NewsLeaks

Vermont Rural Water Association
Winter 2023–24

Workforce woes at very small systems

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The Vermont Rural Water Association provides training and support to public drinking water and wastewater systems to promote healthy communities, rivers, and lakes across Vermont.

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On the cover: Colchester Pond

Bloomfield Exhibits Workforce Challenges in Vermont's Very Small Towns

by Liz Royer
Executive Director

On a chilly October day, water system specialist Paul Sestito and I made the journey to Bloomfield, Vermont to check in with long-time operator Chester Smart and get his thoughts on the unique water workforce challenges in the Northeast Kingdom.

Where is Bloomfield, you ask? From Island Pond, keep driving east another 20 minutes. The town of 221 residents will appear just before you hit the Connecticut River and the New Hampshire border.

The Bloomfield Water System serves 19 connections, mostly residences, as well as Debanville's General Store and Café. Since the Town of Bloomfield is the owner of the system, the Selectboard also functions as the water board. One of the Selectboard members serves as the back-up operator. The annual budget comes from user rates (called "rent") of $425 per year, with the general store paying double. The town is currently repaying a state revolving fund (SRF) loan of $38,000 for a new storage building and upgrades to the disinfection system.

Chester is the Water Commissioner for the Town of Bloomfield and is both the designated operator and the administrative contact for the drinking water system. For his operating services, he bills the town for an average of only 15 minutes per day. Chester is officially retired from many of his other jobs, but he still helps on weekends at other water and wastewater systems in Vermont and New Hampshire.

Chester Smart, Water Commissioner and operator for the Town of Bloomfield, Vt.

Like many very small utilities, Bloomfield Water System is financially limited because it has so few ratepayers. This, in turn, limits how much it can afford to pay operators. The current arrangement seems to work for Chester in his semi-retirement, but Bloomfield may have a hard time hiring a replacement when he wants to fully retire.

Chester grew up in the Lakes region of New Hampshire and joined the Air Force in 1969 with the plan to learn heavy equipment operations. One of his drill sergeants mentioned the option of water and wastewater and he decided that sounded more interesting. Chester spent 14 weeks at Shepard AFB in Texas receiving training in drinking water and wastewater operations. He likes to contrast that training program to the B-52 mechanic course, which was only six weeks!

After leaving the military, Chester went to Colorado for farrier (horseshoeing) school and then moved back to New Hampshire to work for a veterinarian. His dream was to buy a farm, but he didn't qualify for a loan. He began working as a water and wastewater operator in Bristol, New Hampshire. Finally, he

was able to purchase a farm in Brunswick, Vermont and milked 50 cows for 15 years there. In 2003 he then added water and wastewater work in Stratford, New Hampshire, and became the operator in Bloomfield in 2007.

Chester said he really enjoys the water and wastewater work, except for getting called out in the middle of the night. He has seen the industry change quite a bit with more regulations creating more paperwork. He says this was a challenge back when they had dial-up internet! Chester encourages all operators to keep an open mind and be sure to keep up with current technology and learn as much as you can about electrical work.

On the issue of workforce, Chester thinks it's important to get younger operators into the field and make more people aware that these good jobs exist. He was proud to tell us about hiring a young person to paint fire hydrants 35 years ago who now is the superintendent of a water system—you have to start somewhere!

Chester suggests that others could follow his model of combining jobs in water and wastewater operations with farm work or dairy management. There are many similarities between the fields and water/wastewater provides a steady paycheck while pursuing a passion for farming.

Chester's story is not unique to the NEK or Vermont, nor are the challenges faced by small water systems. But what is unique to Vermont are the number of very small community water systems—town-owned, fire districts, and others—that are struggling with financial, managerial, and workforce sustainability. A big piece of the sustainability puzzle is operations and staffing. It is important to include succession planning, back-up operations, and other workforce issues in your management and board discussions. And of course, reach out to Vermont Rural Water for advice and assistance!

Using a Well Camera to Investigate Total Coliform

by Tim Russo
Deputy Executive Director

If your drinking water source is a drilled bedrock well, it probably doesn't require a great deal of attention from an operation and maintenance perspective. Here in Vermont, we are blessed with many clean and productive drilled bedrock wells.

But after this summer's excess rainfall and flooding, many wells have tested positive for total coliform bacteria (or worse). Vermont Rural Water has a nano downwell camera that Brad Roy, our source water specialist, and I have been using to help drinking water systems investigate bacterial contamination.

The camera is a slender, submersible unit, with the lens pointed down (unfortunately, no side views!) and a light to provide illumination. The camera is connected to a spool of wire, several hundred feet in length. On that spool is a meter which tells the current camera depth.

The wire spool is connected to a console that displays real-time video from the camera. We often connect a television screen so everyone can easily see the video. We also record the video so it can be reviewed later, and the camera depth is encoded in the video. Afterwards, we will give you a copy of the recording, as well as a one-page summary report. You can share with your well driller if the investigation finds that the well needs maintenance.

Tim Russo inspects a well using a specialized camera.

As the camera is lowered into the well, we can check the condition of the pitless adapter, the static water level, and the well casing's condition and length. When we pass from casing into the bedrock, things start to get interesting.

What we are generally looking for, at this point in the inspection, is whether there are any fractures in the bedrock just below the casing that are allowing water to infiltrate the well. Aquifers naturally filter groundwater by forcing it to pass through small pores and between sediments, which helps to remove contaminants. However, fractures close to the surface may allow water to enter the well that hasn't yet had time to be adequately filtered.

With the rainy conditions we had this summer, and the resulting high water table, we've seen many wells where inadequate casing is the likely cause of bacteria hits. What to do about it? Ask your well driller for options. They may suggest a casing extension, or Jaswell Seal (also called a well packer).

It could also be that as the water table returns to normal levels, total coliform issues will resolve on their own. But as we have witnessed with climate change-related

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Reducing Inflow and Infiltration to your WWTF Part 2: Roof and Perimeter Drains

by Wayne Graham
Wastewater Specialist

In smoke testing, a blower is used to put non-toxic smoke down the sewer (left). The smoke can be seen coming out of a flat roof drain that is connected to the collection system (right).

This is the second in a series of articles in which I will discuss cost effective ways of reducing inflow and infiltration to wastewater facilities. This is a timely discussion given our wet summer and the recent devastating flooding.

Let's review some definitions, which come from *Operation of Wastewater Treatment Plants, Volume 1*. Inflow is "water discharged into a sewer system and service connections from sources other than regular connections. This includes flow from yards, drains, foundations, and around access and manhole covers."

Infiltration is "the seepage of groundwater into a sewer system, including service connections. Seepage frequently occurs through defective or cracked pipes, pipe joints and connections, interceptors access risers and covers, or manhole walls."

The book further clarifies, "Inflow differs from infiltration as it is a direct discharge into the sewer rather than a leak in the sewer itself."

Inflow from Drains

Homes and businesses often have roof drains or gutters to collect rainfall and sometimes have perimeter drains to deal with unwanted surface or groundwater. Unfortunately, sometimes these drains are connected to sewer lines, which means this water is sent to wastewater facilities. This results in extra inflow, which is taxing on both the collection system and the treatment facility.

For example, a one-inch rainstorm on a 1,000-square foot flat roof delivers over 6,000 gallons to the building's roof drain system. It does not take very many of these roof drains connected to sewer lines to have a large impact on your wastewater facility. Wastewater facilities will need to use extra electricity and chemicals to treat this unnecessary inflow, and the high volume of water can affect the efficiency of the treatment process.

This inflow is a waste of valuable facility capacity and can restrict the number of future hookups the facility can accommodate, therefore restricting growth of the community. A wastewater facility may undergo unnecessary upgrades to increase capacity because it is overwhelmed by inflow and infiltration. This is a huge waste of money, effort, and resources.

Finding Inflow Sources

There are two relatively simple methods of identifying inflow sources like roof and perimeter drains. Smoke testing of collection systems, using a non-toxic smoke-generating liquid, is a very fast way of identifying suspected inflow sources. The smoke is inserted into the sewer through a manhole using a powerful blower. If you see smoke coming from a roof or perimeter drain, it means that drain is connected to the sewer.

Another method, dye testing, involves pouring a liquid dye down a suspected source of inflow and observing likely receiving points such as sewer manholes and stormwater infrastructure to see if the dye appears. Both smoke testing and dye testing are simple and proven tools for wastewater personnel.

Remediation

Once you have identified improperly connected roof and perimeter drains, there are several ways to advocate for them to be fixed (and to prevent them in the first place):

Education: Many homeowners and businesses do not realize the problems they are causing by allowing these drains to discharge into their sewer lines. Educational mailings, billing inserts, door hangers, and newspaper notices are all ways of informing the community about improper connections. Many residents who learn that they pay for these wasteful flows through sewer rates and taxes will voluntarily fix the problem.

Ordinances: Most communities have sewer ordinances that regulate illegal connections such as roof drains and perimeter drains. Enforcing the sewer ordinance is sometimes necessary.

Plumbers: Visit your local plumber(s) to remind them about proper drainage connections.

Getting the word out in your community about drainage connections and doing periodic smoke testing may yield surprising results for your wastewater collection system and treatment plant. For assistance with inflow and infiltration in your community, contact Vermont Rural Water.

Training Calendar

Winter 2024

Date	Course	TCHs	Location	Cost (Member/Non)
Jan 10 – Feb 28 8 am – 3 pm	Basic Wastewater Course	48 **WW**	Montpelier[1]	$685 (includes textbook)
Thur, Jan 11 9 am – 12:30 pm	Operation and Maintenance of Distribution Systems	3 **W**	Zoom	$21 / $42
Tue, Jan 16 9 am – 12:30 pm	Water Treatment: Chlorination	3 **W**	Zoom	$21 / $42
Thur, Jan 18 8 am – 11:30 am	Wastewater Operator's Guide to NPDES Permits and Facility Inspections	3 **WW**	Montpelier[1]	$21 / $42
Thur, Jan 18 9 am – 12:30 pm	Cross Connection Control	3 **W**	Rutland[2]	$21 / $42
Wed, Jan 24 9 am – 11:30 am	Cybersecurity & Internet Safety **New Class!**	2 **W WW**	Hybrid (Zoom/Essex[3])	No cost
Tue, Feb 6 9 am – 12:30 pm	Operation and Maintenance of Distribution Systems	3 **W**	Orleans[4]	$21 / $42
Thur, Feb 8 9 am – 3 pm	Principles of Nitrogen Removal **New Class!**	5 **WW**	Montpelier[1]	$35 / $70
Thur, Feb 15 9 am – 3 pm	Principles of Phosphorus Removal **New Class!**	5 **WW**	Montpelier[1]	$35 / $70
Thur, Feb 15 12 pm – 2:30 pm	Financial Modeling **New Class!**	2 **W WW**	Zoom	No cost
Tue, Feb 20 9 am – 12:30 pm	Safety: Bloodborne Pathogens, PPE, and Ladder Safety **New Class!**	3 **W WW**	Essex[3]	$21 / $42
Thur, Feb 22 9 am – 12:30 pm	OSHA: Environmental Awareness and Workplace Violence	3 **W WW**	Brattleboro[5]	$44 / $85
Tue, Feb 27 9 am – 11:30 pm	Source Protection Plan Update Workshop **New Class!**	2 **W**	Essex[3]	No cost
March 5 – April 23 8:30 am – 3:30 pm	Class 4 Water Treatment Course	48 **W**	Berlin[6] Some sessions on Zoom	$336 / $672 Textbooks sold separately
March 6 – April 17 8:30 am – 3:30 pm	Class 3 Water Treatment Course	36 **W**	Rutland[2] Some sessions on Zoom	$252 / $504 Textbooks sold separately
March 7 – April 18 8:30 am – 3:30 pm	Distribution Course	36 **W**	Rutland[2] Some sessions on Zoom	$252 / $504 Textbooks sold separately
March 13 – May 1 8 am – 3 pm	Basic Wastewater Course	48 **WW**	Chester[7]	$685 (includes textbook)

TCH = Training Credit Hour **W** = Approved for Water Credit **WW** = Approved for Wastewater Credit

Date	Course	TCHs	Location	Cost (Member/Non)
Thur, March 14 8:30 am – 2:30 pm	Basic Math for Water and Wastewater Operators	5 **W WW**	Essex[3]	$35 / $70
Thur, March 14 9 am – 12:15 pm	Vermont WWTFs and PFAS	3 **WW**	Montpelier[1]	$21 / $42
Thur, March 21 8 am – 12:30 pm	Discharges from Breweries and Food Industries to Your WWTF	4 **WW**	Montpelier[1]	$28 / $56
Thur, March 21 8:30 am – 2:30 pm	Advanced Math for Water Operators	5 **W**	Essex[3]	$35 / $70
Thur, March 28 8:30 am – 2:30 pm	Basic Math for Water and Wastewater Operators	5 **W WW**	Rutland[2]	$35 / $70
TCH = Training Credit Hour **W** = Approved for Water Credit **WW** = Approved for Wastewater Credit				

Locations

1. Montpelier: Dewey Building – 1 National Life Drive, Montpelier, VT (furthest building in National Life Complex)

2. Rutland: WWTP – 94 Green Hill Lane, Rutland, VT

3. Essex: Vermont Rural Water's office – 20 Susie Wilson Rd, Suite B, Essex Junction, VT

4. Orleans: Mack Building – 20 Church St, Orleans, VT

5. Brattleboro: Holiday Inn Express – 100 Chickering Dr, Brattleboro, VT

6. Berlin: Montpelier Water Treatment Plant – 1480 Paine Turnpike N, Berlin, VT

7. Chester: Public Safety Building – 130 Pleasant St, Chester, VT

Register Online: vtruralwater.org/training

Registration and Payments

Register online at vtruralwater.org/training to pay by credit card or check. Registrations received less than 24 hours prior to class are subject to a late fee.

Members of the Vermont Rural Water Association receive a 50% discount on most registration costs.

Accommodations

Call 802-660-4988 or email info@vtruralwater.org prior to the day of class to request accommodations.

Cancellations/Refunds

Cancellations received at least 24 hours in advance can receive a refund or transfer to another class. No-shows will be charged the full course fee.

Sick Policy

We ask that if you have symptoms of a contagious illness (Covid, flu, or other) you please do not attend classes in-person. If you are ill on the day of class, we will work with you to find a remote attendance option or switch to another class on a different day.

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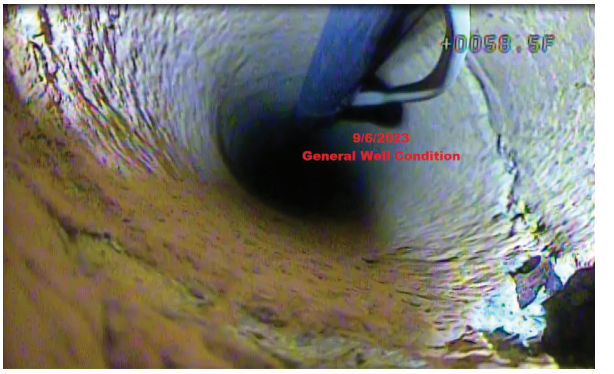
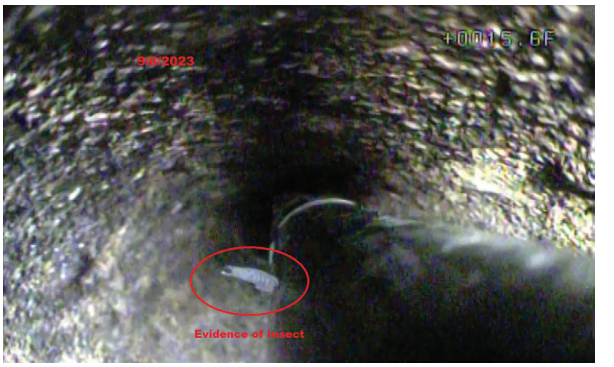
extreme weather events, it's just a matter of time before you experience issues again.

In addition to total coliform hits, we've also used the camera to investigate wells that have high turbidity or have tested positive for PFAS contamination.

Some things to consider before doing a well camera investigation include that the pump will not be able to run during the inspection and the well will need to be shock chlorinated afterwards. Water system personnel will be responsible for removing the well cap/seal and disconnecting electrical power to the well. Any time the well cap is removed, there is a risk of contamination. We strongly advise that after the camera inspection is complete, you shock chlorinate the well to mitigate the risk of contamination. You are also responsible for reinstalling the cap/seal and putting the well back into service.

As a reminder, there is no charge for a well camera investigation from Vermont Rural Water, or for any of our technical assistance services, so don't hesitate to reach out if you have questions or need help.





Top: Inspecting the well casing. Bottom: Evidence of an insect inside the well (circled in red).

Frequent Orthophosphate (OP) Testing
A simple test that can make a big difference

by Elijah Lemieux
Wastewater Specialist

Most of our wastewater treatment facilities are required to report effluent total phosphorus (TP) levels with their monthly reporting. While orthophosphate (OP) levels aren't required to be reported regularly, there is good reason to frequently test them, as well.

It's important to understand the difference between the two tests and the information they provide. Total phosphorous (TP) measures both dissolved and particulate phosphorus in wastewater. It involves a more complex and time-consuming method of testing, requiring more equipment and the process of digestion. Many facilities send their samples out to contracted labs for TP analysis.

Orthophosphate (OP) measures only dissolved phosphorus, the most bioavailable form of phosphorus in wastewater. It is an incomplete but helpful survey of the phosphorus levels in a sample. OP levels are therefore not a direct measure of TP levels and can serve as an indicator only. OP can be tested in-house using relatively inexpensive equipment and a simple procedure.

Why Test Orthophosphate?

OP testing gives quick results and is an easy way to get real-time data on the phosphorus levels in your treatment process. Having this information can help you optimize treatment and identify process problems quickly and efficiently. Here are several ways you could use OP testing:

A colorimeter is an inexpensive way to test for orthophosphate on site.

- Regularly test your effluent to detect rises in OP which could indicate or predict trends in TP.
- Test at different locations in the treatment process during varying conditions to compare how levels and treatment effectiveness changes.
- Test sidestreams returning to your treatment process, such as the liquid coming from dewatering, sludge supernatant, or filter backwash.
- Test at different locations within your collection system to locate sources of phosphorus.

How to Test OP

Orthophosphate testing is done with a pocket colorimeter which which is easily obtained for a few hundred dollars. The reagents cost well under $1 per test.

To perform an OP test using the colorimetric method, mix a sample with a reagent and then read the colored compound with the colorimeter. It is very much like performing a residual chlorine test.

Wastewater operators can use frequent OP testing to optimize treatment and improve the overall performance of their system. The negligible cost makes OP testing a fiscally responsible way to monitor phosphorus levels more frequently. By using OP testing regularly, wastewater operators can identify and address problems quickly and efficiently, while reducing costs.

National Emergency Response Training

by Brad Roy
Source Water Specialist

Brad Roy learns to operate a semitruck-mounted knuckle boom crane at the Emergency Response Training.

Imagine: a storm has been forecasted and, as operators of water and wastewater systems, we've prepared our systems to the greatest extent possible. Now it's a waiting game.

The storm arrives, perhaps bringing strong winds, driving rain, heavy ice, or foot after foot of wet snow. Powerlines are down, rivers and streams rising quickly with muddy waters. No matter the type of catastrophic event, our water and wastewater systems are likely to have sustained some sort of damage and interruption to normal operating conditions. Phones and pagers are ringing on operators' bedside tables. We've been hit yet again, and it's time to respond.

So, now what? How do you respond? What resources are available? How can we help neighboring systems who may have been hit even harder? These questions are being asked in every corner of the country as natural disasters increase in both intensity and frequency due to climate change.

To help answer these questions, I spent a few days at an Emergency Response Training in Cairo, Georgia in late October.

This training was hosted through a collaborative effort between the National Rural Water Association and many affiliate state organizations. Over the course of the two-day training, attendees were able to gain experience at stations covering topics such as emergency generators, portable SCADA systems, bypass and trash pumps, control panels, transfer switches, electrical instruments and safety, mobile water treatment units, and much more.

This event also included classroom sessions to discuss topics like emergency response planning and documents, logistical aspects of emergency response, GIS and mapping, as well as a five-state panel discussion on creative ways to finance emergency response efforts and variations and similarities in state emergency response. Much discussion followed regarding how state associations like Vermont Rural Water can help member utilities not just during and after an emergency, but more importantly, long before an emergency ever occurs.

I was asked to speak at the panel discussion on funding for emergency response initiatives. I talked about the Vermont Rural Water/

Deomonstration of a Water-on-Wheels Mobile Water Treatment System (WOW Cart).

VT WARN Emergency Response Trailers, which were funded through the Vermont Department of Health with a grant from the Centers for Disease Control and Prevention (CDC). These trailers and the equipment in them were very useful during the flooding this July.

This training was an incredible opportunity to not only gain a lot of hands-on experience with technical aspects of emergency response, but also to utilize a large pool of experience from Rural Water staff from across the country. Everyone left full of knowledge, as well as full of some incredible Cajun food cooked up by the generous members of the Louisiana Rural Water Association.

What really stood out to me (other than the fact that Vermont is severely lacking in good jambalaya) was how applicable a wide array of response techniques and approaches from across the country are to Vermont.

While the emergencies may be caused by different disasters in different regions—wildfires, floods, ice storms, hurricanes—the result often leaves water and wastewater utilities in very similar situations. Regardless of the cause, systems are often dealing with issues like damaged pump panels, power outages, downed trees, and limited communications. And in any scenario, ensuring your safety as a first responder is unequivocally priority number one.

One common theme was the need for planning and preparation before the event happens, as well as having a plan to ensure that you and your system staff maintain your health and safety while responding to an emergency. We saw some great examples of written Emergency Response Plans and it got us all thinking about how we as Rural Water staff can better help water and wastewater systems with preparedness planning.

We have seen time and time again that our systems often lack resiliency to many types of natural disasters and catastrophic events, but learning from others who have gone through similar situations was a hugely rewarding and eye-opening experience. If you or your system are interested in learning more about emergency response and preparedness, please reach out to Vermont Rural Water for more information.

Vermont Rural Water Attends WaterPro

by Margaret Dwyer
Board President

WaterPro is an annual conference and trade show held by the National Rural Water Association. This year's event was in Aurora, Colorado in late September. I attended along with fellow board members Rod Lamothe and Jon Thorton as well as Vermont Rural Water staff Wayne Graham, Aaron Perez, Paul Sestito, and Brad Roy.

The three-day event was much bigger than anything we're used to in Vermont, with nearly 2,000 attendees, 125 vendors, and over 60 educational sessions. We met Rural Water staff and board members from all 50 states and representatives from all sectors of the industry including water treatment, engineering, sales, operations, government, development, and management.

We attended technical sessions covering all aspects of the water/wastewater industry including new technologies, treatment, recruiting, and regulatory updates. One of the topics was recruiting and maintaining educated, highly trained professionals in our industry, and I was happy to see many new faces of people just being introduced to the field of water.

The exhibit hall was full of vendors showing the latest and greatest technology in our industry as well as our tried-and-true favorites. It was a great opportunity for everyone to network and catch up with their fellow members from other states and to collaborate, hear new ideas or get potential answers to problems.

Clockwise from upper left: WaterPro Feud trivia game, Vermont's seat at NRWA's annual business meeting (Jon Thornton is our National Representative); Toni Glymph speaks at Women in Rural Water; Brad Roy and Wayne Graham visit Rocky Mountain National Park after the conference; everyone from Vermont Rural Water enjoys dinner together.

There was the popular Women in Rural Water luncheon, which featured an entertaining speech by our favorite microbiologist, Toni Glymph-Martin.

The WaterPro Feud was another highlight of the week. It's a competition where teams from each state show off their game show skills and water trivia knowledge.

Finally, we attended the Membership Appreciation Luncheon to celebrate all of the Supporting Members and attendees of the conference.

It was a week of opportunity to share knowledge, hear from the experts and learn about new and interesting ways of doing our jobs in an ever-changing industry. We look forward to applying all that we learned and sharing new information with our members.

Save the Date!

Vermont Rural Water's 2024 Conference & Trade Show

May 8–9, 2024

Lake Morey Resort

Fairlee, VT

Trainings • Vendors • Golf Tournament

Registration coming soon at

vtruralwater.org/conference

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