PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

WHY PFAS MATTER TO RURAL WATER PROVIDERS

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In current conversations about long-term chemical safety, few phrases raise as much concern as PFAS. The acronym stands for poly- and perfluoroalkyl substances. For water and wastewater utilities charged with protecting public health and the environment, they are becoming a major nuisance.

THE "FOREVER CHEMICALS"

PFAS chemicals are often referred to as "forever chemicals" because they do not naturally degrade in the environment. The sticky nature of PFAS chemicals means they can build up in the human body and lead to health problems including effects on the immune system and the thyroid, as well as an elevated risk for certain types of cancer.

While classified as organic compounds, Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) are a group of man-made carbon-fluorine chemicals produced since the 1940s. They were widely used in non-stick household products, water/stain-repellants, food paper packaging (e.g., compostable pizza boxes and coffee cups), lubricants, aviation firefighting foams and more, according to the Environmental Protection Agency (EPA). The widespread use of these chemicals has led to their widespread presence in the national environment. PFAS have been detected in drinking water, rainfall, wastewater, and landfill leachate.

In May 2016, the U.S. EPA issued a public health advisory — not a regulatory number — of 70 parts per trillion. Though not an enforceable limit, 70 parts per trillion has since become a de facto standard at the state regulatory level. PFAS are the only drinking water contaminants widely used in consumer products subject to regulations down to parts per trillion.

EXISTING TREATMENT OPTIONS FOR PFAS-CONTAMINATED WATERS

Treating PFAS-contaminated water before being discharged to an aquatic receiving source will help reduce its accumulation in water systems.

The three existing options for removing PFAS from wastewater (and therefore drinking water cycles) are:

- Granular activated carbon (GAC)
- Ion-exchange (IX) resins
- High-pressure membrane filtration, nanofiltration and reverse osmosis (RO).

There are pros and cons to consider with each of these technologies. Choosing an option requires balancing costs and operational feasibility against the needs of each specific community. These technologies can be used at the system level in drinking water treatment facilities, focused in high-needs facilities such as water systems in hospitals, or at the individual building level or even in homes. Currently, the options above are the only non-experimental routes on the market. Although there is work is being done on advanced oxidation treatment techniques, these are not yet commercial and could come with a high energy price tag.

PASS IT ON

DEVELOPING A HABIT OF KNOWLEDGE TRANSFER IN THE WASTER AND WASTEWATER INDUSTRY

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In the past couple of months, I have increasingly had water and wastewater operators in classes struggling to turn their classroom experience into field work. Many come on board raw with no experience while older, experienced operators are retiring or leaving the industry. Without intentional processes, when operators leave, system knowledge leaves with them. To be successful, green operators need a set-aside time for intense information sharing and hands-on demonstrations.

Expectedly, workers who come from outside the water and wastewater arena don't come with the know-how necessary to be responsible for system work. To get a new operator up to speed, most need a minimum of at least a month with the outgoing operator and more time if they can get it. Even though it feels straightforward, the team can't point to a map and say: "There's the valve", then expect a new operator to instantly find it when they go into the field. Maps are not always updated. We experienced students need to update and do "as-builts" that are correct so new folks at the very least have an accurate point of reference.

Each plant is its own fine-tuned machine. Only from experience does each operator learn a plant's intricacies.

Running a plant is simply not an intuitive process that new hires should be expected to understand. Each plant has its own quirks and builds. New operators need the outgoing employees to show them the ropes as to how the plant operates and to demonstrate real applications of the TCEQ regulations in regards to plant maintenance. Even experienced operators can't be placed in a new plant and expect to know how it all runs. Each plant is its own fine-tuned machine. Only from experience does each operator learn a plant's intricacies.

For the new operator off the street, the Distribution System, Collection System and Plants are a fearsome animal to learn and to tame. The problem with relying on reading materials and not being shown is that something simple can be a nightmare to a new operator the first time they experience it in the real world. There is a lot of equipment in the ground and in a plant that operators need to be shown and taught about when there's no emergency, just so the logistics don't intimidate them when an issue arises.

I always start my class by introducing everyone and having them give their experience. That little bit of information shows the new operators there is a lot of experience out there to draw from. We also pass around contact information so that these newer operators have an experienced hand to call when there's no one else around. I also encourage the experienced operators to talk about and share events that were a genuine learning experience.

The military has a longstanding model of explaining and teaching the new recruits. In the water and wastewater industry, we need to adopt a habit of teaching newbies exactly how the plant and system for a company works. The model of military personnel being "trained up" ensures that when someone leaves a position, the knowledge doesn't leave with them. In our industry, this would mean if the lead or experienced operator cannot be there to run the plant, someone would at least be able to keep the train on the tracks in an emergency situation.

We also need to ensure that new operators understand why procedures are done a certain way. For example, there are some tests that will give false readings if they are not performed in the proper sequence. The same thing applies to a plant or system. If you do not flush correctly, inspect correctly, keep your bugs happy, or get the right disinfection, not only will the company suffer, but so will the customers!

For the experienced operators in our industry, knowledge has been the power placing them at the top of their system. When they leave or retire, passing that knowledge on and making sure that someone can operate everything is equally powerful for operators, the system, and the community. Passing on that knowledge ensures the water we drink is safe and that our wastewater systems will work.