

# NewsLeaks

Vermont  
Rural Water Association  
Spring 2024

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

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**On the cover:** Brattleboro's new water treatment plant

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# 6 Months Later: Stories & Lessons Learned from the 2023 Floods



by Katherine Boyk  
*Communication &  
Association Coordinator*

In January, a group of water and wastewater operators, Vermont Rural Water staff, DEC employees, and partner organizations gathered at Vermont State University in Johnson to reflect on last summer's devastating flooding. Everyone in the room had been involved in the flood response, whether their system itself was impacted, they helped out at a flooded facility, or they provided assistance from the office. It was a chance to share stories and lessons learned so we can all be better prepared for the next disaster.

Though all the impacted water and wastewater facilities are back online and operating, several of the hardest hit systems are still relying on temporary fixes while waiting on permanent repairs or replacement. And in the meantime, another big storm in December caused many of the same facilities to flood again.

Below are just a few of the stories and takeaways that struck me. I hope you will find these interesting and useful.

## STORIES SHARED

**Preparation** – Steve Cote and Brad Snow from Richmond Water Resources shared how they were able to continue providing drinking water even when their main well was completely submerged by floodwaters. The well is located in the floodplain of the Winooski River and floods frequently. They



Over 40 people attended a discussion about flood response at Vermont State University – Johnson in January.

have a storage reservoir at a higher elevation that is large enough to hold ten days' worth of water. Before the flooding in July, and again in December, they filled the reservoir and shut off the well pump in preparation. When the floodwaters receded—which took six days in July—they could tell the water had been above the well head. The well house was full of sand and silt and needed to be sanitized, but it survived the ordeal. The town was on a Boil Water Notice for several days but residents were never without water.

**Inflow** – Matt Jones with the Waterbury wastewater treatment facility talked about how he discovered a major source of inflow during flood events. There is a park along the Winooski River with bathrooms by the ball fields. In July, the floodwaters were above the height of the sinks and toilets, and Matt calculated that

floodwaters going down the drains were adding at least a million gallons per day to the wastewater facility's inflow. Since Waterbury's lagoons were close to overflowing, which would have been catastrophic for the facility, reducing inflow during floods is critical. Matt hopes to install valves in the bathrooms that can be shut off in advance of future floods to prevent this problem.

**Water Quality** – Jeffery Bean, a water operator at an NTNC industrial park in Georgia, had a somewhat different experience than many. Rather than being

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impacted by flood damage, Jeff's concern was water quality at the source and the ability to continue to treat the raw water adequately. The water source is Lake Arrowhead, which is fed by the Lamoille River, and during the flooding the water was incredibly turbid, causing very short filter runs due to excessive flushes and backwashes. Jeff was also keeping an eye out for contaminants like fuel oil from flooded communities upstream. Plans were made to haul potable water from another water system if a shutdown was required. Fortunately, the system was able to continue operations uninterrupted. While an NTNC being without water may not seem as severe as a community without water, it would have adversely affected the businesses and 540 workers in the industrial park. Jeff said "the flood was a catalyst of organizational changes," which included addressing staffing and operational needs during an event of this nature.

**Sewer Inspections** – Michelle Kolb with the Vermont Wastewater Management Program shared many lessons learned. One that was new to me was doing post-flood collection systems inspections using a remote camera to view the insides of sewer pipes. The state helped facilitate these

in ten communities, and found sewer pipes filled with rocks, silt, and other flood debris; pipes that were crushed or fractured; and pipes with holes or broken seals that were causing groundwater infiltration. Some of the damage found may have been pre-existing due to aging infrastructure, but was worsened by the flooding. This sort of damage is less apparent because it is buried underground, so these post-flood inspections helped many communities find and repair issues before they caused major problems.

**Bacterial Hits** – Tim Russo and Brad Roy from Vermont Rural Water talked about how some water systems that weren't impacted during the initial flooding experienced issues weeks or months later. They're seeing more source wells than usual test positive for coliform or other bacteria. Tim and Brad have performed camera inspections on many of these wells. They often find that the water table is much higher than average, which causes infiltration in wells and introduces bacteria to the water supply.

**Johnson WWTF** – After the meeting at VSU, Dan Copp offered a tour of the Johnson wastewater treatment facility. He showed us around the main building, which is elevated and has flood



A tour of the Johnson wastewater treatment facility.

gates. The July flooding was the first time the flood gates were breached since they were installed in 1995. They were able to get all of

their treatment processes back online within 14 days with the exception of sludge processing.

CONTINUED ON  
PAGE 12 »

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# Chase Stanley Completes Apprenticeship



by Allison Smith  
Training Administrator

Chase Stanley, a trainee at the Brattleboro Water Department, recently completed a two-year apprenticeship in water treatment. To achieve this milestone, Chase fulfilled 4,000 hours of on-the-job training and 288 hours of classroom education.

“He is a quick learner,” said Garrett Calantropio, Chase’s mentor at the Brattleboro Water Department. “Working to keep the public safe is second nature to him. Ethics and integrity is a big part of this job and he has no shortage of that.”

Chase is a veteran of the United States Army and worked for the Brattleboro Police Department for eight years before transitioning to the Water Department. Chase says that the skills he acquired in the Army, like adaptability and the ability to follow protocols and execute tasks, help him in his day-to-day work as a water operator. His career-long commitment to public safety is now expressed through providing safe drinking water to residents.

The Brattleboro Water Department provides drinking water to approximately 12,000 customers. The water source is Pleasant Valley Reservoir and Sunset Lake. The department just transitioned to a new state-of-the-art water treatment facility, which has greater filtration capacity.

Chase expressed pride in working for a proactive utility dedicated

to delivering safe, high-quality drinking water. He emphasized the department’s dedication to providing the best water possible, such as exceeding standards by performing extensive water testing throughout the entire system.

A typical day for Chase includes comprehensive checks of the facility, routine water testing, and maintaining the 100 acres of land owned by the water department. “It is a good job and communities will always need clean water,” he said. “It is a job that keeps your brain working and problem solving.”

There is a shortage of water operators in Vermont and across the country as more operators retire than join the trade. To combat this problem, Vermont Rural Water created an



Chase Stanley (right) and Paula Jackson.

apprenticeship program in 2019 to train new workers at drinking water and wastewater treatment facilities. Apprentices receive a salary while working under the guidance of a mentor, and also attend classes taught by Vermont Rural Water. Learn more at [vtruralwater.org/training/apprentices/](http://vtruralwater.org/training/apprentices/)

Chase became an apprentice in 2021 and is the seventh person in Vermont to complete the program.

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## APPRENTICESHIP


While Garrett was Chase's official mentor during his apprenticeship, the rest of the crew also provided mentorship, recognizing his quick learning ability and enthusiasm for outdoor work.

"Chase is self-motivated, dedicated, and conscientious. He has all the qualities that we want in an apprentice," said Paula Jackson, the apprenticeship program coordinator at Vermont Rural Water. "It has been rewarding to see his passion for water grow and merge with his passion for community service throughout his participation in the two-year program."

Chase's commitment to public service extends beyond his professional duties. Passionate about mental health advocacy, he founded Chasing Zero, a fundraising effort to support suicide prevention for first responders and veterans. Over the past three years, he has raised over \$40,000 through events like a 22-mile walk, which is symbolic of the 22 veterans who die by suicide each day.



Chase Stanley (center) at Brattleboro's new water treatment plant.

For those interested in supporting Chasing Zero, contact [chasingzero22@gmail.com](mailto:chasingzero22@gmail.com) or visit [www.chasingzero22.com](http://www.chasingzero22.com) 

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# More Equipment Available for Emergency Response



by Paul Sestito  
Water Systems Specialist

During the July 2023 flooding, VT WARN's two emergency response trailers experienced their first official deployments. While the trailers and the equipment on them were certainly useful, we also found that we needed some additional equipment. We have since added a number of items to our inventory so the trailers will be even better equipped for the next emergency.

The 12-foot trailers were purchased in 2022 with a grant from the Centers for Disease Control and Prevention (CDC) through the Vermont Department of Health to VT WARN. One trailer contains equipment focused on drinking water and the other has equipment focused on wastewater.

Perhaps the biggest new addition to our water trailer was over 500 feet of 2.5-inch potable water hose, along with a number of fittings and tools for making hydrant-to-hydrant or potable water garden hose connections, as well as flow testing devices. This will allow for the temporary restoration of water service in the event of damage to a water main or service line.

Another item that was added was an inflatable raft and personal flotation devices. We had the opportunity to test the raft and I was impressed at how quickly we were able to set it up. It is very rugged and maneuverable and will be an asset in a flood situation.



The two emergency response trailers (left) and equipment in the drinking water trailer (right).




One thing that stood out to me during the flood response was the exhaustion that responders experienced working long days in tough conditions. To that end, we've added some simple comforts such as fold-up chairs and shade canopies.

After the flooding, the trailers themselves proved useful as office space, lab space, or storage space when flooded-out buildings could not be safely occupied.

The trailers have variety of battery-operated tools and equipment, and this inventory will probably continue to grow. Currently, we have a valve exerciser, small portable pumps for dewatering small structures such as meter pits, and other equipment such as chainsaws for debris removal. We stocked up on portable lighting as well.

The original equipment on the trailers includes ground

penetrating radar units, portable correlators, a valve and hydrant exerciser, a tilt-and-pan sewer line camera, safety equipment, hand tools, and personal protective equipment (ppe).

This equipment is available for use by members of VT WARN—the water and wastewater mutual aid network—at any time. If you are interested in touring the trailers or using the equipment, please contact Vermont Rural Water. We highly encourage all water and wastewater systems to become a member of VT WARN. It is free to join at [vtwarn.org](http://vtwarn.org) .

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# Training Calendar

## Spring 2024

Date	Course	TCHs	Location	Cost (Member/Non)
April 10 – 19 9 am – 1:30 pm	Small Systems Class 2 Water Treatment Course	16 <b>W</b>	Hybrid (Zoom/Essex <sup>1</sup> )	No cost Textbook \$60
Thur, April 25 9 am – 12:30 pm	What to Expect at a VOSHA Inspection	3 <b>W WW</b>	Zoom	\$21 / \$42
Mon, April 29 9 am – 12:30 am	Distribution Exam Preparation Course	3 <b>W</b>	Rutland <sup>2</sup>	\$21 / \$42
Tue, April 30 9 am – 12:30 am	Class 3 Exam Preparation Course	3 <b>W</b>	Waterbury <sup>3</sup>	\$21 / \$42
Wed, May 1 9 am – 12:30 pm	Class 4 Exam Preparation Course	3 <b>W</b>	Waterbury <sup>3</sup>	\$21 / \$42
Thur, May 2 9 am – 12:30 pm	TNC Operations	3 <b>W</b>	Zoom	No cost
Thur, May 9 8 am – 3 pm	Vermont Rural Water's Annual Conference	3.5 <b>W WW</b>	Fairlee <sup>4</sup>	\$75 / \$115
Tue, May 14 9 am – 12:30 pm	Developing and Updating Your Source Protection Plan <b>New Class!</b>	3 <b>W</b>	Springfield <sup>8</sup>	No cost
Tue, May 21 8:30 am – 3:30 pm	Permit Required Confined Space Entry/ Trench and Excavation Safety	6 <b>W WW</b>	Essex <sup>1</sup>	\$42 / \$84
Wed, May 29 9 am – 12:30 pm	Lead and Copper Rule Public Relations <b>New Class!</b>	3 <b>W</b>	Zoom	No cost
Thur, May 30 10 am – 12 pm	Lake Champlain Live <b>New Class!</b>	2 <b>W WW</b>	Burlington <sup>5</sup>	\$28 / \$56
June 5 & 6 9 am – 12:30 pm	Wastewater Microbiology	6 <b>WW</b>	Zoom	\$72 / \$144
Wed, June 12 9 am – 12:30 pm	Optimize Your Water and Wastewater Pump Stations	3 <b>W WW</b>	Chester <sup>6</sup>	\$21 / \$42
Thur, June 13 8 am – 12:30 pm	Understanding Your Motor Control Panels	4 <b>W WW</b>	Chester <sup>6</sup>	\$28 / \$56
Thur, June 13 9 am – 12:30 pm	Corrosion Control	3 <b>W</b>	White River Junction <sup>7</sup>	\$21 / \$42
Thur, June 20 9 am – 12:30 pm	Trench and Excavation Safety	3 <b>W WW</b>	Rutland <sup>2</sup>	\$21 / \$42
<b>TCH</b> = Training Contact Hours <b>W</b> = Approved for Water Credit <b>WW</b> = Approved for Wastewater Credit				

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Locations

- 1. **Essex:** Vermont Rural Water’s Office – 20 Susie Wilson Rd, Suite B, Essex Junction, VT
- 2. **Rutland:** WWTP – 94 Green Hill Lane, Rutland, VT
- 3. **Waterbury:** Municipal Center, Steele Community Room – 28 N Main St, Waterbury, VT
- 4. **Fairlee:** Lake Morey Resort – 82 Clubhouse Rd, Fairlee, VT
- 5. **Burlington:** Rubenstein Ecosystem Science Laboratory – 3 College St, Burlington, VT
- 6. **Chester:** Public Safety Building – 130 Pleasant St, Chester, VT
- 7. **White River Junction:** Hartford Town Office – 171 Bridge St, White River Junction, VT
- 8. **Springfield:** ANR DEC Springfield Regional Office – 100 Mineral St, Springfield, VT

Register Online: [vtruralwater.org/training](http://vtruralwater.org/training)

Registration and Payments

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# Cerium: What is all the flocc about?



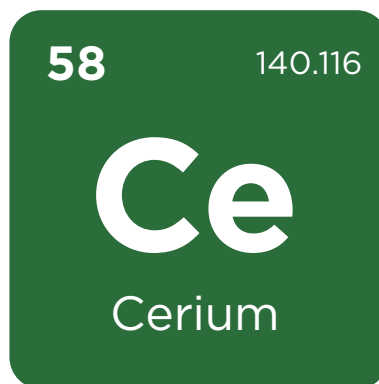
by Forest Anderson  
Wastewater Specialist

**C**erium may not be used frequently in wastewater treatment, but it is worth considering for its multifaceted characteristics. It works well as a coagulant to remove nutrients, a catalyst to break down organic pollutants, and an antioxidant to prevent excess ROS formation.

Cerium is a rare earth element that was first identified in 1803. It was named for the dwarf planet Ceres, which itself was named after the Roman goddess of agriculture and fertility. Coincidentally, cerium is effective at removing nutrients from agricultural runoff.

Both cerium chloride salts and cerium oxide nanoparticles ( $\text{CeO}_2$  NPs) can be used as coagulants to remove organic pollutants and nutrients like phosphorus. They can be added to a clarifier, aeration tank, or mixing tank like other coagulants.

Typically, coagulation is achieved using a combination of a polymer



Cerium is a rare earth element.

and a chemical like alum. With cerium-based coagulants, you only need one product, and you don't need to use much of it. Cerium also doesn't affect alkalinity the way that alum does.

$\text{CeO}_2$  NPs and cerium salts have a high surface area and reactivity, making them more efficient as an adsorbent and coagulant. Cerium causes suspended solids and phosphates to adsorb, floc tightly, and precipitate. The nature of these bonds means that less water is trapped, so the volume of sludge is considerably decreased. This reduces the amount of sludge pressing, drying, and/or hauling that is needed.

where cerium helped achieve a 95 percent removal of phosphorous, resulting in effluent with orthophosphate concentrations of less than 1 mg/L.

Cerium compounds also function as catalysts in the degradation of organic pollutants such as dyes, pharmaceuticals, phenolic compounds, solvents, acids, and petroleum hydrocarbons. High concentrations of these chemicals will cause a toxic event for a wastewater system.  $\text{CeO}_2$  NPs breaks down these chemicals through redox and catalytic reactions.

Cerium, in the form of cerium oxide, is an antioxidant, so it can neutralize reactive oxygen species (ROS). These are byproducts of normal cellular respiration, but increase rapidly during environmental stress such as intense UV exposure or high temperatures. Sudden increases in ROS damage living cells, so  $\text{CeO}_2$  NPs can protect the microorganisms used in wastewater treatment.

In addition to its applications in wastewater treatment, cerium can be used in drinking water treatment as well. For example, it could be used in place of a polymer for surface water filtration. Cerium is not toxic to humans or the environment.

The upfront cost of cerium-based products is higher than traditional coagulants and phosphorus removal compounds, but it could save money in the long run. One cerium product replaces two coagulation products, and only a small dose of cerium is needed to achieve results.

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Three wastewater systems in the Green Mountain State use cerium-based coagulants, and it has led to significantly reduced phosphorus concentrations and lower turbidity in their effluent. I visited one system

# Reducing Inflow and Infiltration to your WWTF

## Part 3: Manholes



by Wayne Graham  
Wastewater Specialist

This is the third and final article in a series about cost effective ways of reducing inflow and infiltration to our wastewater treatment facilities.

The following definitions come from *Operation of Wastewater Treatment Plants, Volume 1* by The Office of Water Programs.

**Inflow** means “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.”



Left: sand shows the path of water. Right: deteriorating concrete under the manhole cover.



Extra water from inflow and infiltration has to be handled by the collection system and treated by the wastewater facility. This is costly, causing the facility to use extra electricity and chemicals, and can affect the efficiency of treatment processes. In the long-term, extra inflow and infiltration take up valuable facility capacity, restricting the number of future hookups and therefore limiting the growth of the community. It might also lead to expensive upgrades to increase the facility capacity.

Manholes are access points to wastewater collection systems. Unfortunately, they can also allow unwanted surface and groundwater to enter. According to an EPA research paper, written by Vermont's own Dick Perez, “30 to 50 percent of inflow and infiltration is due to defects and conditions in or near manholes.”

A manhole inspection program can be very beneficial to identifying sources of inflow and infiltration. Documenting your observations will allow for prioritization of repairs. Manholes should be inspected annually.

Start by inspecting the surface around the manhole. Look for telltale signs of accumulated sand being carried by water. If the cover or frame is below grade, it should be raised to avoid surface water from entering. A quick fix is to use an inflow cover to prevent water from entering into the manhole.

Inspections also need to include risers, joints, walls, and stubs. Water staining can show past inflow and infiltration points, but it's hard to beat putting on a rain coat and inspecting manholes during rain events or times of high groundwater levels. Inspecting the inside of a manhole can be done using pole mirrors, zoom cameras, or actual entries. Be sure to follow confined space entry procedures if your inspection includes a manhole entry.

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They are still sending sludge to Morrisville. Dan said that after the flooding, his crew was working 18-hour days in 90-degree temperatures, with no electricity or air conditioning, and the exhaustion was brutal. They ate so much take-out pizza that no one wanted pizza again for months.

### LESSONS LEARNED

**Flood Levels** – Several people talked about having a plan for taking action when floodwaters approach a certain level. For example, “turn off the well pump when the river reaches that fence post.” You can use nearby landmarks or real-time stream gauge data that can be found online.

**Initial Response** – At the very beginning of the floods, the state and federal emergency response was not yet fully operating. During a widespread disaster like this, you should be prepared for your system to be self-sufficient for the first 24 to 72 hours.

**Evacuating** – If you have time to prepare for an evacuation (you might not!), try to get as much as possible out of the floodplain. This includes vehicles, computers, paperwork, equipment, and spare parts. Simply moving things off the floor out of the basement might not be enough. If you can do so safely, turn off electricity to the building and close valves on fuel tanks. Close the flood doors.

**Safety** – Work with a partner whenever possible. Tell someone where you are going and how long you plan to be gone. When return-

ing to a flooded building, be extra cautious if the electricity hasn’t been shut off (even if there is no power at the moment, it could suddenly come back on). Exhaustion from long workdays creates additional safety risks, so take extra care with tasks such as driving.

ing logs, state reports, important contacts, and your Emergency Response Plan.

**Equipment** – When equipment or parts are destroyed in a disaster, it is important to obtain replacements quickly. Having a detailed inventory with the make and model of all your equipment and contact information for the vendor will speed this up. Spare parts are always a good idea, but during the flood some systems lost both their primary equipment and the spare.


You may be able to borrow equipment from another system through VT WARN. (If you’re not a member, join for free at [vtwarn.org](http://vtwarn.org)) Vermont Rural Water will work on compiling a list of equipment available through VT WARN, as well as a list of companies that have equipment like generators and pumps available for rental.



The Ludlow wastewater treatment facility shortly after the July flooding (top) and in January (bottom).

**Preparation** – In addition to emergency response planning, have a plan for your personal needs, like eating, sleeping, and taking care of family members. A cot, a pillow, and a cooler of food were much appreciated by those who worked long hours during the flooding!

**Have Backups** – Several systems lost computers, paper records, and even the backup copies when their facilities flooded. Have a copy of your important documents stored offsite, whether on the Cloud or another building out of the floodplain. This should include operat-

**Municipal Collaboration** – Every town has a designated Emergency Management Director. Whether or not you are a municipally owned utility, contact your town’s Emergency Management Director before an emergency to make them aware of the importance of drinking water/wastewater and about your system’s needs during an emergency. A list of Emergency Management Directors by town can be found at <https://vem.vermont.gov/programs/emd/contact> 

## » CERIUM

Down the road, the reclamation of biosolids may become increasingly important for wastewater systems. A sludge reclamation process could allow facilities to recover and reuse cerium. As research in this field continues, cerium-based technologies are likely to play an increasingly important role in enhancing the efficiency and sustainability of wastewater treatment. 💧

## » MANHOLES

In addition to regular inspections, smoke testing can be helpful in finding manhole defects. During smoke testing, a blower injects smoke into a collection system. The smoke will quickly emerge from manhole defects such as poorly sealed covers and leaking rings or risers. Note that public notification and safety procedures need to be followed prior to smoke testing.

Once your inspections are done, it is very important to prioritize your repairs to get the biggest



Holes were drilled in this manhole cover to drain a huge puddle, but now will be a source of inflow every time it rains.

return for your time and money. Manholes can be brought up to grade by town crews or local contractors. There are several Vermont companies that do a great job of internal repairs and sealing, or this can be done by collection system personnel using a variety of new products that are on the market.

For assistance with inflow and infiltration in your community, contact Vermont Rural Water's wastewater specialists. 💧

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# Rural Water Rally in Washington, D.C.



by Margaret Dwyer  
*Board President*

**O**n February 6 and 7, the National Rural Water Association held its annual Rural Water Rally in Washington, D.C. Representatives from state Rural Water Associations came to meet with their elected officials to ask them to support funding for Rural Water Associations, including circuit riders, technical assistance, operator training, and workforce initiatives.

In attendance from Vermont were me and fellow board members Jon Thornton and Rod Lamothe, along with April Busfield from Canaan Fire District #2, the winner of the Vermont Drinking Water Taste Test.

Our first meeting was with staff members of Senator Bernie Sanders. The next day we met with a staff member of Senator Peter Welch in the morning and then a staff member of Representative Becca Balint in the afternoon. We explained how Vermont Rural Water has been helping the water and wastewater systems impacted by last year's flooding, being prepared

to respond to future emergencies, and recruiting and training the next generation of water and wastewater operators. We were assured of the Senators' and Representative's ongoing commitment for Rural Water and left feeling confident that the appropriations requests we were asking for would be supported.

On Wednesday, we all attended the Great American Water Taste Test. Unfortunately, Vermont's submission from Canaan Fire District #2 was not a finalist, but the competition was fierce and a good time was had by all.

We had the opportunity to do a Moonlight Monument tour that evening. If you are ever in D.C., it is a wonderful way to see the iconic landmarks that commemorate the history and people of our great nation.

Overall, we felt it was a productive Rally. It is very apparent that providing rural communities with clean drinking water and protecting the environment are a priority in Congress. 💧



Jon Thornton, April Busfield, and Margaret Dwyer at the US Capitol building.

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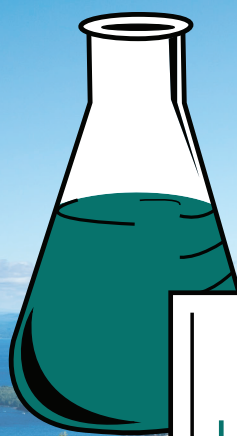
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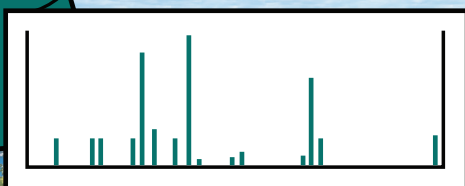
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