CITY OF ames
WATER & POLLUTION CONTROL

Council Briefing

To: Mayor and Council

From: John Dunn

Date: January 13, 2022

Subject: PFAS Results in Ames Drinking Water

The Iowa Department of Natural Resources is undertaking a statewide sampling initiative to determine the prevalence of a class of chemicals known as per-and polyfluoroalkyl substances, commonly referred to by the acronym "PFAS." This is a huge class of manmade compounds that includes more than 5,000 individual chemicals. PFAS compounds have been extensively used for more than 70 years in applications such as: non-stick coatings; stain-resistant carpeting; water-repelling clothing and fabrics; paper packaging for food; and metal plating operations. The most ubiquitous use, and the most common source of drinking water contamination, comes from PFAS uses in aqueous fire-fighting foams (AFFFs). There is emerging scientific data indicating that in high enough concentrations, PFAS can pose a health risk, especially to developing fetuses and breastfed infants.

On January 10, the Iowa Department of Natural Resources published a set of PFAS test results from a handful of individual wells and the finished drinking water for the City of Ames. The results are published at this URL:

https://experience.arcgis.com/experience/b04e0e828a974e6e8962e47895ebb520

The only standard currently established by the US EPA for PFAS is a "Health Advisory Level" for the combined total concentration of two specific PFAS compounds: Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS). PFOA and PFOS were the most widely produced chemicals in the class. Because these two chemicals have been used in an array of consumer products, most people have been exposed to them. In fact, researchers have found PFOA and PFOS in the blood of nearly all the people they tested.[1]

In 2006, eight major companies voluntarily agreed to begin to phase out their global production of PFOA and PFOA-related chemicals. As the production of the chemicals dropped, research

[1] US EPA FACT SHEET: PFOA & PFOS Drinking Water Health Advisories," downloadable from https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf

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studies show that the levels of PFOA and PFOS found in blood have been decreasing. However, they are still is use in some applications, such as fire-resistant aviation hydraulic fluids.

The US EPA Health Advisory includes the following statements.

> *To provide Americans, including the most sensitive populations, with a margin of protection from a life- time of exposure to PFOA and PFOS from drinking water, EPA established the health advisory levels at 70 parts per trillion (ppt).* ***When both PFOA and PFOS are found in drinking water, the combined concentrations of PFOA and PFOS should be compared with the 70 parts per trillion health advisory level.*** *This health advisory level offers a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOA and PFOS in drinking water.*
>
> *EPA's health advisory levels were calculated to offer a margin of protection against adverse health effects to the most sensitive populations: fetuses during pregnancy and breastfed infants.*

The results of the limited testing performed by the Iowa DNR in December 2021 is summarized below.

Sample Location	Combined PFOA and PFOS
Ames Finished Tap Water	9.6 ppt
Well #6 (Downtown)	2.4 ppt
Well #17 (ISU Campus)	38 ppt
Well #18 (South Duff)	7.2 ppt
Well # 21 (South Duff)	2.3 ppt

A full summary of all detected PFAS compounds is attached at the end of this memo.

There are two key comments to be aware of when considering these results.

1. **The analytical test methods are exceedingly sensitive. That fact coupled with the wide range of PFAS uses over the past 70-plus years means that detecting PFAS compounds is nearly certain when sampling ambient rivers and streams.** Previous testing in 2013 used an older test method that was less sensitive. The testing at that time returned a "not detected" result. It is only within the past year or so that test methods have been approved by the US EPA to allow detection at these parts per trillion levels. When sampling for PFAS compounds, some of the considerations that have to be taken include:

    a. A requirement that the staff doing the sampling cannot have eaten at a fast food restaurant in the prior 24 hours. Otherwise, they might have traces of PFAS on their hands from the food wrappers.

b. Only certain brands of plastic baggies can be used to wrap the sample bottles, because some brands contain PFAS and will contaminate the samples.

c. Shipping containers cannot use "blue ice" types of cold packs, because they contain PFAS and will contaminate the samples.

d. Even when using regular wet ice, the ice and the samples must be separated by at least two layers of plastic. Otherwise, PFAS found in the ice could contaminate the samples.

e. Filling out sample labels used in the field when sampling must use "fine point" Sharpies, because the same brand of wide-tipped markers contain enough PFAS to contaminate the samples.

f. The Iowa DNR staff said they even wore masks while sampling in December; not because of any COVID concerns, but out of an abundance of caution to ensure they weren't causing PFAS contamination of the samples.

2. **The concentration detected in Ames tap water, at 9.6 parts per trillion (ppt, or nanograms per liter) is well below the US EPA Health Advisory Level of 70 ppt.** In a conference call with staff from the Iowa DNR on January 6, the DNR characterized the results as "very low," and as being "consistent with what we are finding around the state."

> Conceptualizing a concentration of 9.6 parts per trillion can be a mind-boggling proposition. Consider it in this way: Trying to find a concentration of 9.6 parts per trillion, such as found in Ames tap water, is analogous to downloading a Netflix movie and trying to fast forward through it to find an image that lasts for just a single second; except the movie you are searching through is more than 3,300 years long.

Here are answers to some likely questions about the detection of PFAS in Ames water.

Q. Is Ames water safe to drink because of the PFAS?

A. Yes. It is the professional judgement of the staff of the Water & Pollution Control Department that because PFOA and PFOS was only found in trace concentrations far below the US EPA Health Advisory Level, the Ames drinking water is safe to drink. There is nothing to indicate that any consumer needs to take any special actions. That same opinion was echoed by staff from the Iowa DNR, who stated clearly that the concentrations found constituted "very low levels" and that Ames water is "safe to drink." Remember that levels found in the finished drinking water are well below the US EPA Health Advisory Level which already includes an added margin of safety that protects the most vulnerable population.

Q. Is the source of the detected PFAS known?

A. Because of the wide-spread use of PFAS compounds over the past seventy years, the compounds are endemic. That is, they can be found almost anywhere in the environment, including in ground water.

Having said that, the Iowa DNR did note that the "PFAS signature" (the combination of individual PFAS compounds found) in Well #17 is markedly different from the other wells tested. More investigation would be needed to definitively identify the source of PFAS in Well #17. The source that would be first investigated is the old fire training facility located on Haber Road. Over the many years the facility was in use, there was repeated use of the AFFF foam used on the site. Well #17 is located directly down-stream based on the direction of flow in the shallow aquifer in the area, so any AFFF contamination of the groundwater would migrate towards Well #17.

Q. Is there any plan to perform any sort of "groundwater remediation?"

A. The Iowa DNR indicated that, based on the overall low levels found, they are not planning any sort of hazardous waste site assessment or groundwater remediation.

Q. Is there any additional testing planned?

A. Yes. The sampling performed by the Iowa DNR was just a snapshot that looked at what the DNR considered to be the most vulnerable wells. The Water & Pollution Control Department is already making arrangements to sample every well. Additionally, sampling will be performed on the combined raw water prior to treatment, and on the finished water after treatment. This sampling will occur sometime prior to the end of March 2022. Additionally, the Iowa DNR is asking that Ames monitor the concentrations in the finished water quarterly (every three months) for the next year. The DNR staff indicated that if the concentrations continue to be found at the same low levels, the monitoring frequency would likely be reduced due to the low risk.

Q. Can any changes be made to the treatment process if PFAS is ever detected at a level of concern?

A. Yes; there are ways to remove PFAS from drinking water. The most likely method, considering the treatment systems already in place in Ames, would be the use of an activated carbon process.

Q. Are there any immediate operational changes that the Ames Water Plant is considering?

A. Yes. Once the results from every well have been obtained, the PFAS concentration can be used as an additional consideration when selecting which combinations of wells to run. For example, the use of wells with higher PFAS concentrations can be limited to periods of higher flows, so that the concentrations can be diluted with water from wells with lower levels. There are already many parameters that must be considered by the plant operators when selecting which grouping of wells to use, and PFAS concentration can be added to that list.

Q. If a customer wants to take extra precautions on their own, what recommendations would the Ames Water Plant offer?

A. There are some home filters that customers could use. A study performed by the New Hampshire Department of Environmental Services found two classes of home filters that can be effective at removing PFAS compounds. Granular Activated Carbon (GAC) filters can be effective, as long as the customer regularly replaced the carbon filters at the interval recommended by the filter manufacturer. Reverse Osmosis (RO) systems can also be quite effective. But RO systems tend to waste two to four gallons for every gallon treated, so their use should be limited to points where water is used for drinking. The National Sanitation Foundation (NSF) maintains a listing of products that claim to remove PFOA and PFOS compounds on their website (https://info.nsf.org/Certified/DWTU/).

Complete Summary of Detected PFAS Compounds in Ames – December 2021

Well #6

Perfluorobutanoic acid (PFBA)	2.0 ng/L
Perfluorooctanesulfonic acid (PFOS)	2.4 ng/L
Total PFOA and PFOS	**2.4 ng/L**

Well #17

Perfluorobutanoic acid (PFBA)	7.9 ng/L
Perfluoropentanoic acid (PFPeA)	15 ng/L
Perfluorohexanoic acid (PFHxA)	13 ng/L
Perfluoroheptanoic acid (PFHpA)	3.1 ng/L
Perfluorooctanoic acid (PFOA)	12 ng/L
Perfluorononanoic acid (PFNA)	4.2 ng/L
Perfluorobutanesulfonic acid (PFBS)	7.8 ng/L
Perfluoropentanesulfonic acid (PFPeS)	3.3 ng/L
Perfluorohexanesulfonic acid (PFHxS)	24 ng/L
Perfluorooctanesulfonic acid (PFOS)	26 ng/L
Total PFOA and PFOS	**38 ng/L**

Well #18

Perfluorobutanoic acid (PFBA)	3.9 ng/L
Perfluoropentanoic acid (PFPeA)	2.3 ng/L
Perfluorohexanoic acid (PFHxA)	2.7 ng/L
Perfluorooctanoic acid (PFOA)	2.6 ng/L
Perfluorobutanesulfonic acid (PFBS)	3.8 ng/L
Perfluorohexanesulfonic acid (PFHxS)	2.1 ng/L
Perfluorooctanesulfonic acid (PFOS)	4.6 ng/L
Total PFOA and PFOS	**7.2 ng/L**

Well #21

Perfluorooctanesulfonic acid (PFOS)	2.3 ng/L
Total PFOA and PFOS	**2.3 ng/L**

Finished Drinking Water

Perfluorobutanoic acid (PFBA)	3.0 ng/L
Perfluoropentanoic acid (PFPeA)	3.6 ng/L
Perfluorohexanoic acid (PFHxA)	3.3 ng/L
Perfluorooctanoic acid (PFOA)	3.1 ng/L
Perfluorobutanesulfonic acid (PFBS)	2.6 ng/L
Perfluorohexanesulfonic acid (PFHxS)	5.5 ng/L
Perfluorooctanesulfonic acid (PFOS)	6.5 ng/L
Total PFOA and PFOS	**9.6 ng/L**

Analyzed by Eurofins Eaton Analytical (South Bend, IN) using US EPA Method 533. This method detects 25 different "short chain" per- and polyfluoroalkyl substances (PFAS). (i.e., those with carbon chain lengths of 4 to 12). Any compound that was not detected above the reporting limit is not shown on the above list.