# PFAS SURVIVAL KIT

## What's included in your Survival Kit:

- Rules of Engagement (Regulations)
- Advanced First Aid (Treatment Options)
- Hunting and Gathering (Finding the Right Consultant)

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# RULES OF ENGAGEMENT

Initial PFAS compliance monitoring for community and nontransient noncommunity water systems serving a population **of greater than 350 persons begins January 1, 2024**; initial monitoring for systems serving a population of **less than or equal to 350 persons begins January 1, 2025.**

**PFAS stands for perfluoroalkyl substances** and is a general term used to describe a larger family of man-made chemicals. EPA has identified two specific chemicals known as Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS), which are known to have the most adverse health effects and environmental impact.

This final-form rulemaking sets new Minimum Contaminant Levels (MCLs) for PFOA and PFOS. The rulemaking also establishes the provisions necessary to comply with the MCLs, including requirements for monitoring and reporting, public notification, consumer confidence reports, best available treatment technologies and analytical requirements. The MCLs are 14 parts per trillion (ppt) for PFOA and 18 ppt for PFOS.

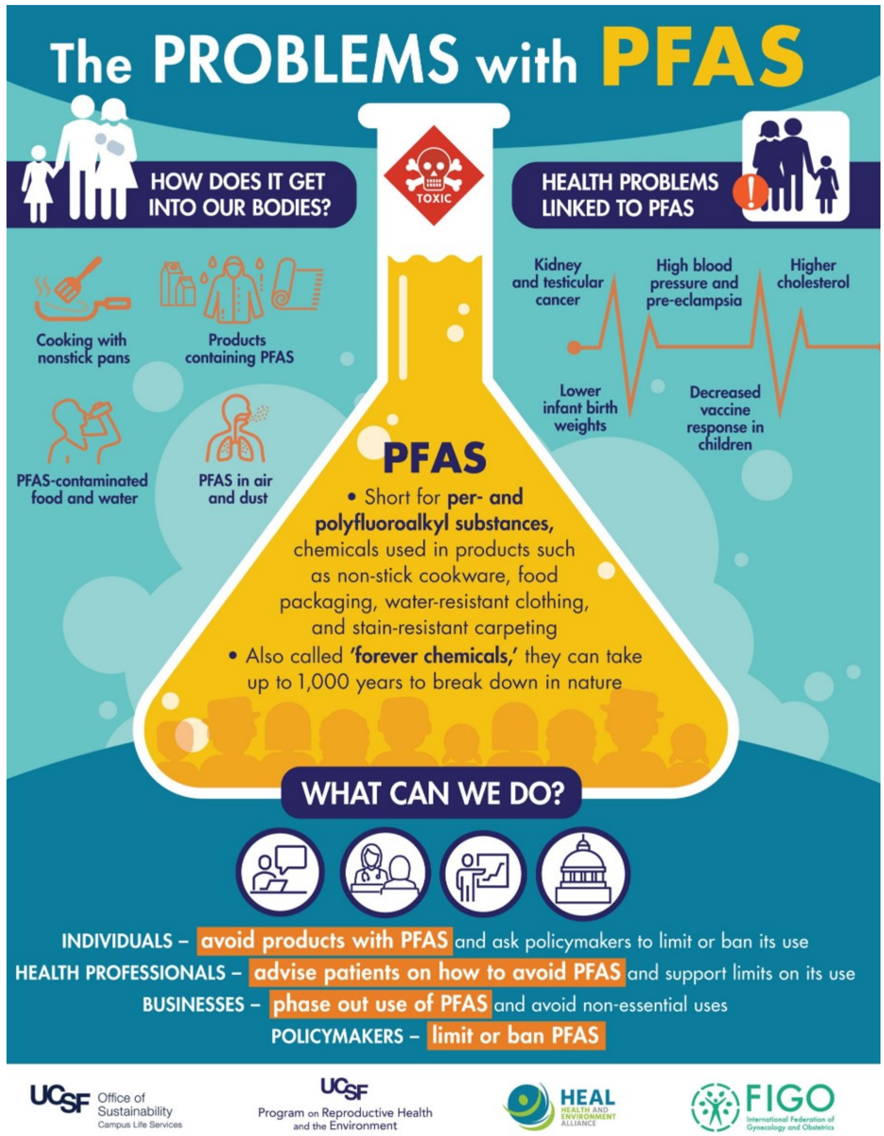
Initial monitoring consists of four consecutive quarterly samples. If PFOA or PFOS or both are detected at a level greater than their respective MCL during initial monitoring, compliance monitoring is required quarterly. When sample results indicate a violation of one or both MCLs, follow-up actions are required, including 1-hour notification to the Department, consultation with the Department on appropriate corrective actions, and Tier 2 public notification (PN).

# PROPOSED PFAS NATIONAL PRIMARY DRINKING WATER REGULATION

On March 14 2023, EPA released a proposed rule regarding PFAS limits through the National Primary Drinking Water Regulation. This would be the first-time enforceable limits have been implemented regarding PFAS on the federal level.

EPA is proposing a National Primary Drinking Water Regulation (NPDWR) to establish legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six PFAS in drinking water. PFOA and PFOS as individual contaminants, and PFHxS, PFNA, PFBS, and HFPO-DA (commonly referred to as GenX Chemicals) as a PFAS mixture. EPA is also proposing health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for these six PFAS.

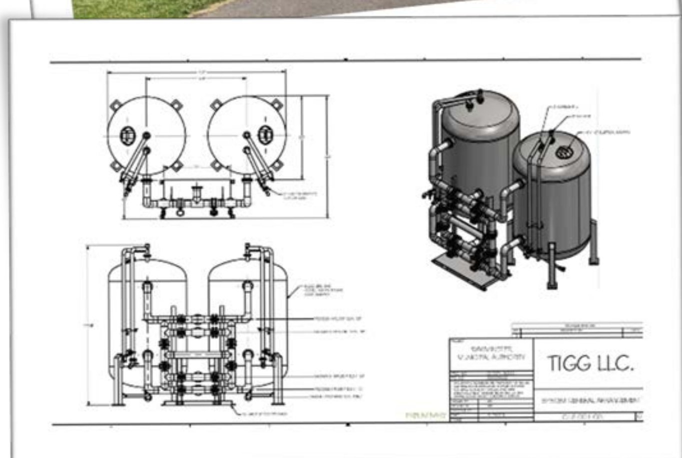
The proposed PFAS NPDWR does not require any actions until it is finalized. EPA anticipates finalizing the regulation by the end of 2023. **EPA expects that if fully implemented, the rule will prevent thousands of deaths and reduce tens of thousands of serious PFAS-attributable illnesses.**



# ADVANCED FIRST AID
## (TREATMENT OPTIONS)

## ACTIVATED CARBON- FILTRATION

Activated carbon treatment is the most studied treatment for PFAS removal. Activated carbon is commonly used to adsorb natural organic compounds, taste and odor compounds, and synthetic organic chemicals in drinking water treatment systems. Adsorption is both the physical and chemical process of accumulating a substance, such as PFAS, at the interface between liquid and solids phases. Activated carbon is an effective adsorbent because it is a highly porous material and provides a large surface area to which contaminants may adsorb. Activated carbon (GAC) is made from organic materials with high carbon contents such as wood, lignite, and coal; and is often used in granular form called granular activated carbon (GAC).

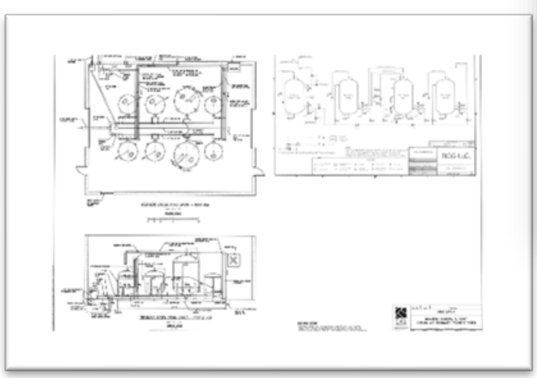



# ION EXCHANGE RESIN- FILTRATION


Ion exchange resins are made up of highly porous, polymeric material that is acid, base, and water insoluble. The tiny beads that make up the resin are made from hydrocarbons. There are two broad categories of ion exchange resins: cationic and anionic. The negatively charged cationic exchange resins (CER) are effective for removing positively-charged contaminants and positively charged anion exchange resins (AER) are effective for removing negatively charged contaminants, like PFAS. Ion exchange resins are like tiny powerful magnets that attract and hold the contaminated materials from passing through the water system. Negatively charged ions of PFAS are attracted to the positively charged anion resins. AER has shown to have a high capacity for many PFAS; however, it is typically more expensive than GAC. Of the different types of AER resins, perhaps the most promising is an AER in a single use mode followed by incineration of the resin. One benefit of this treatment technology is that there is no need for resin regeneration so there is no contaminant waste stream to handle, treat, or dispose.

# HIGH-PRESSURE MEMBRANE - REVERSE OSMOSIS

High-pressure membranes, such as nanofiltration or reverse osmosis, have been extremely effective at removing PFAS. Reverse osmosis membranes are tighter than nanofiltration membranes. This technology depends on membrane permeability. A standard difference between the two is that a nanofiltration membrane will reject hardness to a high degree, but pass sodium chloride; whereas reverse osmosis membrane will reject all salts to a high degree. This also allows nanofiltration to remove particles while retaining minerals that reverse osmosis would likely remove. Research shows that these types of membranes are typically more than 90 percent effective at removing a wide range of PFAS, including shorter chain PFAS.



# PFAS/PFOA EXPERIENCE

## Horsham Air National Guard Base
## Multi-Media Filtration System
## Horsham, Pennsylvania

CKS Engineers, Inc., an ARRO Consulting Company, performed design and construction management of a multi-media filtration system project at the Horsham Air National Guard Base (formerly Willow Grove Naval Air Station) to remove PFOA and PFOS from stormwater run-off. Stormwater run-off was found to have varying levels of PFOS, as much as 650,000 parts per trillion which was being discharged to nearby creeks. The filter system used four levels of treatment to provide up to 500-gallon per minute of capacity. The filter steps included a sand filter for particulate and organic removal, zeolite media for removal of oils, greases, and other organics, followed by granular activated carbon and finally ion exchange media for removal of PFOS and PFOA. Removals to non-detect level are consistently achieved. This project was funded by the Air National Guard.


## North Wales Water Authority
## Well No. 3
## Warrington, Pennsylvania

Granular Activated Carbon Filters
20,000 pounds of Carbon per Vessel
Valve Tree with Motor Operated Valves

Exterior of Granular Activated Carbon Filter Building

SCADA Control Panel for Granular Activated Carbon Filters

| PROJECT NAME | CONTRACT COST | DATE | PROJECT DESCRIPTION |
|---|---|---|---|
| PFOS/PFOA Well Contamination – Water Service Project | $1,500,000 | 2021 | Installation of 6 Water Main Extensions and 83 New Water Services to Supply Public Water to Properties Impacted by PFOS/PFOA Contamination<br>*Design, Construction Management, Inspection* |
| Well Nos. 3 & 9 GAC Filtration System | $2,335,970 | 2021 | Installation of GAC Treatment System and Appurtenances to Address PFC Contamination at Wells 3 and 9<br>*Design, Construction Management, Inspection* |
| Wells 5, 8 and 11 PFC Removal Treatment Systems | $4,500,000 | 2021 | Installation of Ion Exchange and GAC Treatment Systems for Removal of PFC Contamination (In Design)<br>*Design, Construction Management, Inspection* |
| PFC Contamination Remediation Projects (Funding by WGNAS)<br>a)Costner Well Filtration System | $1,900,000 | 2017 | Installation of GAC Treatment System and Appurtenances to Address PFC Contamination at Wells 1, 2, and 6<br>*Design, Construction Management, Inspection* |
| NWWA Interconnections | $475,000 | 2017 | Installation of New Interconnection Facilities to Accommodate Supplemental NWAA Water Supply<br>*Design, Construction Management, Inspection* |
| Easton Road and Center Street Water Main Extensions | $143,222 | 2017 | Installation of Public Water Mains to Provide Service Connections to PFC Affected Properties<br>*Design, Construction Management, Inspection* |
| Well No. 14 & 15 Activated Carbon Filtration System | $1,360,000 | 2017 | Installation of GAC Filter Systems to Remove PFC's from Two Wells<br>*Design, Construction Management, Inspection* |
| Well No. 2 Activated Carbon Filtration System | $550,000 | 2017 | Installation of GAC Filter System to Remove PFC's from Well<br>*Design, Construction Management, Inspection* |
| Wells 10, 13, and 26 Activated Carbon Filtration Systems | $1,562,877 | 2016 | Installation of GAC Filter Systems to Remove PFCs from Three Authority Wells<br>*Design, Construction Management, Inspection* |

# HUNTING AND GATHERING
## (FINDING THE RIGHT CONSULTANT)

## LOCATION

**ARRO Consulting, Inc.** is a multi-disciplinary consulting firm offering extensive experience providing engineering, operations assistance, and related services to municipal entities in eastern and central Pennsylvania and northern Maryland.

Because ARRO's client base is more than 85 percent municipal entities, we are familiar with the leadership skills necessary to successfully manage multiple assignments simultaneously that are commonplace when appointed as municipal engineering consultant for a municipality.

**ARRO currently serves over 200 clients from our six strategically located offices in Pennsylvania and Maryland.**

### OFFICE LOCATIONS

**Berks County, PA** 321 North Furnace Street, Suite 200, Birdsboro, PA 19508

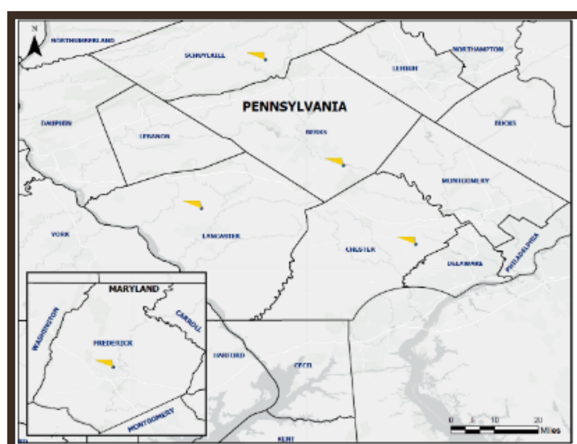
**Bucks County, PA** 4259 W. Swamp Road, Suite 410, Doylestown, PA 18902
*(CKS Engineers, an ARRO Consulting Company)*

**Chester County, PA** 1450 East Boot Road, Building 100, West Chester, PA 19380

**Schuylkill County, PA** 1239 Centre Turnpike, Orwigsburg, PA 17961

**Frederick County, MD** 201 Thomas Johnson Drive, Suite 207, Frederick, MD 21702

**ARRO's corporate headquarters is located in Lancaster County, PA.**
108 West Airport Road,
Lititz, PA 17543
www.arroconsulting.com



# EXPERIENCE

## WATER PUMPING STATIONS

ARRO has designed several hundred new or rehabilitated water pumping stations. These stations have included booster pumping systems as small as 25 gallons per minute and high service pumping systems as large as 100.0 MGD with 2,000 horsepower motors. Potable water systems have been designed for a pump discharge pressure of 1,000 feet, requiring special attention to start/stop controls, as well as special materials. Raw water, high service, and booster pump stations have been designed for both manned and remote operations. Pumping system analysis and design experience includes surge protection, suction and discharge conditions, energy considerations, start/stop sequencing, stand-by power, and instrumentation and control systems, including telemetry to central control stations.

## WATER TRANSMISSION/DISTRIBUTION MAINS

ARRO has provided design and construction engineering services for over 2,000 miles of transmission mains and distribution systems ranging in size from four inches to 72 inches in diameter. Various pipeline materials have been used for pressures up to 400 psi in mountainous terrain. Projects have ranged from simple installation of new 5,000 L.F. six-inch diameter mains to a single project involving 400 miles of pipe. While pipeline projects may vary widely in size, many of the design and construction issues encountered are similar. These issues may include water hammer, thrust blocking, blow-offs, air/vacuum valves, pipe interconnections (wet or dry), material selection, special crossings (railroad, river, highway), utility relocations, soil conditions, traffic considerations, bedding and installation, and similar items. Historical and environmental features, including wetlands, may also impact the design and installation of a water supply network.

## WATER STORAGE

ARRO has provided design and construction engineering services for over 150 water storage tanks including 32 new or rehabilitated tanks within the past 10 years. These tanks include steel, cast-in-place concrete, and prestressed concrete. Installation has included elevated spheroid, hydropillar, and standpipe; buried; or ground level tanks with capacities ranging from 80,000 to 13,500,000 gallons.


With regard to aesthetics, most tank designs are simple and functional. When requested, we have also designed tanks to blend with their architectural surroundings or to provide a more pleasing appearance. For instance, a new 1.0-million-gallon concrete ground-level water storage tank for the City of Frederick won a national award for excellence in architectural treatment from the Portland Cement Association for the use of a brick facing to complement many of the local historical structures.

Rehabilitation of existing tanks may include adding or replacing tank covers, repair of structural deterioration, and repainting, including disposal of removed paint which may contain lead. Demolition of existing tanks also presents challenges to a water system in that by removing the tanks, the hydraulics of the system may change significantly. Hydraulic network analysis is normally required to predict the likely impacts of not having an existing tank available. This also applies to temporarily removing a tank from service for maintenance or repair. Further, the demolished materials must be properly disposed.

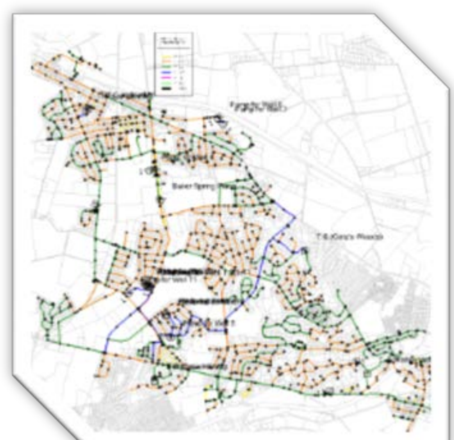
ARRO has sited and developed water supply wells throughout the eastern United States in most major hydrogeologic settings. ARRO provides a full range of services including hydrogeologic investigations, well drilling supervision, pumping tests, design of water treatment systems, permitting, and construction management.

ARRO routinely provides the following services for well development projects:

- Well Siting Studies
- Pre-Drilling Plans
- Well Drilling Specifications
- Well Drilling Supervision
- Pumping Tests and Aquifer Assessments
- Water Quality Sampling and Evaluations
- Post Drilling/Hydrogeologic Reports
- Permit Applications
- Water Treatment System Design
- Bid Documents Preparation
- Construction Management

ARRO is recognized by many professional organizations and government agencies as a leader in well development and has led technical training sessions on the use of fracture trace analysis.

## COMPUTERIZED HYDRAULIC MODELING



ARRO has specialized expertise in the field of computerized hydraulic modeling of water, wastewater, and storm sewer systems. ARRO provides this focused knowledge to clients throughout the northeast. Using a commercial software package, ARRO prepares computerized hydraulic models to find economic solutions to water distribution or wastewater collection/conveyance system problems without physical disruption of the system. Our models schematically represent supply, pumping, piping, storage, valving, and demand of the actual system. Both existing and projected water demands or wastewater flows are evaluated. ARRO's services apply to any imaginable addition, deletion, or modification of supply, pumping, piping, storage, valving, and demands. ARRO's modeling services provide a coordinated planning overview, defining the scope, timing, and results of any change. Most of the 60 models developed to date have been used in capital improvement planning to accommodate area growth.

# CONTACT US TODAY!

For more information:

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