WATER WORKS

Challenges and strategies to build a resilient water workforce

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Executive Summary

BY KATIE JOHNS

Every year, the Water Group of Endeavor Business Media polls its audience in the annual State of the Industry surveys. One of the questions always asks what the biggest challenge companies are facing. It is an open-ended question, and oftentimes, "workforce" is listed as a response. Whether respondents mean retaining the workforce they have, finding the next generation of water professionals or replacing those who are retiring, the workforce poses a challenge to many in the water industry.

Through this handbook, we take a deep dive into four elements of the workforce. From the HR perspective, to building and maintaining the workforce, to forging the path to get there, the articles examine the challenges and solutions so many are facing.

Recruiting and retaining staff seem to be the two main factors of the workforce — and the two biggest challenges. Once you have tackled recruitment, how do you retain that staff? Where is the next generation going to even come from? Recruitment is shaped by a tricky landscape. State mandates and certifications vary across the country. What applies for one state might not in another. On top of that, some mandates can slow the hiring process, but on the flip side, that can lead to more job security.

And it is not just mandates that cause barriers. The COVID-19 pandemic brought a major change in the workforce. Between layoffs and remote work, many re-evaluated their careers. On top of that, funding can be a major hurdle. To combat these, some companies have implemented their own hiring initiatives. Stantec, for example, embarked on hiring 2,000 people by the end of 2025 in its H20+U campaign. In another instance, the U.S. Department of Commerce and the National Oceanic Atmospheric Administration announced $60 million in funding to help train people in jobs that advance a climate-ready workforce.

Once employees are established, a new set of challenges occurs — retention and retirement. The Trinity River Authority in Texas stood to lose more than 400 years of combined experience from just nine retiring employees. To keep that generational knowledge in place, the municipality worked to integrate change management and establish sustainable operations.

When all is said and done, when all the cards are laid on the table, and when everyone sees the challenges ahead, how do we get there? How do we even start creating a roadmap to a strong water workforce? With impending regulation changes, utilities feel a sense of urgency to find more employees to help them keep up with demand.

It is a nuanced and layered issue, but as the articles here will layout, there is a way forward.

In this handbook:

The Next Wave: Building the Workforce

How three initiatives are shaping the future of the water workforce

BY KATIE JOHNS

It is a challenge so many industries face. How is the workforce going to continue to grow? While retention is one thing, building up a workforce is another. Many companies and municipalities have plans in place to keep their workforce steady and growing. Below, three workforce initiatives highlight the need for a growing water workforce.

Stantec's H20+U Campaign

A big workforce transition came during and immediately after the COVID-19 pandemic. The pandemic saw massive layoffs in numerous industries, but it also saw a lot of people reflecting on their careers in general. For some people, the pandemic was the rocket that launched them into a whole new career path.

For Stantec, a sustainable engineering, architecture, and environmental consulting firm, its leadership saw this change occurring with opportunity piled on top.

"Particularly in the water space, there's multiple tailwinds that were driving the need for a lot of people to support the amount of work that was being talked about," Ryan Roberts, executive vice president of Water for Stantec, said.

Roberts pointed to tailwinds such as climate change and its impacts, including increased storm events, coastal resiliency, flooding, drought, water augmentation and industrial development.

Then, Roberts saw his brother-in-law's LinkedIn posting sharing that his company was embarking on an initiative to hire 100,000 people. He called up his brother-in-law to learn more and brought that discussion to Stantec. With the need to hire and a want for more brand recognition, Stantec embarked on its own hiring initiative.

"We essentially took a look and said 'over the next four years, what do we see?' We are always looking forward in terms of where do we see forecast for our business heading? What is it going to

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take for us to be able to accomplish those goals from a resourcing or workforce perspective," Roberts said.

It turns out it will take hiring 2,000 people by the end of 2025. Stantec took this 2,000-person hiring initiative and turned it into the "H20+U" campaign. Stantec leadership determined the 2,000 number by identifying the pace at which they wanted to grow the company. The number does consider people leaving the firm, but largely, the number is what Stantec will need to grow at the rate it wants while also moving into new segments.

As of print time, Stantec was about 75% to its goal and is hiring at all levels. Roberts said the company targets a certain "shape" to make sure there are enough senior level folks to support the development of those on the intermediate level who then support the development of those on the entry level.

Building up Stantec's workforce is not just about hiring people. It is about helping them develop throughout their whole career. Through campus ambassador programs, early-career cohorts and a developing professional's group, employees can learn and collaborate with individuals in the same career level as them or beyond.

"We are actively hiring at all levels through our workforce, and we just look to do it at a pace of each of those levels that makes for a long-term sustainable shape from a career development and opportunity creation and mentorship-type standpoint," he said.

NOAA's Climate-Ready Workforce Funding

In June 2024, the U.S. Department of Commerce and the National Oceanic Atmospheric Administration (NOAA) announced $60 million in funding to help train people in jobs that advance a climate-ready workforce.

The initiative was born out of NOAA receiving Inflation Reduction Act (IRA) funds. In that funding, there was a focus on building climate resilience in coastal states, territories and tribes, through the Good Jobs Challenge. According to the U.S. Department of Labor, "good jobs are the foundation of an equitable economy that lifts up workers and families and makes businesses more competitive globally."

On top of being considered a "Good Job" this initiative is also a Justice 40 program, meaning 40% of the benefits goes to people who come from, or live in, historically underserved and underrepresented areas.

The funding will aid nine projects around the country, with $50 million going directly to the projects and $10 million for technical assistance to support the grantees.

The model for these grants includes two key components aimed at accessibility — a sectoral partnership and wraparound services. The sectoral partnership puts all the recruiters, trainers and employers together to ensure the employee is getting the proper training. The wraparound services include solutions to things like travel, childcare and other barriers to employment. In each of the nine grants, there are funds for these services to help employees overcome these barriers.

The sectoral partnership allows for more connection between the training and what employers are looking for their staff to be able to do. This type of partnership can be implemented anywhere.

"I think by participating in these types of partnerships municipalities can really look at what are the needs within your area and work collaboratively with the different stakeholders that

are involved," Nicole Rucker, Climate Ready Workforce Project coordinator at NOAA, said.

These grants are the first of their kind, and Frank Niepold, Climate Ready Workforce Program manager of NOAA said the resources, findings and successes should be informative to the water sector as a whole to help in the future.

"We only had $50 million to give," Niepold said. "Now that seems like a lot of money, but when you're doing this work and you're going around, the demand was way larger than what we were able to supply."

Tampa's New Construction Crew

Much like workforce challenges during the pandemic, no industry has been spared from rising costs. To combat high pricing, Tampa's Water Department created a new, nine-person construction crew, called the Engineering Construction Crew.

To make this crew, which has 90 years of combined experience, Tampa hired internally, which then caused a ripple as the spots left open by the crew had to be filled. Rory Jones, Tampa Water Department director, said that ripple down will lead to the opportunity to hire externally at the entry level.

"I want to see a little bit of humility and a lot of initiative, and we'll train those skills," Jones said. "I'd like to be able to eventually get that way with our reactive work too. Let's build up this workforce. Let's buildup this knowledge, and we'll start to spread this across the reactive side, not just the plan side of the work."

The construction crew takes on all new projects while the department's reactive side handles work such as leaks and main breaks.

Aside from promoting within, a beneficial aspect Jones sees with this internal construction crew is less reliance on subcontractors to do work. Though Jones said the contractors are great allies who the department still needs, the internal construction crew can grow in scope while providing more customer service.

When asked if the city would create more crews like this, Jones said it would make sense to continue doing so.

According to a press release from the City of Tampa, since the crew began working in late 2023, the team has saved more than $400,000 in construction costs.

Whether it is accessibility, retention, skill level, inflation or funding, there are myriad reasons for a water workforce gap. With initiatives like the ones above, work can be done to fill that gap while paving the way to ensure the workforce is stronger for future generations.

Gracefully Navigating Hiring Hurdles in the Water Sector

How Human Resources in the water sector faces down recruiting challenges

BY MANDY CRISPIN

Recruitment in the public water sector is shaped by unique challenges, including statutory hiring processes in certain states, skill shortages, and labor market dynamics. Despite these difficulties, Human Resources professionals focus on the benefits for both utilities and incoming and outgoing employees.

Metropolitan Water Reclamation District

Population Served: Approximately 5.25 million people

Service Area: Cook County, Illinois, (about 883 square miles)

Facility Capacity: One of MWRD's seven facilities, the Stickney Water Reclamation Plant, is among the largest wastewater treatment plants in the world. It serves 2.3 million people and can treat up to 1.44 billion gallons of water per day, but on average it treats about 700 million gallons per day.

Employees: Approximately 1,756

Source: MWRD

The Civil Service Framework: Statutory Mandates and Processes

For those utilities that have to comply with state mandates during hiring, the challenge is that the requirements slow the process. The benefit of this method, however, is that it results in improved job security and helps develop a more dedicated workforce.

In Illinois, section 70 of the Metropolitan Water Reclamation District Act requires that all applicants for jobs in the classified civil service of the Metropolitan Water Reclamation District (MWRD) must take competitive civil service exams to assess their qualifications. Patti Vanella, MWRD human resources manager, outlined the undertaking when this added portion of the application process is required.

Potential employees must apply, be approved based on qualifications, take a categorized civil service exam that MWRD oversees, and be scored. Then MWRD creates a ranked eligibility list from the applicants based on appropriate job classifications.

The life of those ranked eligibility lists is usually three years, and from these lists, the utility interviews candidates. After interviews, a job offer is made to most suitable person/people. These steps can

be cumbersome, but once the applicant is hired, the potential for a lifelong career is bone fide.

"After a year of service, you are protected by a civil service status," Vanella said, which is a selling point to those who are career-minded, especially in the current climate where most professionals change occupations several times over their lifetimes.

Under the condition of anonymity via email, a Human Resources generalist at a utility in another state that does not have these mandates said they benefit from standardized hiring practices indirectly, including sourcing hired talent from nearby employers. While frowned upon, recruiting talent in this way has become a response to finding talent in a competitive marketplace.

Shortages in Engineering

Both Vanella and the source that requested anonymity reported a shortage in engineering applicants.

"I think every utility would say that finding qualified candidates, especially in specialized roles like engineering, is one of the biggest challenges they face," Vanella said.

She said three categories of engineers present challenges, but two of those are exceptionally difficult for recruitment. Senior level mechanical engineers are sparse, and electrical and structural are the really rare types in her searches.

According to the National Center for Education Statistics (NCES), in the academic year 2019 - 2020 U.S. institutions awarded approximately 123,000 bachelor's degrees in engineering. Mechanical and electrical engineering degrees account for just over 20% of degrees granted, while structural engineers are less than 20% of engineering degrees.

A community website at the University of Washington for electrical and computer engineering reports that there is only a 33% graduation rate, and gender and minority diverse communities are underrepresented. That diversity is underrepresented to the point that job listings are indicating positions are open to everyone by using specific language. For example, a Facebook post in a water industry community group, made by a utility urgently looking to hire, listed "*Gender- Males & Females Both Can Apply*" in addition to perks such as free transportation and onsite medical care.

The American Society for Engineering Education (ASEE) reports that although that 33% graduation rate is up from 2006 reporting (which recorded the rate at 29%) recruitment and retention remains urgent and "pre-college outreach," for example STEM programs, and changing curriculums to better suit real world needs could help.

Adding to that, public sector utilities may not have the funds to pay for incentives such as relocation or signing bonuses, so where these graduates are going to school matters.

The Retirement Wave: A Crisis or Opportunity?

As retirements rise in the water sector, utilities must plan for seamless transitions. There is an emphasis on training successors before departures, and a highlight on pension education sessions to support retirees.

"We focus on transferring knowledge before people leave," Vanella said. "Our mentoring programs and overlap periods between retiring employees and new hires are critical to ensuring institutional knowledge isn't lost."

Providing comment on the condition of anonymity, a utility Human Resources generalist wrote in an email that their company's tack is "periodic pension informational group sessions and one-on-one sessions with employees who are thinking about retirement."

"People retiring is not a surprise," Vanella added. "We can usually see it coming because most employees are long-term and take

Engineering By The Numbers

Information from Bureau of Labor Statistics (BLS), 2022–2023, and National Science Foundation (NSF) 2021–2022

- 123,000 engineering bachelor's degrees awarded annually in the U.S.
- Mechanical & electrical engineering make up 20% of these degrees.
- Structural engineering represents a smaller subset.
- Male mechanical engineers ~262.500 v. female mechanical engineers ~87,500
- Male electrical engineers ~187,500 v. female electrical engineers ~62,500
- Male structural engineers ~262,500 v. female structural engineers ~87,500
- Male environmental engineers ~35,500 v. female environmental engineers ~16,700
- White ~70% Asian ~10-12% Hispanic/Latino ~7-9% Black or African American ~5-7%
- Categorized as Other ~3-5%

advantage of our pension programs. That gives us time to prepare and plan for those transitions."

Together, these approaches demonstrate best practices for retaining institutional knowledge, ensuring workforce continuity, and taking care of exiting employees in a respectful way while simultaneously monitoring and predicting potential labor shortages.

The water industry continues to demonstrate agility with its ability to manage change, making the "silver tsunami" appear to be more an opportunity than a crisis both for people looking for stable jobs and those ready to enjoy a well-earned retirement.

In contrast, the Human Resources generalist who requested anonymity noted in an email that the only negative comments on exit surveys are that there aren't enough opportunities for promotion. This is across the entity, though, and positions other than engineers like administrative positions are much easier to fill.

Strategies for Recruitment Success: Careers Fairs

Bureau of Labor Statistics (BLS) reports that there are 6.1 million people who are currently unemployed (4.1%), but that translates to close to "low" historically, and it creates a highly competitive market when it comes to those looking to hire.

"Everyone is working, and we're all trying to hire from the same small pool of qualified candidates," Vanella said. "That makes it difficult for public utilities to compete with the private sector."

She said catering to recent graduates by working with local educational institutions is her best advice for utilities struggling to recruit.

Admittedly, utilities like those served by MWRD could take a long while to execute the hiring process end to end, years in fact, but Vanella said the important part is to communicate preplanning, highlight the utility's philosophy on succession planning during the career, and focus on long-term employment as meaningful aspects when attracting and retaining talent.

"We have a very robust recruitment process for that entry level engineer," Vanella said. "The idea behind it is to start the candidates out when they are right out of school as assistant engineers and have them work their way up."

This strategy takes on a whole new meaning and becomes even more important given retirement trends and how a utility might navigate that specific challenge.

"We've been fortunate; there have been no layoffs, even during challenging economic times," Vanella said. "Our jobs offer stability, which is a big draw for people considering public sector work."

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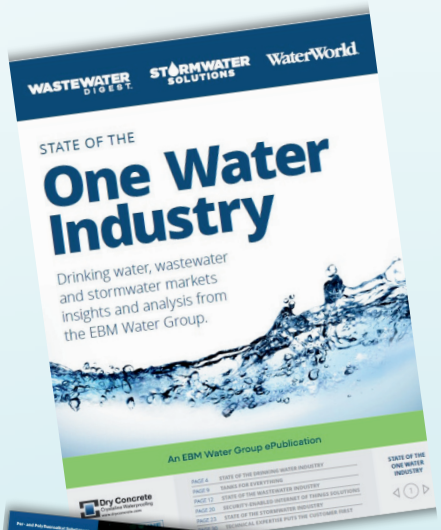

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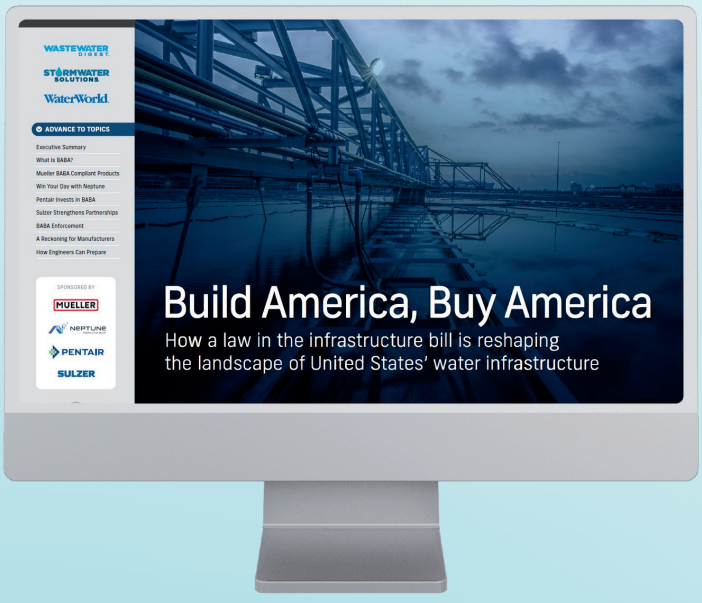

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Utility Leadership Blueprint

Applying lessons from the largest regional Texas municipality to develop workforce, integrate change management and establish resilient operations.

BY BOB CROSSEN

As the Trinity River Authority in Texas emerged from the COVID pandemic, it recognized a serious problem. Between retirements and attrition, it stood to lose more than 400 years of combined experience from just nine employees.

This kind of loss is not uncommon for water and wastewater utilities in the United States. According to data from the *WaterWorld* and *Wastewater Digest* State of the Industry surveys in 2023 and 2024, more than 10% of survey respondents indicated they were 70 years old or older, and at least two-thirds of all survey participants noted they were 50 years old or older. In 2024's survey, another trend emerged. Roughly 30% of respondents said they had 30 years of experience or more, and 27% said they had less than 10 years of experience. The generational transfer of knowledge has more than begun.

Dedication Beyond Measure

For TRA, all nine employees gearing up for retirement by 2024 had at least 40 years of experience. Three of those nine employees had 50 years of experience each. Careers of that length with the same organization have become rare in the modern workforce landscape, and that fact was not lost on the authority's leadership.

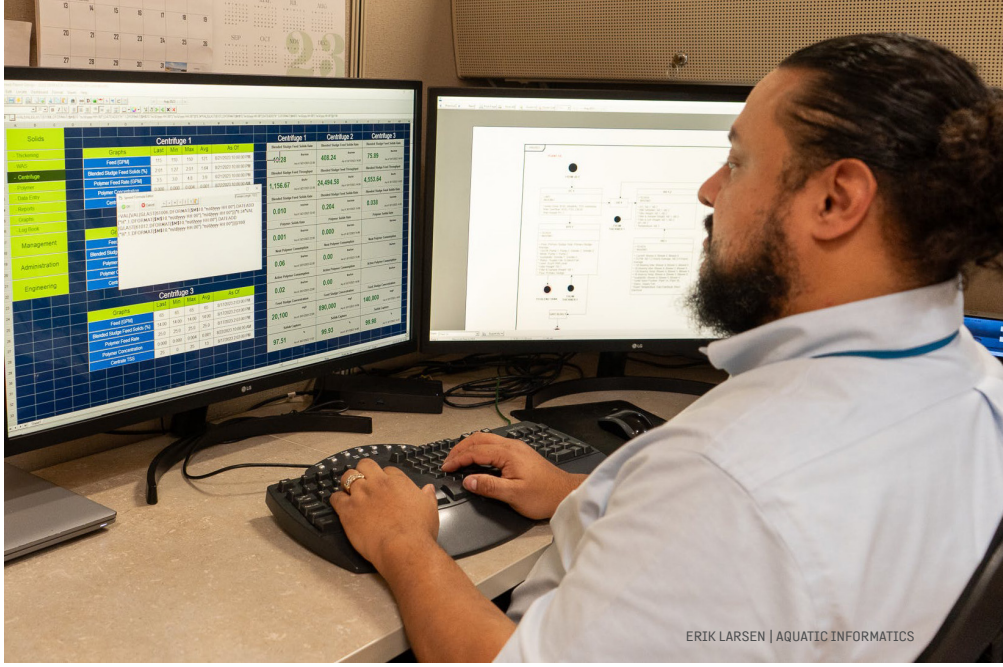
"We had a lot of folks that are very dedicated to the authority. People have been here a very long time. … I see why people stayed a long time, because it's a very great place to work," said Matthew Jalbert, executive manager of the Northern Region for the Trinity River Authority. "But we also started saying, 'Well, how do we end up kind of moving our folks that are about to retire and then try to develop the next generations leaders?'"

With a vision of what the future held if no action were taken and the challenges that would result from losing so much legacy knowledge, Jalbert and the TRA team created a plan of action. They aimed to break down utility silos, cross-train operators for resiliency, implement technology to assist operators in their day-to-day jobs, and developed a platform for professional development and advancement within the organization.

The Impact of Silos on Water Utilities

Trinity River Authority is the largest wholesale provider of wastewater services in Texas, serving nearly 18,000 square miles in the Trinity River Basin.

Five wastewater plants and one drinking water plant service the entire region, and approximately half of Texas' population depends on water from the basin for its supply. The wastewater plants serve a combined 2.25 million people and the TRA drinking water plant serves water to 250,000 customers.



ERIK LARSEN | AQUATIC INFORMATICS

Using a water information management system, David Naranjo can see data on all three centrifuges at the same time.

While TRA holds authority over all six plants, each one lived it its own bubble, which John Bennett, deputy executive manager of the Northern Region for TRA, said presented difficulties.

"Five years ago, when I stepped into this role, one of the things that I realized was that we were very siloed across each of our plants, across each of our work groups, and that was really by design," Bennett said. "Each plant does operate its own individual budget. Each work group has its own individual budget. But coming into a role where I was very familiar with two of our plants, I really needed to be able to have a better understanding of what my staff knew at the other facilities."

Four of the original five plant managers since Bennett took on his role will have retired by January 2025, meaning promotions for promising talent at the cost of lost knowledge. Bennett established a "Meeting of the Chiefs" once per quarter to bring the lead plant managers together. Each chief can share how they handle things at their facility.

"Then they talked about the programs they put together there, what are their [performance metrics], what are their job plans," Bennett said. "And then we can share those out. And you don't have to reinvent the wheel at your plant."

Another aspect led TRA leadership to create a stand-alone group for lab work, compliance and regulations that can assist all plants called Regulatory Oversight. Prior to breaking down silos, some labs would only handle samples, monitoring and reporting for a single facility.

Similarly, the engineers had been assigned to one plant with little exposure to the others in the authority. By expanding the team to include engineers in training and professionals engineers who conduct work across multiple plants, Bennett said asset management and plant manager effectiveness have improved.

"Prior to this position [and] me coming into this role, the plant managers were responsible for everything that occurred on the plant asset management programs, laboratory services, regulatory oversight," Bennett said. "You really didn't have the time to be the plant manager that you needed to be and focus on your facility."

In unifying the support groups, TRA recognized how beneficial it was to break down silos to open doors for efficiency and resilient operations. So it applied the concept to its operations arm in the form of cross-training.

Why Cross-training Matters

The success of cross training, in Bennett's experience, hinged on identifying the champions for specific plant processes or equipment operations. Those champions can become a resource for their colleagues when things are not going as planned or if treatment results are not meeting expectations.

The ultraviolet disinfection, cloth filter and centrifuge equipment are the same in multiple plants, which afforded TRA the opportunity for knowledge sharing and standardized procedures.

"It's really helped us to optimize these centrifuges as well as all the other equipment," he said, "and to getting them to perform at a very high rate, [and] at a substantially lower cost than what we were performing at."

The benefits of cross-training did not stop there, however. Bennett said during capital improvement program meetings, the champions at the plants can catch technical details that would otherwise go unnoticed.

In one example, Bennett shared how one of the current plants had a biological nutrient removal (BNR) system in place with aluminum sulfate chemical feed as a back-up. When another plant was in design to move to full BNR, the operator who ran the plant with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Kolton Stephens, operator at Ten Mile Creek Regional Wastewater System, enters data on site.

Mike Easley, chief operator at Ten Mile Creek Regional Wastewater System, reviews data with David Naranjo to determine if adjustments are needed.

the alum back-up was able to notice the lack of alum chemical feed in the designs for new construction.

"So, because of the knowledge he gained over at the other facility that did have it, he was able to bring that to the table," Bennett said. "It allows them to give a lot of input into the design of the equipment that they're going to have to maintain and operate."

These meetings then foster constructive discussion over what the operators like and do not like, leading them to discuss the why behind those feelings. In the end, Bennett said this creates an environment for improved processes while also balancing operator knowledge so they can work at multiple plants in the event of emergencies or requested time off.

One such example of that are the wastewater plant operators who have dual certifications, which allow them to operate the water plant. Periodically, those dual-certified operators will visit the water plant for a refresher, which Bennett said creates resiliency in the event of another COVID pandemic or other similar emergency.

Where Technology Meets Training

The lessons learned in cross-training also applied to digital tools. TRA's journey in this regard began after Doug Short, chief information officer and chief information security officer, wandered into Bennett's office and Bennett shared an idea.

"[John] said [to me], 'You know, Doug, it'd be really great if I could just see kind of what each one of my plants status is at any one time,'" Short said, noting the idea was simple on paper.

In practice, it became a bigger challenge. At the time Bennett proposed the idea, TRA's security system and protocols required on-site presence to access real-time information about a plant's operations. Considering the geographic size of TRA's service area, getting timely performance data was not feasible.

In fact, Short realized quickly that making this adjustment would require a lot of organizational change. The relationship between IT and operations could get tense. The security requirements for IT would occasionally impact operational procedures or would slow things down. And on the flip side, operations would occasionally skip steps leading to problems for IT. Creating an open pathway for communication was vital.

Short and Bennett put together the DevOps team composed of IT, operations, maintenance, engineering, regulatory and laboratory groups. This opened the doors to sharing ideas and finding successful compromises between all stakeholders in the authority.

"By building out these teams, we increased teamwork across the board, [improved] trust between IT and operations, and [built] communications between those teams," Short said.

Importantly, Short said this was not a cure-all. Regular check-ins were still a critical component of the digital integration. A monthly accountability forum brought in the plant managers and their teams to debrief on implementation, discuss issues holding things up, and progress toward the ultimate goal.

"And from that, you saw a healthy competition develop," Short said. "No plant manager wants to be second or third or last in getting this project done. So that healthy competition helped us to speed the project up."

Through integrations with all the teams and coaching on the digital tools, Short said the executive team now has visibility into plant performance from a dashboard that incorporates data from instruments in every plant.

Build a Roadmap for Your Future Leaders

With so much organizational change and the retirements of longtime employees, employees witnessed several opportunities to move up in the organization. The path to achieve those roles or develop the skills to take on a position of greater responsibility, however, was not as clear. Certifications and licensing is only one element to consider for leadership roles.

"We realized that our challenge was not to develop just the technical skills," said Taylor Huynh, executive manager of administrative services at the Trinity River Authority. "While that is important, we also needed to ensure they had the soft skills to handle difficult situations as well."

In working with executive leadership and supervisors across the authority, Huynh and her team developed the TRA University with five leadership academy tracks: executive development, leadership development, management and supervisor development, staff development and team development. In addition to this, it started a mentor/mentee program and developed both a knowledge, skills and ability program as well as a position qualification statement program.

These, Huynh said, provide the tools for employees to see a future career with TRA and the steps needed to achieve it, especially in developing skills to solve conflicts and handle crises between employees.

"We're seeing employees now engaging in understanding and wanting to understand more about the programs," Huynh said. "They're engaging with [human resources] more and their supervisors and management more for defining their career path."

Huynh stressed the importance of the career development coming from the employee rather than the trajectory being set by supervisors and management. Since implementing these academies in 2015, Huynh said many employees have taken advantage of the career development opportunities. Most notably, she said those who wanted to move up but felt uneasy or unready to take the next step discovered and developed the skills needed for a promotion.

"Oftentimes a succession plan is not successful until you have committed and invested in those employees to make them ready," she said. "There's no guarantees on succession planning, but there's always guarantees in ensuring that you continue to engage and continue to invest in employees that are willing and want to invest in themselves."

Training, Education and Licensing

How to Standardize the Water Workforce

BY ALEX COSSIN

LCRIs, MCLs, PFAS, GAC, IX, RO - to the average reader, these acronyms mean nothing. To the 1.7 million water workers across the country, these abbreviations carry weight.

Most reading this probably experienced a slight eye-twitch skimming through some of those acronyms above. If that did not illicit a response, maybe this will: How did the lead service line inventory go? How many letters do you have to send out? How is the PFAS treatment coming along? Have you decided on what treatment technologies to use for your water system yet? How is your BABA compliance? How's that submission for funding coming along?

Stressful, right?

Utility leaders are under a time crunch right now. They are stressed out. But they have a plan.

Utilities are teaming with companies to record lead service lines in their communities and send letters to their customers. They are also pilot testing PFAS treatment technologies in their water systems – some are already treating it. Dedicated personnel are typing up requests for grants and submissions for funding. Contractors and utilities are working on sourcing BABA compliant materials. All these people are included in the 1.7 million water workers across the United States.

That is a lot of people, but they need more.

Part of the pressure that utilities are facing right now stems from workforce issues.

The Learning Curve

Troy Gallagher has been in the water and wastewater business for more than 30 years. He has worked in the industrial, municipal and consulting areas for water and wastewater, and ran his own business for more than a decade.

Gallagher is now passing on his knowledge as an instructor for Bay College's Water Tech Program in Michigan. His valuable experience is a powerful tool for the future of the industry.

"In most states, there is a shortage of licensed water and wastewater operators and managers," Gallagher said.

Gallagher's point is echoed further by the U.S. Bureau of Labor Statistics job outlook for operators, which states that over the next decade about 10,300 openings are projected each year. According to the Bureau, all those openings are expected to result from the need to replace workers who transfer to other occupations or exit the labor force, such as to retire.[1]

These statistics place an emphasis on Gallagher's role in preparing the next generation for their careers in the water industry.

"The program is growing fast," Gallagher said. "We are doing more apprenticeship programs now, and students are very excited about careers."

Crossing the Line

Licensing and certification requirements for operators are determined on a state-by-state basis.

Different states have varying requirements. Someone who attends school in Michigan, gets an apprenticeship, and receives certification cannot pack up and drop into California as an operator.

"Certifications are very important for operators and managers to move up," Gallager said. "It would be great if states and the federal government worked together to standardize. It would make shifting jobs easier and allow every state to accept reciprocity."

Some states, such as Ohio, may grant certification by reciprocity if approved by the director. Other states may require an operator to re-test to meet their standards.

This makes it more difficult to fill job openings. This point is echoed throughout the water and wastewater communities as people turn to platforms like Reddit and Discord to share their frustration.

A Possible Revolution

Although anecdotal, posts from online users convey real problems from actual people within the industry.

Reddit is a popular online forum that hosts different threads on any topic imaginable — one being wastewater. A quick search shows that certification complaints are sprinkled throughout posts.

"This industry's certification system is a joke," posted a Reddit user concerned about a certification exam.[2,3]

Another user took to the website and asked "If you were in charge of your state's certification testing, how would you do it?"[4]

A third user asked "How easy/difficult has your experience been transferring between states?" One user, replying to the question, answered "It's a hot mess."[5]

Once again, posts from the internet are completely anecdotal, but it may be a sign of a larger problem. All three of the mentioned Reddit posts were submitted on the Wastewater sub-Reddit within the past year. A sub-Reddit can be thought of as a dedicated forum for a given topic - in this case wastewater.

It is not all bad news on the internet, however. Users often support one another.

They answer difficult questions and help people find the right resources.

Could the internet be a potential steppingstone for standardization? It 'is hard to tell, but their voices and frustrations should be heard by governing bodies.

Gallagher's advice for students and trainees looking to pursue careers in the water industry?

"Keep taking your certifications, keep moving up the ladder and don't stop learning," he said. "Water is going to be the new oil."

A compilation of screenshots of Reddit posts from community members covering various topics surrounding the water industry and certifications. SOURCE: REDDIT

Engineering the Future

Gwen Woods, Ph.D., P.E., PMP, is a project manager and water resources engineer for Riley Engineering. Her experience covers multiple industries, with a concentration on water and wastewater treatment design, water distribution system design and analysis, and wastewater collection system design.

Similar to Gallagher, Woods has mentored and developed the future generation of water resources engineers. She has taught at the middle school, college and adult education levels.

"One thing that makes me very hopeful for the future is, as younger generations enter the workforce, it's more ingrained/expected to incorporate new technological solutions to our technical approach," Woods said. "Both civil engineering and the water industry are historically change-averse for good reasons related to avoiding undue risk."

Woods stated that an aging workforce is an issue in engineering as well. The Bureau of Labor Statistics projects 22,900 job openings per year over the next decade due to the growth of the profession combined with people exiting the field.[6]

"Civil engineering currently graduates about 20,700 college students per year," Woods said. "That amounts to about 5% turnover per year in the industry combined with a deficit of new graduates entering the industry, even if all civil graduates enter the civil engineering workforce."

When people retire or change sectors, valuable experience goes with them. That is why it is important for people like Woods and Gallagher to pass on what they have learned to the next generation.

"The biggest challenge with this is to learn from experienced engineers before they retire," Woods said. "It's not just about numbers but about the wealth of experience that a seasoned engineer has at retirement. I think formal and informal mentoring, documentation of knowledge and opportunities for experienced engineers to work part-time as technical advisors can help mitigate the risk that we lose institutional knowledge."

Meeting Demands

Solving the workforce problem in the engineering sector starts with getting the word out. People need to know about the opportunities that exist in the industry.

"A lot of it comes down to making the industry more visible so young people can know it exists and think about it for a future career," Woods said. "Infrastructure, particularly water and wastewater, is so often out-of-sight, out-of-mind, but it's so important. I think awareness building encompasses a wide range of outreach, from playing the long game as far as getting kids interested in the industry early on, to networking with college students, to offering internship programs, to telling the public about what we do."

For most, clean water is perfectly integrated into their lives, so it often goes unnoticed. People do not think about the technicians, operators and engineers behind the scenes who make this stuff work. It does not cross the mind of a young person in search of a future career.

Woods stated that there is another piece of the puzzle to retaining the engineering workforce that can get overlooked - engineering can be tough.

"We need to make sure our workplaces are welcoming to a diversity of backgrounds, that we support less experienced engineers in their technical and career growth, that we acknowledge people's hard work - through compensation, benefits, formal recognition, informal thank-you's, etc. - and that we foster a collaborative environment where 'the best idea wins' regardless of who came up with it," Woods said.

Simply by making people aware, fostering the growth of young professionals and by reinforcing them, a future generation can be prepared for work in the industry.

The Next Generation

Discord is an online platform that is similar in some ways to Reddit. It allows users to create their own servers, chat via text and voice, and supports the creation of separate channels within the server for different topics.

Discord exploded during the COVID-19 pandemic as students and professionals took to the platform to create community.[7]

People can be invited to private servers or freely join public servers to access the different channels.

In the Water Works server, water and wastewater professionals talk about their days, share photos of lab results and troubleshoot issues with their systems via public discussion.

Discussion categories include "wastewater" and "drinking-water" topics. There are regional channels for California and Canada for locals to engage.

Training the Future

"When I first began learning about the water treatment field, I was really excited," said Christian Peterson, a user on Discord. "While exploring new career opportunities, I kept seeing mentions of the industry's growing demand due to an anticipated wave of retirements. It seemed like the perfect field to enter, but the reality has been frustrating."

Peterson currently resides in Maryland and is gearing up to enter the industry by attending the Sacramento State University online water program.

"I've noticed that a lot of the information about entering this field isn't always accurate or up to date," Peterson said. "I've already spent $500 out of pocket just for courses and materials. These programs provide certifications of completion, but they don't count toward the training required to sit for certification exams in Maryland."

An Ideal Candidate

Woods, as well as being a project manager and water resources engineer, is highly involved in the hiring process at Riley Engineering. She provided a list of what an ideal candidate looks like for their company, but from an engineer's perspective.

"There is a high demand for civil engineers in general and water resources engineers specifically," Woods said.

The ideal candidate has:

1. Technical skills learned from school and/or internships,
2. A willingness and ability to pick up new skills quickly,
3. And most of all, embodies our company values such as integrity, flexibility and humility.

"Ours is an industry where we're always learning and applying our knowledge to new situations, and we're always collaborating, so we look for people who want to work in that kind of environment and with whom we can easily work," Woods said.

Why Certifications Matter for Engineering

Similar to water operators, requirements for engineers may differ on a state-to-state basis. However, Woods believes that the current system is effective for engineers.

"I think in terms of professional registration, the existing system that provides reciprocity on licensure between states is working," Woods said. "It recognizes that much about engineering is the same from state-to-state, but the framework still allows individual states to have their own requirements - such as an additional test about state standards or a requirement for continuing education."

Core elements of engineering remain the same across the country. Differing climates require some variation which can bleed into requirements. For example, northern states may have to account for things like snow load and cold temperatures, while southern states account for extreme heat and humidity.

"It makes sense that states like California don't have reciprocity so they can impose more stringent testing requirements for things

like design for seismic risk," Woods said. "It's critical for engineering in that state, but not so much of a concern in other parts of the country."

A Frustrating Cycle

According to Peterson, you cannot even sit for the exams unless you've been hired by a company as a "Temporary Operator in Training."

This creates a possible cycle that can be frustrating for people entering the field.

"You can't get hired without experience, and you can't gain experience without being hired," the anonymous Discord user said.

In order to become a Temporary Operator in Training in the state of Maryland, you must apply for a certificate.[8]

According to the Maryland Center for Environmental Training (MCET) "the Temporary Certificate is issued to a newly hired operator or one transferring to a facility with a different classification. The Temporary Certificate holder, known as an Operator in Training, must work under the direction of a holder of an Operator or Superintendent Certificate."[9]

Maryland operator certification requirements consist of three elements:

- Education
- Experience
- Examination

MCET states the first task in the Operator Certification Sequence is to obtain employment.

"So far, I've submitted roughly 50 applications to both private and public water plants nearby, but I haven't heard back from any of them," Peterson said. "I come from a background in nonprofit and facility maintenance, but I don't have formal training or certifications, which has been a challenge."

Gatekeeping the Next Generation

It's safe to assume that water plants want to hire the best of the best. However, gatekeeping people with serious interest in the industry, who have done the research and are spending money on schooling to better themselves may add to the problems of a workforce shortage.

"This is a small field with a high bar of entry," Peterson said. "You typically need either construction/utility experience or a background in chemistry/laboratory work to be seriously considered. The job also requires knowledge of multiple disciplines – chemistry, math and physics – as well as an ability to stay on top of documentation and evolving regulations."

One thing young people can do is reach out to seasoned professionals, like Gallagher and Woods, to supplement their knowledge.

"Having had the chance to speak with experienced professionals in the field, I've learned a lot," Peterson said. "Everyone has been incredibly welcoming and willing to share their insights. They've told me that, while there's a lot of interest in the field, hiring is often a slow and selective process, with multiple rounds of interviews involving different departments."

Networking, and finding the right resources, can also play a crucial role in gaining experience. Peterson stated that he has had more success reaching out to smaller nonprofits like the National Rural Water Association for help. He stated that reaching out to places like Maryland Environmental Services via phone and email has not been very productive.

"One resource I found especially helpful when I started exploring the field was the Water Sifu podcast," Peterson said. "It's an excellent introduction to the industry, and I highly recommend it. There's also a strong interest in reaching out to high school and college students to train the next generation, which is encouraging."

With such a focus on investing in young people, it may cause folks looking to switch careers to be overlooked – losing out on people who are passionate about the industry.

Solving the Workforce Problems in the Water Industry

There is no "one-size-fits-all" approach to solving the issue at hand. The water industry is as diverse as one can get. States have different requirements. Complaints are anecdotal. Everyone learns in different ways, has unique expectations and differing views of what to expect from the industry.

Solving this problem requires a personal approach. What can you do as an individual, with the resources you have, to solve the workforce issues?

Utilizing federal standards may be beneficial for operator certification, but it may not be useful from the engineering side.

Investing in the younger generation may bring 50 years of a solid workforce, but you lose out on people looking to join the industry later in life.

The industry's best bet? Get out and talk to people. Rally for regulation change. Join that Discord channel or Reddit group. Entertain an unpaid internship. Take the chance on someone passionate about the industry who may not have the experience you're looking for.

"I've found that talking to people in every role, no matter how small, can have a huge impact on your career down the road," Peterson said. "A single conversation can open doors years later."

Questions for the Water Veterans From Someone in Training

People entering the water industry are eager to learn. There's an emphasis placed on learning from industry veterans before they retire – something emphasized by Gallagher and Woods.

Peterson submitted questions for industry veterans. If you've been in the industry for some time, it may be beneficial to take these into consideration to understand what's on the minds of those starting out.

1. I'd love to know more about opportunities for getting involved in the industry. Are there conventions, groups, nonprofits, or volunteer opportunities you'd recommend?
2. Are tours of facilities an option?
3. How do you research and connect with private companies and public utilities in this field?
4. I'd like to understand the industry's broader ecosystem: Who are the key suppliers, maintenance personnel and service providers?

Endnotes

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