

# SUPPLY LINES WITH THE SOURCE



Newsletter of the NHDES Drinking Water & Groundwater Bureau  
on the web at [www.des.nh.gov](http://www.des.nh.gov)

Fall 2019

## Bright Ideas at the New Hampshire Water Science Fair

By Nancy Leland, Research Scientist, Lim-Tex

New Hampshire's Fourth Grade State Water Science Fair is a great place to see bright young minds taking new approaches to solving problems related to a most valuable resource, our water. At this year's Water Science Fair, finalists clearly worked hard to design and carry out their experiments. While a trophy went to the winner, I spotted another winner in the group - Keenen Stipe - who had conducted an experiment using nets to harvest water from fog in arid regions.

The possibilities were mind-blowing: we could use the fog net concept on the University of New Hampshire (UNH) cyanobacteria aerosol project to collect samples for toxin analysis. Not only did Keenen answer my questions, she provided me with a list of parts and assembly instructions. I brought the concept and plans to Professor James Haney at the University of New Hampshire's Center for Freshwater Biology (UNH-CFB). He read it, smiled, and asked, "Where did you get this? I've been trying to figure out how to collect fog."

Spanning 30 years, Professor James Haney's research at the UNH-CFB has focused on the ecology of cyanobacterial populations and exposure pathways of cyanotoxins. Using an ecosystem approach, no stone has been left unturned as students have explored topics ranging from cyanobacterial response to environmental stressors, zooplankton life histories and interactions with cyanobacterial populations, transfer of cyanotoxins in food webs, occurrence of cyanotoxins in food supplies and potential impacts of cyanotoxins on human populations (the ALS

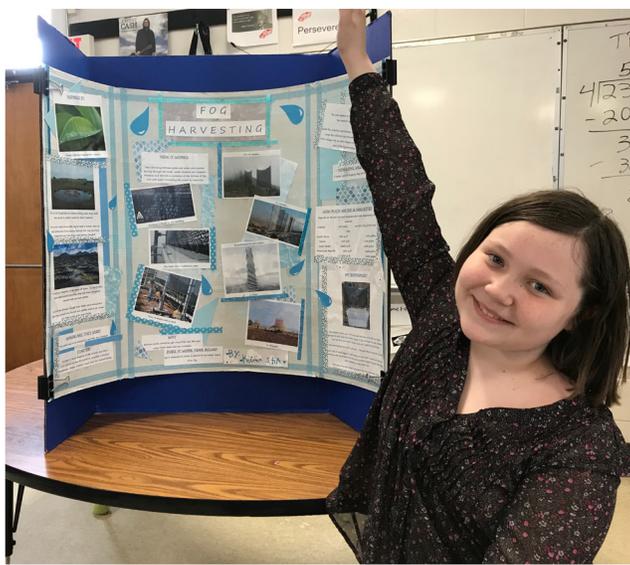
story). Professor Haney's long-standing support of volunteer monitors has led to the development of monitoring techniques for cyanobacteria that can predict bloom conditions and estimate microcystin concentrations. Although there are many projects underway at his lab, the current favorite is the aerosolization of cyanotoxins. The aerosol research, begun in 2005, includes work by then doctoral candidate Amanda McQuaid (who now oversees NHDES'

cyanobacteria monitoring), Masters students Kate Langley and Katie Low, and numerous undergraduate students. What conditions contribute to aerosolization? What are all the exposure pathways? What samples can we collect? Do we need new collection methods? Is there a better way to do this?

Using fog nets is a promising idea for UNH-CFB. With a new collection method and samples for analysis, we could broaden our understanding of the potential for exposure to cyano-

toxins via aerosols. Conveniently, Professor Haney teaches a Field Limnology class where students use traditional (Secchi disks, water quality sondes, etc.) and new methods to evaluate freshwater resources. We intend to have students construct, deploy and study the use of fog nets. Our sincere thanks to Keenen and the Water Science Fair for exploring real water issues and solutions and introducing this research tool to us!

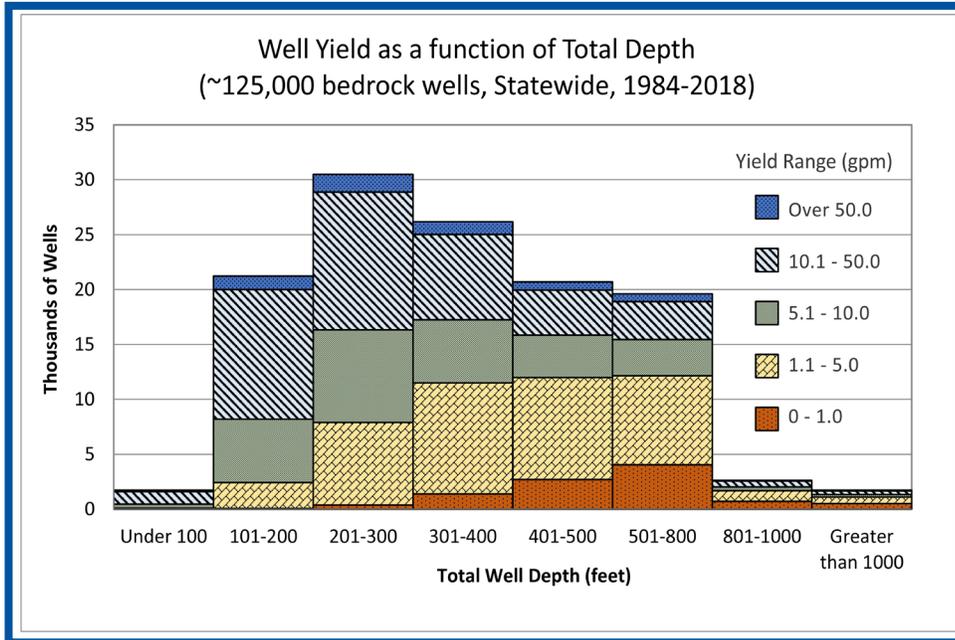
If you would like to learn how your local school can participate in the Water Science Fair and Drinking Water Festival, contact Lara Hooper at [lara.hooper@des.nh.gov](mailto:lara.hooper@des.nh.gov) or (603) 271-4071. 💧



Keenen Stipe with her Water Science Fair project Fog Harvesting

# Bedrock Water Wells – Depth and Yield Trends

Ninety-five percent of the wells installed in New Hampshire for domestic drinking water purposes are bedrock wells – also referred to as drilled or artesian wells. New Hampshire Geological Survey maintains a water well report database of over 137,000 records. These records date back to 1984, when the State’s well construction standards and well reporting rules were enacted. The well records are publically available online through the NHDES [OneStop](#) search tool.



Trends in the data of approximately 125,000 bedrock wells, installed between 1984 and 2018 for water supply purposes, show the majority of wells yielding >10 gallons per minute (gpm) are 100-400 feet deep, while the majority of low-yield (<5 gpm) wells are 300-800 feet deep. Most wells are finished to 300-500 feet deep. This suggests that drilling deeper will not increase the chances of finding more water. Rather, deep wells can be considered most useful in providing a storage space for water when installed in low-yielding rock.

The data were collected statewide for 34 years and do not describe what happens at the local level; local geology is the predominate factor in guiding at what depth to complete a well. Wells are completed to depths where the desired yield is encountered.

## Distribution of Well Yield in 125,000 Bedrock Wells

| Yield Range (gpm) | Percent of Total |
|-------------------|------------------|
| Greater than 50   | 5%               |
| Between 11 and 50 | 33%              |
| Between 6 and 10  | 23%              |
| Between 1-5       | 31%              |
| Less than 1       | 8%               |

## Distribution of Well Depth in 125,000 Bedrock Wells

| Depth Range (ft)   | Percent of Total |
|--------------------|------------------|
| Up to 300          | 43%              |
| 301-500            | 47%              |
| 501-800            | 8%               |
| 801-1,000          | 1%               |
| Greater than 1,000 | 1%               |

With more wells being installed, increased withdrawals and interconnections, and our ability to better set casing (and more commonly grouting casing) it will be interesting to see how the next 10 years of data differ from the past. 💧

*Supply Lines with The Source*, the quarterly newsletter of the NHDES Drinking Water & Groundwater Bureau, is published by:



29 Hazen Drive  
PO Box 95  
Concord, NH  
03302-0095

Commissioner Robert R. Scott  
Asst. Commissioner Clark Freise  
Division Director Thomas O’Donovan  
Bureau Administrator Sarah Pillsbury  
Editors Lara Hooper  
Paul Susca  
Pierce Rigrod  
Design Editor Lara Hooper

To subscribe, contact Pierce Rigrod at (603) 271-0688 or [pierce.laskey-rigrod@des.nh.gov](mailto:pierce.laskey-rigrod@des.nh.gov) [www.des.nh.gov](http://www.des.nh.gov)

Printed on Recycled Paper

## Fine Issued to Unlicensed Pump Installer

On September 15, 2017, the NHDES Water Division proposed an Administrative Fine totaling \$44,000 to an individual for installing 20 well pumps without a license. The fine also noted the installer's failure to properly bond the submersible pump circuit equipment grounding conductor to each well casing for all 20 wells, which is required for wells with metal casing, to prevent electrical hazards.

NH RSA 482-B and the Administrative Rules of the New Hampshire Water Well Board set water well industry regulations to protect groundwater resources and public welfare. A pump installer license is required from the Board before installing new or replacement well pumps.

The NHDES compliance policy allows for settlement terms for a proposed fine upon request by the violator. A settlement was finalized in this case on March 15, 2018: the installer agreed to pay \$15,400 in fines, and an additional \$11,000 towards a Supplemental Environmental Project. The project approved by NHDES funded water bottle refill stations at several New Hampshire schools to ensure access to safe and reliable drinking water while reducing germ exposure. A portion of the fine was suspended provided the pump installer,



who became licensed, remains in compliance for two years.

Information on the licensing and construction requirements of water wells in New Hampshire is on our [Water Well Board website](#). Contact Abigail Fopiano with licensing questions at (603) 271-1974. Information about NHDES-issued enforcement actions is also available on the [NHDES Legal Unit webpage](#). For questions regarding enforcement, please contact Emily Jones at (603) 271-4109.

## DWGB Calendar of Events & Deadlines: November 2019 – April 2020

|            |  |
|------------|--|
| January 10 | Disinfection Byproducts and Chlorine Residual report for Quarter 4 – 2019 due, contact Kimberly Durgin at <a href="mailto:kimberly.durgin@des.nh.gov">kimberly.durgin@des.nh.gov</a> or (603) 271-2516 |
| April 10   | Disinfection Byproducts and Chlorine Residual report for Quarter 1 – 2020 due, contact Kimberly Durgin at <a href="mailto:kimberly.durgin@des.nh.gov">kimberly.durgin@des.nh.gov</a> or (603) 271-2516 |
| Anytime    | <a href="#">Cyanobacteria Monitoring and Training grant applications</a> accepted, contact Pierce Rigrod at <a href="mailto:pierce.rigrod@des.nh.gov">pierce.rigrod@des.nh.gov</a> or (603) 271-2950   |
| Anytime    | <a href="#">Record Drawing grant applications</a> accepted, contact Emily Nichols at <a href="mailto:emily.nichols@des.nh.gov">emily.nichols@des.nh.gov</a> or (603) 271-7017                          |
| Anytime    | <a href="#">Tank Inspection grant applications</a> accepted, contact Luis Adorno at <a href="mailto:luis.adorno@des.nh.gov">luis.adorno@des.nh.gov</a> or (603) 271-2472                               |

**To see event calendars for additional opportunities, please visit:**

[Granite State Rural Water Association](#)  
[New Hampshire Water Works Association](#)  
[New England Water Works Association](#)

# How to Avoid Public Water System Violations & Significant Deficiencies

Good news! All five of the most frequent violations of drinking water regulations by the approximately 2,500 Public Water Systems (PWS) in New Hampshire in 2018 are easily and completely avoidable with a little planning.

Four of the top five violations can be avoided simply by

sampling on time, paying the annual permit fee, and sampling active wells and other water sources within 24 hours of issuance of lab results showing detection of bacteria in a routine sample.

Violations are issued for exceeding a Maximum Contaminant Level (MCL). Of all routinely analyzed chemical parameters, arsenic most frequently exceeds its MCL. Arsenic is of note because its MCL is 30-3,000 times less protective than MCLs for other regulated cancer-causing contaminants, depending on which contaminant you compare it to. For this reason, it will be lowered in 2021 to better protect public health in New Hampshire.

| Violation   | How to Avoid   |
|---|--|
| Bacteria Monitoring or Reporting (M/R) Failure                    | Check online PWS Master Sampling Schedule. <b>Sample early in monitoring period and the week</b> |
| Failure to Pay Permit to Operate Fee                              | Submit completed application (find on NHDES OneStop using PWS ID number; select PTO icon)        |
| Failure to Monitor Groundwater Source After Detecting Bacteria... | Sample wells/spring for bacteria <b>within 1 day of lab report</b>                               |
| Failure to Correct Significant Deficiency                         | Correct or ask for alt. date <b>within 30 days</b>   |
| Disinfection Byproducts M/R                                       | See Bac. M/R Failure   |

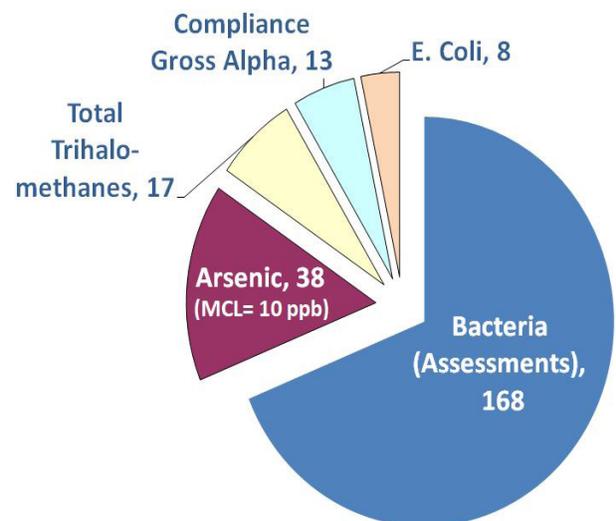
The smallest PWSs (serving fewer than 250 people) incur between 80% and 85% of monitoring/reporting violations. PWSs serving transient populations (such as gas stations) violate drinking water regulations more frequently than community or non-transient, non-community PWSs. Of transient PWSs, restaurants and campgrounds have the highest violation rates, typically for failing to sample water for bacteria.

For further detail about violations see the [2018 Annual Compliance Report](#). 💧

## Public Water System Categories

- **Community** – residential
- **Non-Community** – not residential
  - **Non-Transient (NTNC)** –not a residential water system and serves the same 25 people, or more, over 6 months per year, e.g., office park.
  - **Transient (TNC)** – a system that serves at least 25 persons in a transitory setting or more than 60 days each year, e.g., coffee shop.

## Chemical MCL Violations and Bacteria-based Assessments for Non-Transient Systems (2018)



# Sanitary Surveys and Water System Assessments

Drinking Water and Groundwater Bureau sanitary surveyors conduct official inspections (sanitary surveys) of approximately 600 PWSs every year, to support public health for users of these water systems. The surveyors identify Significant Deficiencies (SigDefs), which are issues that could compromise the safety of the supplied water. Sanitary surveyors and state-certified water system operators also conduct water system assessments triggered by the detection of bacteria in PWS water samples. These

inspectors search for and identify Sanitary Defects (a subset of SigDefs). Corrections for SigDefs and Sanitary Defects range from simple actions such as tightening nuts on well cap bolts to more costly actions such as replacing a well or water main. SigDefs must be corrected within 30 days or be included in a corrective action plan. PWS with uncorrected SigDefs that are not in compliance with a corrective action plan incur violations.

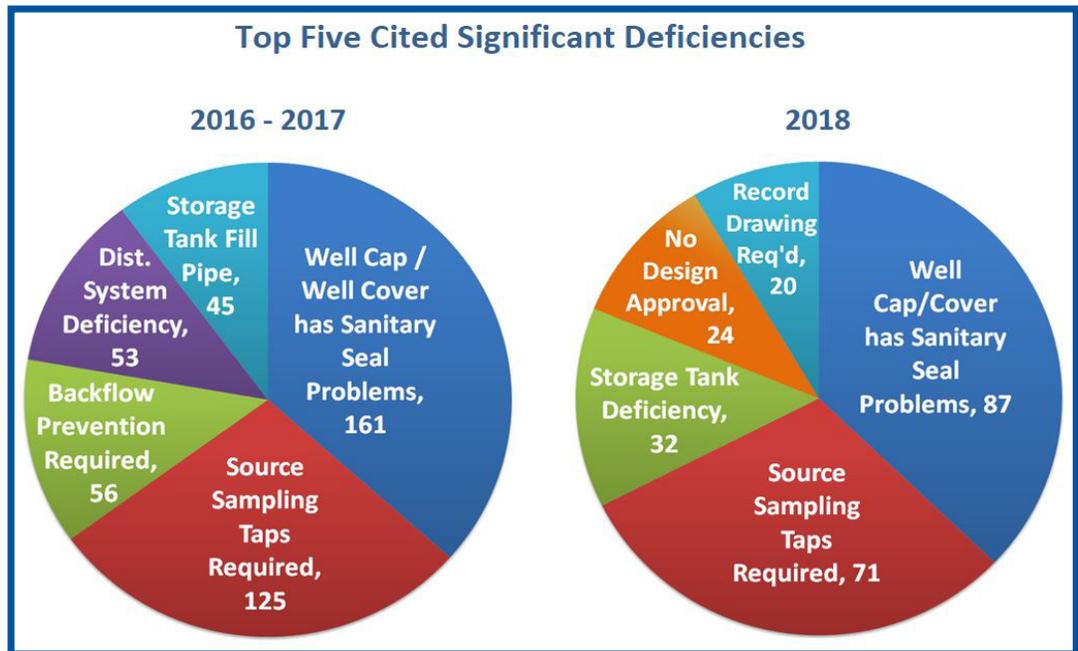
Both violations and non-complying SigDefs potentially carry political impacts due to inclusion in annual reporting to each water consumer. The single most effective way to avoid citations is annual inspection using the same [Level 2 Assessment Form](#) that state sanitary surveyors use, and fact sheet [WD-DWGB-7-13](#), to find and fix any issues found.

The most frequently cited deficiencies change little from year to year and they are among the simplest to correct: making sure that the well is sealed against the surrounding soil and groundwater, and installing a sampling tap for each water source. Many causes of a water storage tank SigDef (e.g., torn vent screen, hole on a hatch, missing fill pipe, etc.) are easily corrected.

Other frequent deficiencies include cross-connections between potable and non-potable water supplies, and installation of treatment equipment without NHDES

review and approval of equipment design specifications (e.g., residential-quality ultraviolet lights are commonly installed when equipment for PWS should meet NSF Standard 55).

For information about DWGB outreach to strengthen water system capabilities, see the [2018 Capacity Development Annual Report to EPA](#). 💧



Are you reading a paper copy of *Supply Lines with the Source?*

Save a tree – go electronic!

Visit the NHDES website and click on the



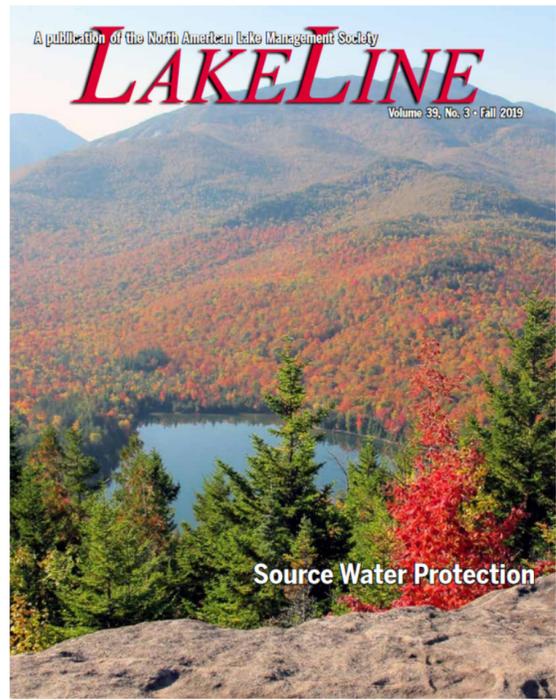
icon on the right hand side to sign up!

# Lake Management Magazine Focuses on Source Water Protection

The fall 2019 issue of LakeLine, the e-magazine of the North American Lake Management Society (NALMS), focuses on source water protection and includes several articles featuring New Hampshire and Maine lakes. Topics include:

- Management challenges in New Hampshire's multi-use water supply lakes
- Forest management for source water protection with a focus on the Lake Massabesic watershed and
- Managing recreation on Portland, Maine's water supply source, Sebago Lake

Look for LakeLine 39-3: Source Water Protection on the [LakeLine website](#). 💧



LakeLine's Source Water Protection fall 2019 edition cover

## Get Connected, Be a Mentor, Have Fun and Grow Your Career!

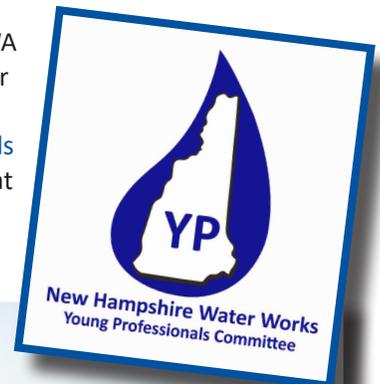
By Patricia Kelliher, Assistant Engineer, Hazen and Sawyer

New Hampshire Water Works Association (NHWWA) is excited to announce the formation of a Young Professionals (YP) Committee. The mission of the NHWWA YP Committee is to attract and retain young talent in all aspects of the water industry and provide opportunities to network through a variety of educational, social, and professional events. The committee currently includes forty members and is growing! The YP Committee is led by Patricia Kelliher (Chair), Corbin Kennedy (Vice Chair), Sarah Demos (Treasurer) and Sophie Ricard (Secretary).

Patricia, a consulting engineer at Hazen and Sawyer, is an active member of NHWWA's program committee which shapes the training content produced by NHWWA. Corbin is a Manager of Contract Operations for Granite State Analytical servicing small drinking water systems and an invaluable resource for the small systems that he serves. Sarah is the Deputy Director of Finance and Administration for Manchester Water Works and also serves as the Treasurer of the NHWWA

Board of Directors. Sophie is the Environmental Compliance Manager for the City of Concord's Water Treatment Plant and a member of the New Hampshire Drinking Water Coalition that plans the 4th Grade State Drinking Water Festival and Science Fair.

This winter, the committee is planning a presentation series and will be co-hosting a networking event with NEWWA YP Committee following the NHWWA/NEWWA Joint Meeting in January. For more information, visit the [NHWWA Young Professionals website](#) or contact Patricia at [pkelliher@hazenandsawyer.com](mailto:pkelliher@hazenandsawyer.com). 💧



Corbin Kennedy, Patricia Kelliher, Sarah Demos and Sophie Ricard

# Operator Profiles:

## Alexander Kotsekon

Alexander Kotsekon is a water works operator for the Concord Water Treatment plant. He holds New Hampshire water works operator treatment grade 4 and distribution grade 4 certifications.

**Please tell us about your water system.** I have been working for the City of Concord for 20 years. Our primary surface supply is Penacook Lake, which provides the majority of the raw water. The City also has the ability to supplement the lake from the Contoocook River in high demand and dry periods. Additionally, the City has a 1.0 MGD groundwater well field in Pembroke for an emergency supply. The treatment process is textbook conventional treatment with coagulation, flocculation, sedimentation and filtration. We use polyaluminum chloride for coagulation (which I piloted and recommended) and mixed media in four filters (granular activated carbon, and silica sand). The plant capacity is 10.0 MGD. The water system has five concrete storage tanks holding 7.5 million gallons, two booster stations, nearly 200 miles of water mains and 12,000 service connections.

**What was your first job?** My professional career started upon graduation from high school in 1972. That year, I was admitted to the Institute of Chemistry and Chemical Technologies in Ukraine. In 1977, I graduated from the Institute with a Master's Degree in Chemical Engineering. My major was drinking water and industrial liquid waste treatment technologies. My first job was deputy chief of the chemical processes department at a military electronics production plant in Ukraine.

**What have you learned which you wish you'd known when you first started in the industry?** At my first job in Ukraine, I had to learn how to write a comprehensive business-related letter, how to express briefly and in concentrated form the main idea and purpose of the letter. At my first job in the United States, I needed to pick up my third language, English, from scratch as quickly as possible. My first language was Ukrainian, my second language was German, and I had no English at that time.



Alexander Kotsekon

**How long have you been in the profession?** I have been in the water treatment field for 40 years. Here, in the United States 23 years: three years with a private company as a production manager and 20 years with the City of Concord as water treatment plant operator. I hold a grade 4 license in water treatment and a grade 4 water distribution system license as well. I have held a grade 4 license in municipal waste water treatment for the last six years. I am 64 years old and planning to retire in December of this year.

**What advice do you have for new operators?** My advice is learn, learn and learn. Learn from experienced peers and operators, learn from training courses and professional classes. Strive to be the best. Do not be shy to express

any suggestions for process improvement even if it may be beyond the scope of your duties. Be proud of your very morally rewarding job that provides community wellbeing.

**What is your favorite part about being a water works operator?** The favorite part of my current job is coming to work every day in a good mood. Nice people to work with, friendly atmosphere, strong

teamwork and recognition that I am part of a collective effort to deliver the citizens of Concord drinking water with the highest quality possible. 💧

## New Hampshire Drinking Water Exposition & Trade Show a Success

On Thursday, October 24 New Hampshire Water Works Association held the 26th annual Drinking Water Exposition & Trade Show at the Grappone Conference Center in Concord. This year there were approximately 340 people attending the Show including operators, consultants, and exhibitors with 54 booths. There were sixteen seminars, which provided 854 hours of continuing education credits to operators and other licensed professionals. In addition, the NHWWA's Young Professional's luncheon was held during the event.



## PROTECT YOUR TAP

10 minute lead test

**E**PA and NHDES created the Protect Your Tap: 10-minute lead test, an online guide that walks homeowners through a series of steps to see if they have lead pipes bringing water into their home, how to reduce their exposure to lead and how to get their water tested. If you would like to share the guide with your community, please contact Amy Rousseau at (603) 271-0893 or [amy.rousseau@des.nh.gov](mailto:amy.rousseau@des.nh.gov) for more information. Check out the [Protect Your Tap website](#).

## Public Works Employees Memorial

**P**ublic Works employees, including drinking water and wastewater operators, are on call 24 hours a day, 7 days a week, for 365 days a year. You work quietly and tirelessly and your work is dangerous. Your service often goes unrecognized. On June 5, 2019, a new memorial was dedicated to New Hampshire Public Works employees honoring 36 state, county and municipal employees who have died while performing public duties. The memorial is located in front of the New Hampshire Department of Transportation on Hazen Drive in Concord. Visit the [Memorial to Public Workers website](#) for more information. 💧



*Public Works Employee Memorial*



PPSRT STD  
U.S. Postage  
**PAID**  
Concord, NH  
Permit #1478