

Aquarion PFAS Update

.....
**North Hampton Select Board Meeting
February 26, 2018**

Carl McMorran, Operations Manager

**John Herlihy, Vice-President, Water Quality & Environmental
Management**

Dan Lawrence, Director Engineering & Planning

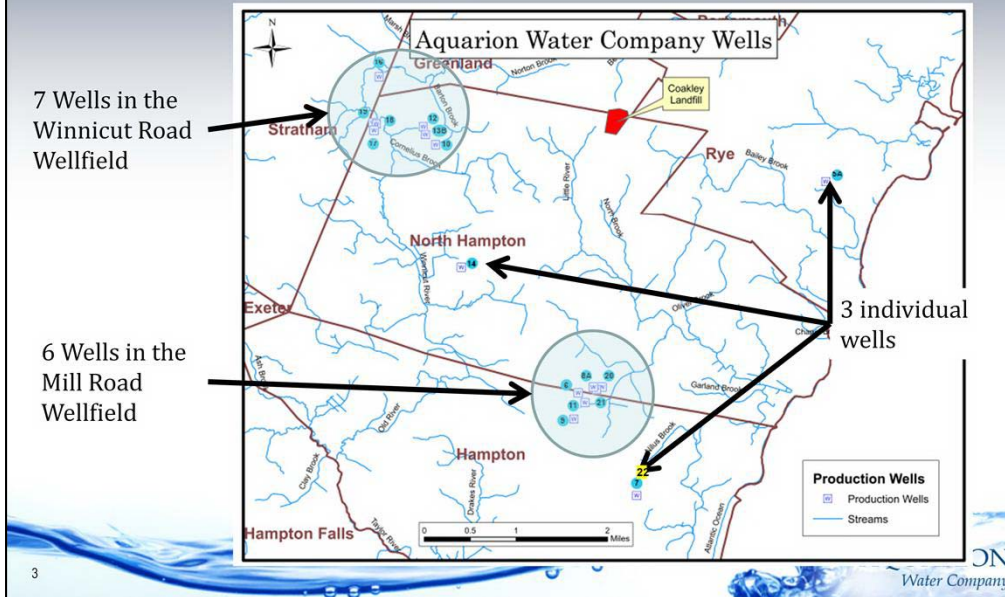


PFAS means Per- and Poly-FluoroAlkyl Substances, which is a more accurate scientific and regulatory acronym, which refers to those fluoride containing compounds in water. The old acronym, PFC, may be confusing because it is also used to describe other environmental contaminants that are not associated with water.

Agenda

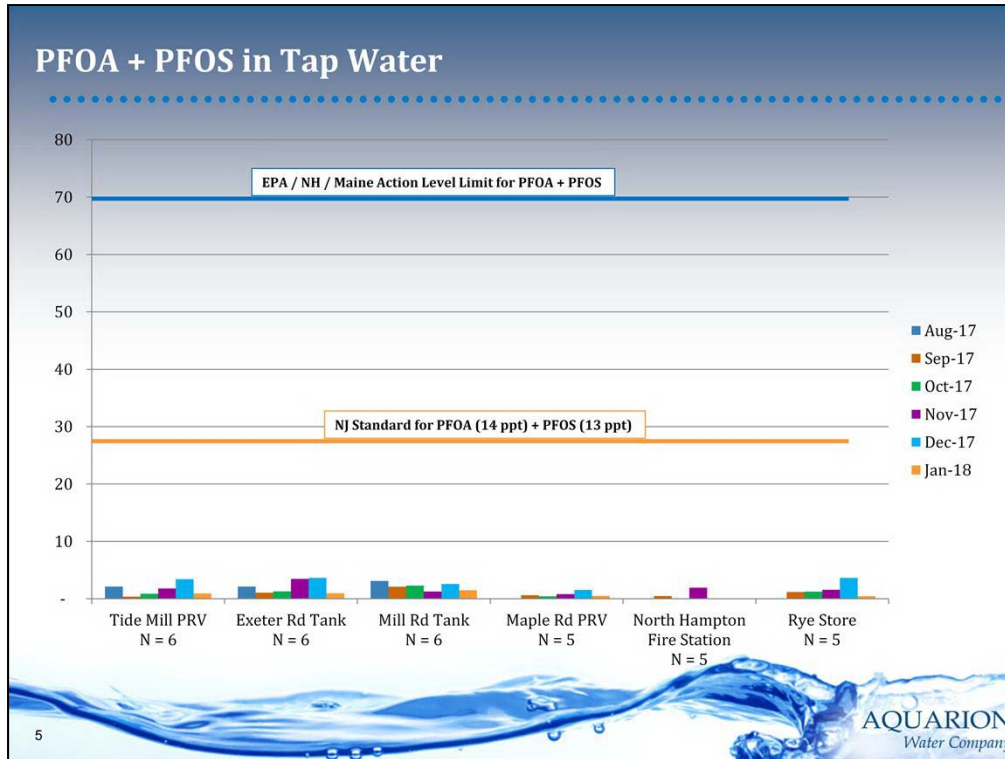
- Where does Aquarion get the water it provides to its customers?
- What are PFAS (Per- and Poly-Fluoroalkyl Substances, formerly PFCs)?
- What health standards have been set for PFAS?
- What concentration of PFAS are in tap water?
- What concentration of PFAS are in groundwater?
- What actions is Aquarion taking to address PFAS?
 - Monitoring drinking water and wells
 - Source selection strategy
 - Groundwater Investigations
 - Treatment alternatives

Where does Aquarion get the water it provides to residents and businesses?



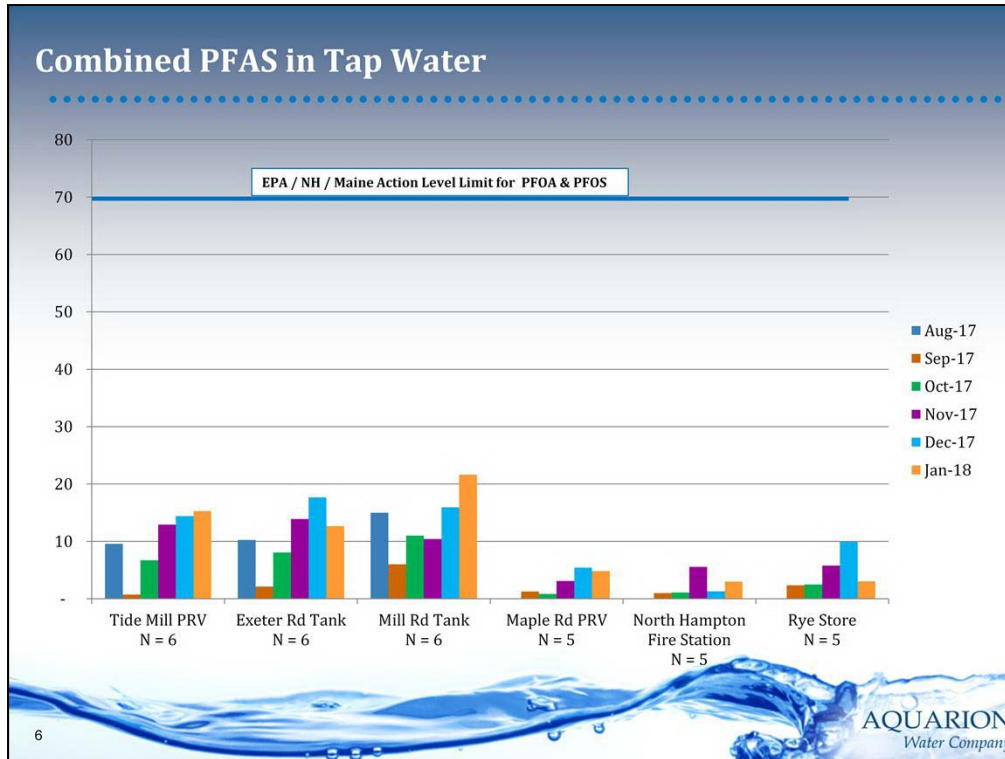
Actions to Identify PFAS Levels

- Unregulated Contaminant Monitoring Rule Testing
 - 2014 - 2015
 - 6 PFAS parameters from
 - 8 Sources
 - 2 Distribution System Locations
- 2016 - 2018 - Aquarion performed voluntary testing
 - All wells
 - 6 Distribution System Locations
 - PFAS Analyses Expanded to 26 Parameters
 - Total samples: 100 (2017 - 2018)
 - Total tests: 2,072 (2017 - 2018)



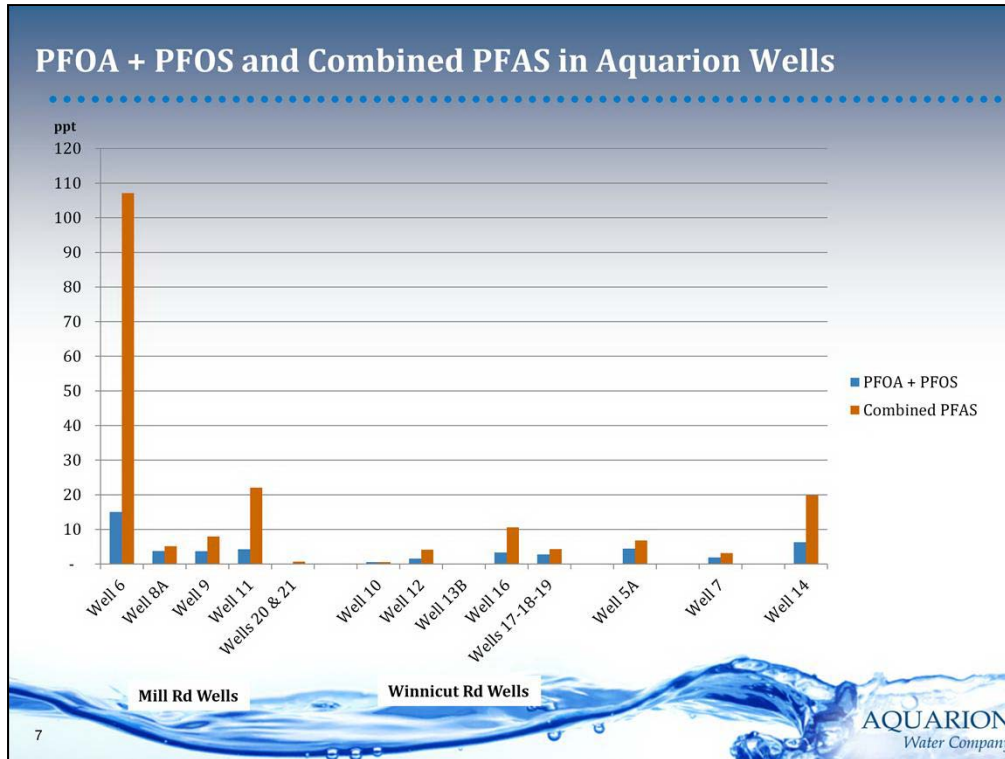
PFOA and PFOS are currently the only two regulated PFAS, and have only been detected in very low concentrations in tap water.

This chart shows how much below PFAS concentrations are compared to the current action level of 70 parts per trillion (ppt), and to the most conservative regulation currently in place in New Jersey.



Laboratory analyses can detect 26 different PFAS compounds, of which only 9 have been detected.

Although most are not regulated, the combined amounts are still much lower than the Action Limit.

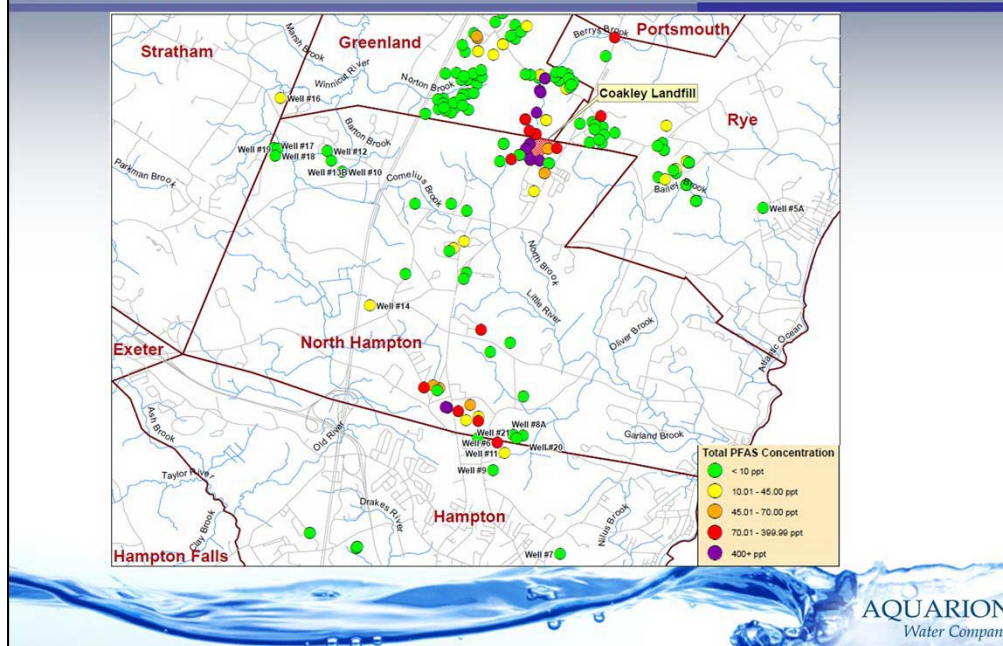


PFAS levels in individual wells are also very low.

A few wells are somewhat higher, although the Action Limit is not exceeded.

Water from multiple wells is continuously mixed in the water distribution system, which results in the very low levels observed in tap water.

Sources of PFAS?



Aquarion is also helping develop more information on the general distribution of PFAS in the local aquifers by supporting work by DES to conduct PFAS sampling private wells in the area.


This map shows the higher concentrations near the Coakley Landfill, as expected, and in some other wells, which seem to concentrate along the Rt 1 corridor.

Also note many other wells in the area, indicated by the green dots, which indicate little or no PFAS concentrations.

DES is hoping to collect samples from an additional 50 wells in the area to fill in the blank spots on the map.

Actions for Minimizing PFAS in Tap Water

- Remove wells from service**
 - Mill Road Wells are critical infrastructure to meet water demands
- Reduce PFAS through source selection**
 - Lowest cost option
 - Shortest lead time
- Treat affected wells**
 - Lowest final concentrations
 - Highest cost option



Aquarion is also evaluating options for reducing and removing PFAS in the water supply.

Removing wells with higher PFAS from service will reduce overall PFAS, but would also reduce production capacity and the ability to meet peak demands.

Source selection involves reducing the use of wells with higher PFAS on day-by-day and annual schedules, essentially using them only to meet peak demands.

Treatment options include installing granular activated carbon (GAC) or ion exchange (IX) filters. These two options would require capital investment in treatment facilities and equipment, an increase in annual operating costs, and will take several years to design and construct.

Planned Upgrades Provide Additional Blending






In addition to improving chemical treatment and other operating efficiencies, combining the six Mill Rd wells into one treatment facility allows for optimization of PFAS levels through source selection.

Planned Upgrades Allows For Optimized Source Selection



PFAS Treatment Technologies

	Granular Activated Carbon (GAC)	Proven technologies
	Ion Exchange (IX)	Lower capital and annual operating costs
	High Pressure Membranes	Smaller waste streams

12

AQUARION
Water Company

GAC is a proven method of removing PFAS.

IX is newer, but has the potential for lower costs.

High pressure membranes are not practical for the volume of water to be treated.

Due to the chemical differences of different PFAS, a combination of GAC and IX may also be advantageous.

We are conducting bench scale testing of GAC and IX.

3 Treatment Alternatives were Evaluated

Scenario 1: Treat Well 6

- Highest concentration well
- 360 gallons per minute

Scenario 2: Treat Wells 6, 9, 11, 8A

- All overburden wells
- 1,930 gallons per minute

Scenario 3: Treat Wells 6, 9, 11, 8A, 20, and 21

- All Mill Rd Wells
- 2,120 gallons per minute

13

AQUARION
Water Company

The scope of treatment is also to be determined, and is partly dependent upon forthcoming changes to regulatory standards.

The scale and cost of treatment depends upon how much water volume needs to be treated.

Conceptual Treatment Costs

	Blending	Scenario 1 PFAS treatment of water from Well 6	Scenario 2 PFAS treatment of water from Wells 6, 8A, 9, 11	Scenario 3 PFAS treatment of water from Wells 6, 8A, 9, 11, 20/21
PFOA/PFOS (ng/L)	11	6	<4	<4
PFOA (ng/L)	8	4	<4	<4
PFOS (ng/L)	<4	<4	<4	<4
Combined PFAS (ng/L)	46	20	<4	<4
Conceptual capital cost	\$0	\$1.9M	\$5.8M	\$5.7M
Conceptual annual O&M costs	\$0	\$0.1M	\$0.3M	\$0.3M
Rate increase required	0%	5%	16%	16%



Source selection would allow for marginally higher PFAS levels, but incurs no additional cost to the Mill Rd Plant project.

Adding treatment to Well 6 is projected to reduce PFAS levels by roughly half. Estimated costs for needed capital improvements and operating costs would increase water rates by 5%.

Adding treatment to all wells on Mill Road is projected to remove all PFAS (for those wells only). Estimated costs for needed capital improvements and operating costs would increase water rates by 16%.