration, microbiology and a clarifier to settle sludge out and then remove it from the plant. The aeration gives oxygen to the microbiology to allow it to continue to eat the raw sewer coming into the plant and the goal is to keep a healthy microbiology working for you in the treatment process. A CAS system is a very old treatment process but still can be effective for a decentralized community if designed and used properly.

- c. **Aerated septic system** - Yes, aerated septic systems, I would consider to be a suspended growth treatment since aeration is added. Normally a traditional septic system is anaerobic and doesn't give much treatment but once aeration is added and maybe a few other key components, an aerated septic system can produce high quality effluent. Aerated septic systems normally are used for 2,000 gpd treatment, but according to <https://www.infiltratorwa->

ter.com/ there are systems that have been designed and installed with a capacity of 100,000 gpd. Several factors that affect the use of an aerated septic system are the lay of the land, type of soil and the absorption rate of the soil.

2. Attached growth treatment options

a. **RBC (rotating biological contactors)** – RBC technology has been around awhile in the treatment of sewer system, mostly centralized, but with technology continue to move forward RBC have become more popular in decentralized areas. An RBC doesn't use aeration for oxygen, but it uses rotating contactors that move 24/7 to allow the biology to be aerated and provide food continuously. This system can be setup to treat low flow or high flow applications, custom designed for what the system needs. RBC treatment system is very quiet and most the time little to no odor produced, which makes a great choice for small footprint areas, and close proximity to residents, business and or small communities.

b. **Sand filters** – Sand filters can be a great addition to a primary treatment. Sand filters can be a treatment option for large or small treatment needs. Sand filters are another form of attached growth treatment that utilize microorganism to remove organic matter from wastewater. Sand filters

essentially spray the supernatant of the primary treatment system over sand and filter membrane that will gravity feed through the filter member and go to a form of disinfection and then be discharged back into the local environment. Sand filters are installed in addition to a primary treatment. Sand filter is a great asset to help utilize an attached growth treatment and can help produce high quality effluent for low or high flow system for a decentralized community.

c. **Constructed Wetlands** - Constructed wetlands are a considered an attached growth treatment system that is used for secondary or tertiary treatment following a primary source. CW mimics natural patterns using water, rocks, sand, soil and plants to help breakdown sewer naturally as possible. Most applications for wetlands are very cost effective and energy efficient due to majority of applications are gravity feed inlet and outlet.

3. Benefits

a. **Cost** – Probably the number one question when dealing with any type of treatment system is how much it costs. Well using a decentralized system can have potential to have reduced cost due to less piping and infrastructure needed when not tying into a centralized system. With the cost of lift stations, piping and labor a decentralized treatment system can be much more cost

effective for the community needs.

b. **Timeframe** – Decentralized systems can be installed quickly and many come prepacked and ready to install customized already per site. Where a centralized systems take much more custom prep work onsite.

c. **Scalability** – Decentralized systems are usually very scalable per site needs, and if the system needs to grow and has the space another unit can be installed and attached to existing treatment quickly and double or triple slow capacity.

d. **Energy Efficient** – Most DWWTP don't use much electricity or if any at all in some applications, making the cost to operate the system very cost effective for the community. Solar is becoming a popular item for these small systems, so that no major electrical infrastructure is needed.

In summary of Decentralized Wastewater treatment system will continue to be a hot topic going forward in the future for sewer treatment. With the rising cost of all materials and labor systems will need to meet tight budgets and DWWTP will be a treatment option that is looked at now and in the future. If a DWWTP is designed and installed correctly they can be a reduce cost compared to centralized system and produce a great effluent for the safety of the community and environment.

Site sources

https://www3.epa.gov/npdes/pubs/trickling_filter.pdf

<https://www.cseindia.org/> ■

SUDOKU PUZZLE

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

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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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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Cybersecurity- Updates & Protocols

It seems that our digital world continues to expand by the second and the importance of cybersecurity has never been more paramount. With cyber threats evolving at such a rapid pace, staying ahead of the game requires a most vigorous approach that encompasses the latest updates and time-tested protocols. Let's take a look at the current state of cybersecurity and the protocols that can help safeguard our digital lives.

Recent Updates in Cybersecurity:

- 1. Software Patches and Updates:** Keeping software up to date is a frontline defense against cyberattacks. Regular patches and updates address security vulnerabilities that could be exploited by attackers. Organizations are encouraged to enable automatic updates to ensure their systems are protected from known threats. The Cybersecurity and Infrastructure Security Agency (CISA) continuously monitors and advises on necessary updates.
- 2. NIST Cybersecurity Framework Enhancements:** The National Institute of Standards and Technology (NIST) remains a critical resource in cybersecurity, constantly refining its framework to tackle emerging threats. Recent initiatives focus on securing the software supply chain, enhancing the protec-

tion against potential breaches, and advancing post-quantum cryptography to prepare for future computational advancements.

Key Protocols for Well-Conditioned Cybersecurity:

- 1. Strong Password Policies:** Complex, unique passwords are essential. Encourage the use of password managers to generate and store secure passwords. Regularly updating passwords adds an extra layer of security.
- 2. Multi-Factor Authentication (MFA):** MFA is a crucial protocol that adds an additional verification step, such as a fingerprint scan or a one-time code, making it significantly harder for attackers to gain unauthorized access.
- 3. Firewalls and Network Segmentation:** Firewalls act as gatekeepers, blocking unauthorized access to networks. Segmenting networks ensures that if one part is compromised, the damage is contained, preventing attackers from moving laterally.
- 4. Data Encryption:** Encryption is vital for protecting sensitive data, ensuring that even if data is intercepted, it cannot be read without the decryption key.
- 5. Incident Response Plans:** Having a healthy incident response plan is critical. These plans should detail steps for

identifying, containing, and mitigating the impact of a cyber incident, and should be regularly updated and tested.

Emerging threats on the radar include an even more sophisticated Ransomware which can be downloaded in many various ways. This malicious software encrypts a victim's data and locks them out, then the attackers demand a ransom for its release. You **MUST** have backup strategies and try to avoid paying the ransom to discourage this evil practice.

Phishing Attacks still remains a widespread threat where attackers deceive you into revealing sensitive information such as bank accounts and social security numbers. Awareness training and strong email security measures are essential defenses.

Insider Threats, such as a belligerent ex-employee can be intentional or accidental. With regular audits, access controls, and monitoring, we can help alleviate these risks.

Looking ahead to the landscape of cybersecurity, it is ever-changing, with new threats and technologies continually emerging. By staying informed about the latest updates and adhering to proven protocols, individuals and organizations can strengthen their defenses against cyber threats. Remember, cybersecurity is not just a technical issue but a collective responsibility among everyone. Staying vigilant, informed, and prepared is our best defense for any and all

Cybersecurity Threats. ■



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



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Managing Fire Hydrants to Control Water Loss

Many water utilities lose an appreciable amount of water from fire hydrants that are opened without authorization or knowledge of the water utility. This not only results in an apparent loss but also frequently results in damage to fire hydrants from improper operation. In addition to loss concerns, fire hydrants are viewed more seriously as a security issue in the post 9/11 world. Hydrants could potentially be used as an entry point to intentionally inject contaminants into the drinking water supply; therefore, having strong oversight of fire hydrants is now viewed as more critical as in the past.

The primary purposes of fire hydrants are firefighting and water distribution system testing and maintenance, including flushing water mains. In many water utilities, however, the use of fire hydrants for both authorized and unauthorized purposes goes far beyond these functions. Unauthorized use from fire hydrants, which is classified as apparent losses, occurs when water is drawn illegally from hydrants to fill tank trucks for construction purposes. Many

water utilities have policies that permit water to be drawn from fire hydrants for a variety of purposes. This water typically falls under unmetered, unbilled authorized consumption in the water audit and includes water used in street cleaning and filling swimming pools.

These varied uses of fire hydrants pose potential problems for water utilities and a customer, including water taken from fire hydrants is often unmetered. The more hydrants that are opened the greater the amount of water that must be metered or estimated to quantify this consumption in the water audit. Water taken continuously from fire hydrants should include backflow protection to prevent contaminants from entering the distribution system during a negative pressure event. Water drawn from a fire hydrant could pose a health risk if used for human consumption since water quality degradation can occur as the water passes through the barrel of the hydrant. Widespread unauthorized openings of fire hydrants can result in greatly reduced pres-

sure in the distribution system, crippling firefighting capability and greatly increasing the risk of backflow contamination. Allowing a variety of people to operate fire hydrants increases the likelihood of damage occurring to hydrants due to lack of familiarity with operating procedures or use improper tools to operate the fire hydrant. And allowing multiple uses of fire hydrants sends a poor public relations message that water is free for the taking to those who can manage to open a hydrant.

In closing; for the above reasons it is recommended that water utilities keep the number of permitted uses of fire hydrants to a minimum, and such usage should be carefully regulated and overseen. Utilities should vigorously maintain control of their fire hydrants and resist request for sundry uses of hydrants. It is important that the utility establish a sound policy for fire hydrant usage that is supported by the fire department and political leaders. Procedures for permitting and tracking allowable uses should be put into place and enforced. ■

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Inflow and Infiltration in Wastewater Systems

Wastewater systems play an important role in public health and environmental protection. However, inflow and infiltration, often referred to as I&I, are issues that can overwhelm these systems. This leads to inefficiencies in the system, environmental risks, violations, and increased costs. Inflow and Infiltration which is commonly called I&I, is large amounts of unwanted water flowing into a sewer system. Inflow and infiltration are terms used to describe unwanted water entering the sanitary sewer system from sources outside of the system. When excess water such as groundwater and stormwater a collection system, it contributes to I&I, causing many challenges for the treatment facilities. I&I is a concern for wastewater systems because it causes the system capacity to exceed the treatment plant design capacity. This in turn, requires more energy and raises costs or requires treating a higher quantity of wastewater.

Reasons for Inflow

- Yard Drains
- Sump Pumps
- Roof Drains connected to the system
- Flooding
- Entry at poorly sealed Manholes

Reason for Infiltration

- Manhole Covers improperly sealed
- Aging infrastructure
- Failing pipe joints
- High Groundwater levels

One of the biggest issues with I&I

is to detect it. One of the best ways to track I&I is to keep track of flow rates. Look for sudden flow increases during and after a rain events.

Comparing dry and wet weather flow rates with wet weather events can also reveal circumstances that point to inflow and infiltration. This method helps identify trouble spots in the sewer system for further investigation. Flow monitoring techniques help detect problem areas in the collection system caused by inflow and infiltration. Temporary or permanent flow meters are can be used to measure the amount of water moving entering sewer lines, which helps find jumps in flow rates... This allows utilities to see which areas of the collection system are most affected by inflow and infiltration, making it easier to determine necessary repairs.

Inspection Techniques

- Dye Testing
- Camera Inspections
- Smoke Testing
- Manhole Inspections during Wet Weather

Problems Caused by Inflow and infiltration are many including:

Excessive Water at Treatment Plants: I&I can overwhelm wastewater treatment plants by because of all the extra water it adds to the system. This extra water takes treatment units away that could be used for the treatment of wastewater thus, reducing the plant's efficiency. In many cases, this becomes so overwhelming that costly expansions to the treatment facility are needed to

handle the extra flow.

Increased Energy Costs: When I&I adds extra water to the system, it requires more run times on almost all equipment thus increasing energy cost process that water. This higher energy use drives up operating cost, increasing the treatment process cost while decreasing efficiency over time.

Higher Solids Disposal Costs Burden: The additional water from I&I dilutes the wastewater, making it more difficult and time consuming to treat. This sometimes requires extra steps to process, leading to higher costs for disposal and treatment.

Uncontrolled I&I can lead to significant operational, environmental, and financial challenges for Wastewater systems like yours. I&I puts an increased workload on wastewater system equipment. This constant overuse causes the equipment to wear out faster. The added use also raises maintenance and operating costs and can disrupt the system performance.

Compliance Issues

I&I can cause combined sewer overflows, where untreated wastewater escapes the system and enters the environment. These overflows contaminate rivers, lakes, and other water bodies, posing serious risks to public health and the receiving water.

When untreated wastewater from overflows is released into the receiving water, it often violates discharge permits and regulations. This non-compliance can result in costly fines

for wastewater systems. These fines can lead to financial instability and highlight the importance of addressing I&I up front and quickly.

Economic Costs

Increasing the size of the system to compensate for the increase in capacity often becomes necessary. These upgrades, such can become

very expensive and time-consuming. However, many of these costs can be avoided by proactively managing of I&I issues.

I&I issues can be a major problem at your wastewater facilities. Please do all you can to get the I&I out of your system. This should save your system time, money and equipment.

If need be, West Virginia Rural water has some equipment to help you find I&I. We have smoke blowers we loan out. We can also help you with some camera inspections with our push cameras. We can also assist with dye testing if need be. Contact us for some assistance on finding some of your I & I problems. ■

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- Low construction costs and available contractors are not guaranteed to last.



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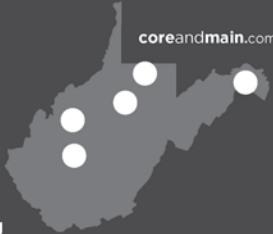
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Resource Recovery Strategies to Transform Wastewater into Revenue

As the world grows more focused on sustainability and resource management, wastewater systems are in a unique position to make a substantial impact. Traditionally viewed as waste, wastewater contains a bounty of valuable resources — nutrients, energy, and other resources that can be recovered, reused, or sold to help offset operating costs and provide a meaningful return on investment in our communities.

For years, water and sewer utilities have focused primarily on treating wastewater to meet regulatory requirements standards and release the treated effluent back into receiving water bodies. However, with advancements in nutrient removal technologies and a growing recognition of the value in wastewater, the industry is now recovering these nutrients for reuse — thereby creating a sustainable green solution while potentially significant revenue in the process.

One of the key frameworks guiding this shift is the “Utility of the Future” initiative, developed by the National Association of Clean Water Agencies (NACWA), the Water Environment Federation (WEF) and the American Water Works Association (AWWA) in 2013. This comprehensive blueprint envisions utilities as entities that go beyond day-to-day wastewater treatment. Wastewater treatment plants have evolved and are often referred to as water resource recovery facilities (WRRFs).

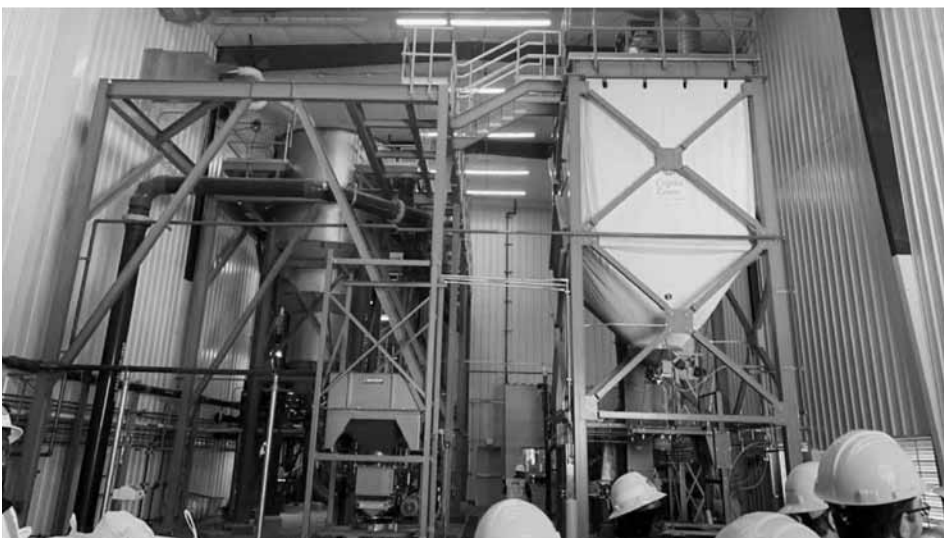
By capturing nutrients, heat, and other resources, utilities can transform their facilities into hubs of sustainability while creating meaningful cost recovery and even revenue from the offtake agreements by the end users. Many wastewater utilities have transformed their operations by leveraging this critical element of our circular economy—with nutrient recovery as a backbone for future-forward resource planning.

Nutrient recovery: The low-hanging fruit

Among the most valuable resources in wastewater are nutrients like nitrogen and phosphorus. While these nutrients are essential for agricultural fertilizer production to support the U.S. food supplies, these nutrient loads, particularly phosphorous loads, are detrimental to water resources if not properly treated. The U.S. and the world are facing a diminishing supply of naturally occurring phosphorus, making wastewater-based phosphorus recovery a sustainable solution with long-term benefits.

Nutrient recovery technologies such as Ostara’s Pearl are helping utilities extract valuable nutrients from wastewater and convert them into high-quality fertilizer. This process precipitates struvite formation, turning a typically wasted resource into a marketable resource for agriculture. By reducing waste and promoting reuse, these innovations support a circular economy, reintegrating essential nutrients into the agricultural fertilizer market to support our food supply system.

Examples of successful nutrient recovery installations in Georgia include the F. Wayne Hill Water Resources Center, which has been using the Ostara Pearl(TM) and WASTRIP(TM) technologies to recover nutrients from the wastewater treatment process. The system has not only improved nutrient management but also created a new revenue stream for the utility, produc-



ing over a ton of fertilizer per day. Similarly, the RM Clayton Water Reclamation Center (WRC) in Atlanta, Georgia, has benefitted from this nutrient recovery technology as part of the Mayor's Sustainability and Resiliency program to aid with permit compliance, and reduce chemical and operating costs.

As nutrient recovery systems improve, the financial benefits from the sale of fertilizer products can be substantial to help offset the annual operating costs within a facility especially after the payback period ends.

Energy and heat recovery: A multi-resource approach

In addition to providing nutrients, WRRFs also offer latent heat and energy that is converted to biogas during the treatment process. Methane gas, a by-product of anaerobic digestion, can be captured and used to generate combined heat and power (CHP) or even returned to the local gas system. This biogas is considered a renewable energy source and when used in a CHP system, can generate substantial power and heat which reduces the purchased power from the local power utility. By combining nutrient recovery with energy and heat management, utilities can significantly reduce op-

erational costs and improve their bottom line. Both of the WRRFs mentioned in Georgia have utilized CHP programs for over a decade.

Compliance considerations: meeting regulations while maximizing recovery

Utility executives need to balance revenue potential with compliance to avoid penalties and maintain the integrity of local ecosystems. Compliance requirements for nutrient removal and discharge vary significantly depending on the location of the treatment plant and the specific receiving water body and discharge location.

To address these regulatory requirements, utilities need stronger nutrient management strategies. These strategies include advanced biological nutrient removal processes as well as nutrient recovery technologies to meet increasingly more stringent discharge limits while harnessing the value of nutrient recovery. By integrating nutrient recovery into their treatment process, utilities not only improve their compliance performance but also add a valuable revenue stream.

Another important consideration is the increasing regulatory scrutiny on biosolids management. With the growing concerns over the presence

of PFAS in wastewater and biosolids, land application of treated solids is becoming more challenging. Side-stream treatment processes provide another pathway for valuable resources to potentially leave the plant, offering an alternative to landfilling or land application of biosolids.

By recovering the nutrients before they become part of the biosolid waste stream, utilities can better manage some of the compliance challenges posed by the evolving regulations around biosolid disposal.

How to Find Buyers for Recovered Resources

For utilities looking to monetize recovered nutrients, identifying buyers is key to success. Ostara typically offers a turnkey solution with multi-year offtake agreements with haulers and buyers that alleviate the burden on the utility.

Agricultural markets are the most obvious target for fertilizer products made from wastewater and biosolids, but finding the right buyers requires a strong market assessment and outreach. Establishing partnerships with fertilizer producers, local agricultural cooperatives, and large-scale farms is one way to secure a reliable customer base for recovered nutrients and biosolids.

In addition to fertilizers, or biosolids products, wastewater effluent treated to advanced treatment or water reuse standards, can also be used for industrial cooling, irrigation, or even aquifer storage and recovery systems (ASR) that replenish groundwater supplies while offsetting potable water (drinking water) usage.

Utility leaders looking to integrate or expand existing water reuse solutions as an immediate or future resource recovery strategy should



have a strong understanding of the local market drivers of high population growth and industrial water demands for new industries or that have a high demand for water reuse due to ongoing water scarcity issues or fertilizer. By diversifying the market opportunities for recovered resources, utilities can improve the revenue potential of their nutrient recovery programs.

The revenue potential of nutrient recovery

The revenue generated from nutrient recovery depends on several factors, including the volume of wastewater treated, the technology used, and the local demand for the recovered products. However, early

adopters of nutrient recovery systems are already seeing financial benefits.

In some cases, nutrient recovery can reduce operational costs by lessening the need for chemical treatments or reducing the volume of biosolids needing disposal. As more utilities implement these technologies, the overall revenue of wastewater-based nutrient recovery is expected to grow.

Leveraging wastewater as a resource for a circular water economy

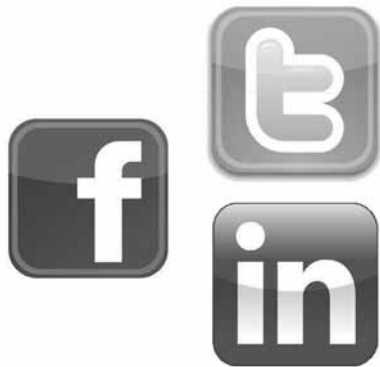
The wastewater treatment industry is undergoing a transformation. As utilities move toward becoming utilities of the future, they are dis-

covering the value of wastewater as a resource rather than just waste. By embracing technologies that recover nutrients, energy, and heat from wastewater, utilities can not only meet compliance requirements but also create new revenue streams.

The key to success lies in integrating these technologies, understanding the regulatory landscape, and seeking out buyers for the recovered resources. The move to a circular economy for wastewater has the potential to benefit both the environment and the utility's bottom line.

Written by Chris Haney, P.E., President of the Water operating group at STV ■

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Jay Anderson	Bruce Darner	Michael Hawranick	James Mitchell	Colin Rimel	Kristina Ward
Kelly Arnold	Matt Dawson	John Inghram	Dean Miller	Jason Roberts	Frank Welch
Timothy Bennett	Mark Dearman	Ernie Jack	Kelly Ann Naylor	Tony Shirkey	Louis Wooten
John Bresland	Jeff Ekstrom	Jim Klein	Gregory Neely	Jonathan Stanley	Gary Young
Tom Brown	Samme Gee	Brian Lanham	Courtney Nease	Matthew Stanley	
Kennon Chambers	Kevin Hamrick	Patricia Lee	Richard Ohalek	Paul Stover	
John Cobb	Kevin "Ricky"	Jessie Linville	Elisa Perry	Shawn Thompson	
Brandon Conley	Hamrick, Jr.	Julie Merow	Mark Place	Doug Urling	



West Virginia Rural Water Association

Training Calendar

June 1 to August 30, 2025

- June 11 - Proper Valve and Hydrant Maintenance - Lewis Wetzel Family Center - New Martinsville - 6 CEH W
- June 12 - Pump Station 101 for W & WW - Lewis Wetzel Family Center - New Martinsville - 6 CEH W & WW
- June 17 - Natural Disasters / Weather Impacts - Town Hall - Davis - 6 CEH W & WW
- June 18 - Emerging Contaminants for W & WW - Town Hall - Davis - 6 CEH W & WW
- June 24 - Emerging Contaminants for W & WW - Marina - St. Mary's - 6 CEH W & WW
- June 24 - Centrifugal Pumps - Library - Welch - 6 CEH W & WW
- June 25 - Operator Responsibilities - Library - Welch - 6 CEH W & WW
- June 25 - Pump Controls and SCADA for W & WW - City Hall - Summersville - 6 CEH W & WW
- June 25 - Chief Operator - Marina - St. Mary's - 6 CEH W & WW
- June 26 - Control Valves and Instrumentation - City Hall - Summersville - 6 CEH W & WW
- July 8 - Water Pathogens - Fire Dept. - Peterstown - 6 CEH W
- July 8 - Emerging Contaminants - PSD Office - Mason Co. PSD - 6 CEH W & WW
- July 9 - Basic Math - Fire Dept. - Peterstown - 6 CEH W & WW
- July 9 - Operator Responsibilities - PSD Office - Mason Co. PSD - 6 CEH W & WW
- July 15 - Understanding Pumps and Motors - Fire Dept. - Glenville - 6 CEH W & WW
- July 16 - Operator Safety - Fire Dept. - Glenville - 6 CEH W & WW
- July 16 - Air Valves and Aging Infrastructure in W & WW - Alderson Broaddus Campus - Philippi - 6 CEH W
- July 17 - Ductile 101: The Basics - Alderson Broaddus Campus - Philippi - 6 CEH W & WW
- July 22 - Cyber Security / Becoming a More Valuable Employee - Water Plant - Petersburg - 6 CEH W & WW
- July 29 - Asset Management - City Hall - Keyser - 6 CEH W & WW
- July 30 - Natural Disasters / Weather Impacts - City Hall - Keyser - 6 CEH W & WW
- August 25-29 - Class I Wastewater Certification Review - City Hall - Summersville
- August 27 - PRV Maintenance Class - Phil Gainer Center - Elkins - 6 CEH W
- August 28 - Confined Space - Phil Gainer Center - Elkins - 6 CEH W & WW
- July 14-18 - Class II Water Certification Review - Lodge - Chief Logan State Park
- July 22 - Emerging Contaminants for W & WW - Alderson Broaddus Campus - Philippi - 6 CEH W & WW
- July 23 - Technical Math - Alderson Broaddus Campus - Philippi - 6 CEH W & WW
- August 25-29 - Class I Water Certification Review - Lewis Wetzel Family Center - New Martinsville

WEST VIRGINIA RURAL WATER ASSOCIATION
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SCOTT DEPOT, WV 25560
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USDA Rural Development Water and Environmental Programs has consistently supported rural communities in completing necessary upgrades to their water and wastewater facilities.

WEP is instrumental in helping rural America maintain affordable water access for all rural people, and it is imperative that Rural Water's voice and priorities are heard within the Halls of Congress and within our nation's leadership. Through our combined thousands of rural leaders from every state, we can ensure Congress and the Trump Administration know that WEP is the trusted partner for rural America and must be maintained.

**Please Sign the Pledge
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