Potable Reuse and PFAS

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What are PFAS? How does the EPA regulate PFAS in drinking water?

Per-and polyfluoroalkyl substances (PFAS) are a large class of synthetic chemicals that have been used in industry and consumer products since the 1940s. PFAS are commonly used to make products resistant to water, heat and stains. Many PFAS have unique properties that make them highly stable in the environment—often colloquially referred to as "forever chemicals."

People can be exposed to PFAS through certain consumer products, through occupational contact, and/or by consuming food or water that contains PFAS. Current scientific evidence indicates that exposure to specific PFAS above certain levels can result in harmful health effects including an increased risk of some cancers. Find out more about PFAS here.

In April 2024, the EPA announced the final National Primary Drinking Water Regulation for six PFAS chemicals. When fully implemented, this regulation will apply to all public water systems.

Check out the National Primary Drinking Water Regulation for six PFAS chemicals, here.

What is potable reuse? Is it held to the same PFAS regulations as other drinking water?

Potable water is water that is used for drinking and other household uses. Potable reuse is the use of recycled municipal wastewaters—highly treated, so that they meet or exceed federal Safe Drinking Water Act standards—for such purposes.

All drinking water supplied by a public water system must meet federal standards, regardless of the source. This includes the limits the EPA established through the National Primary Drinking Water Regulation for six PFAS chemicals.

Public water systems that implement potable reuse must meet all federal drinking water regulations, including those for PFAS.

How do PFAS get into the potable reuse water supply?

The water supply source for potable reuse is treated municipal wastewater. Wastewater that flows into a treatment plant, known as influent, can contain PFAS from a variety of sources including industrial dischargers and household products in domestic wastewater. Most traditional municipal wastewater treatment plants are not designed to remove PFAS.

What treatment technologies are available for potable reuse utilities to use to reduce the levels of PFAS in drinking water?

Utilities can remove the six regulated PFAS from drinking water by installing advanced treatment technologies such as:

- Granular activated carbon (GAC)
- Anion exchange resins (AIX)
- Nanofiltration (NF)
- Reverse osmosis (RO)

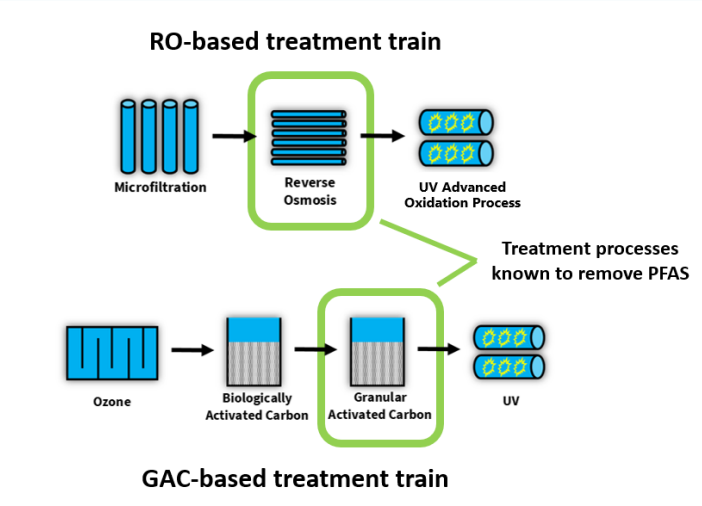
Potable reuse systems often use either RO or GAC filtration (see the figure below) as part of their overall treatment design. These systems can remove a wide range of microbial and chemical contaminants, including the six regulated PFAS and some PFAS that are not part of the regulation. Additionally, these systems also include sophisticated monitoring to ensure consistent and reliable treatment.

Reverse Osmosis

RO physically removes microbial and chemical contaminants, including the six regulated PFAS, from water by forcing water through a high-pressure membrane. The water that does not pass through the membrane (often referred to as the concentrate, brine or reject stream) must then be treated and/or disposed of.

Granular Activated Carbon

GAC is a porous media that removes chemicals, including the six regulated PFAS compounds, from water. Organic chemicals such as PFAS attach, or adsorb, to the surfaces of the GAC media as the water passes through the media's pores. The GAC media must be replaced periodically to maintain sufficient PFAS removal during operation.



RO-based and GAC-based advanced treatment trains used to purify treated wastewater prior to conventional drinking water treatment. These are two example treatment trains; there are other possible configurations.

Drinking Water Treatability Database

The Drinking Water Treatability Database provides more provides more information on the technologies available to treat drinking water.

Are there examples of potable reuse systems using these treatment technologies?

RO case example: Groundwater Replenishment System (California)

To remove a variety of chemicals and microorganisms, the Groundwater Replenishment System in Orange County, California, includes RO as part of a multi-barrier treatment process that recycled water undergoes before being injected into drinking water aquifers. The treatment system can produce 130 million gallons of water for potable reuse daily and has been operational since 2008.

GAC case example: Aurora Prairie Waters (Colorado)

The Prairie Waters potable reuse project in Aurora, Colorado, uses an advanced treatment train that includes GAC filtration to remove contaminants such as pharmaceuticals, personal care products and other human-made chemicals. The treatment system can produce up to 10 million gallons of advanced treated water each day and has been in operation since 2010.

The EPA expects that the PFAS National Primary Drinking Water Regulation will provide additional public health benefits because the available treatment technologies can remove additional PFAS that may have adverse health effects.

What can a potable reuse system do to prevent PFAS from ending up in drinking water?

Potable reuse facilities closely monitor different chemicals, including industrial chemicals, that are entering the wastewater treatment plant so that they can take steps to protect public health. They may choose to use legal authorities, including Clean Water Act pretreatment authorities, to prevent the introduction of PFAS into their wastewater or to upgrade their treatment systems.

Controlling PFAS from industrial dischargers

Reducing the amount of PFAS that industries discharge to municipal wastewater treatment plants may lower PFAS concentrations in the treated municipal wastewater, the source of water for potable reuse. To do this, municipalities operating wastewater treatment plants can use the authorities of the National Pretreatment Program. The EPA has developed guidance on how to use these authorities to address PFAS.

Examples of states exploring National Pretreatment Program authorities

Communities can use National Pretreatment Program authorities to develop what are commonly called "enhanced source control" programs. To protect drinking water quality and potentially reduce treatment costs, California and Colorado have explicitly added enhanced source control to their direct potable reuse regulations, and other states developing direct potable reuse regulations are considering similar requirements.

Common Treatment Technologies for PFAS and Potable Reuse

Reverse Osmosis

RO removes microorganisms and chemicals, including PFAS, from water.

Even before EPA finalizes the PFAS drinking water regulation, **California's Orange County Water District has used RO as part of a multi-barrier process for potable reuse** to protect public health.

Granular Activated Carbon

GAC removes a range of chemicals, including PFAS, from water.

Aurora, Colorado, uses an advanced treatment train that includes GAC to purify treated wastewater.

What else has the EPA done to help manage PFAS risks?

The PFAS Strategic Roadmap lays out the EPA's whole-of-agency approach to addressing PFAS. You can learn more about the EPA's work on PFAS at www.epa.gov/pfas.