Collinsville Water Plant PFAS Report

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1/29/25 (Updated 9/23/25)

1.0 - PFAS/PFOA regulations

In 2024 the United States Environmental Protection Agency (EPA) officially set in motion regulations regarding the group of chemicals collectively known as PFAS.

2.0 – Regulation timeline

The transition to enforceable PFAS contamination levels in drinking water has already begun with federally mandated PFAS testing in late 2020. The rollout of the regulations can be distilled into three primary phases: testing, design and implementation of treatment, and enforcement.

2.1 - Phase one – Testing: (through 2027)

All public water supplies are required to draw a minimum of two finished water samples, analyze them for the presence of PFAS, and report the results by 2027.
– Refer to the PFAS Regulation list of compounds and hazard index formula entry on page 6.
– The Collinsville Water Plant is already compliant with this phase.

2.2 - Phase two – Design and implementation of treatment: (through 2029)

All public water supplies (PWS) that detected non-zero amounts of PFAS during phase one will be required to manage PFAS presence in their finished water according to upcoming 2029 enforceable PFAS regulations. Many public water supplies will require implementation of adequate PFAS removal processes before 2029.
– I assert that Collinsville's PWS is among this group.

2.3 - Phase three – Enforcement (2029 and after)

All public water supplies will be placed on a PFAS testing schedule, based on their previous PFAS results, and must remain at or below the Maximum Contaminant Level (MCL) for the specified PFAS compounds and hazard index. Failure to remain under the MCL will result in compliance violations. This can result in expensive daily fines and expose the City of Collinsville to civil lawsuits from affected individuals and groups.

3.0 - Collinsville PFAS/PFOA test results

Samples have been analyzed from the Collinsville Water Plant finished water sample tap and all six groundwater wells beginning in November 2020 with the most recent samples being analyzed in August of 2024.

All of Collinsville's groundwater wells and the finished water samples have returned with detectible levels of PFAS; all but one well contained PFAS levels above the 2029 MCLs.
– Refer to the tables at the end of this report to see analysis results by source and date.

3.1 - Class Action Lawsuit Participation and Good Faith Estimates

The unfortunate reality that Collinsville's PWS is in the top 17% of PFAS affected water supplies in the state of Illinois upwardly impacts compensation from the ongoing class action settlements. We have been actively participating in the BASF, Tyco, 3M, and Dupont PFAS settlements.

The city's legal counsel obtained a good faith estimate that projects Collinsville's individual compensation to be roughly $4.8 million. The settlement amount, per plaintiff, considers each PWS's gross production and lab-confirmed severity of PFAS presence. Because Collinsville's PWS is in the top 17% of most affected water supplies in the state of Illinois, the compensation estimate reflects that impact.

4.0 - Removal options

There are three treatment methods known to remove PFAS from drinking water: Reverse Osmosis, Resin Exchange, and Granular Activated Carbon (GAC). All three of these methods would require the adaptation of a pressurized pumping system to be retrofitted within the current gravity driven, or non-pressurized treatment system.

4.1.1 - Reverse Osmosis

Reverse Osmosis (RO) is a nano-scale filtration strategy that offers the most complete PFAS removal results at the highest cost to operate and maintain. It has the unfortunate extra effect of removing or changing other desired qualities of the drinking water, fundamentally undermining other treatments already in operation.

To safely distribute our drinking water after RO treatment, additional treatment systems would be required to restore the finished product to a condition that it can be safely pumped through the distribution system.

In conclusion, Reverse Osmosis is NOT recommended for our application since additional treatment systems would be required to reverse the undesired effects of RO.

4.1.2 - Resin Exchange

Resin Exchange is a specialized filtration media strategy that uses chemical and topographical attraction and trapping qualities to remove specific substances. The media would require replacement roughly every three years.

The operational costs are comparable to Granular Activated Carbon, but the media shipping and disposal costs would be significantly higher as the resin requires incineration, which is currently only offered in three states, Illinois not being one of them.

Regardless, this option is NOT recommended. A required portion of our treatment process is adding disinfectant to the water before our filtration step. Resin exchange systems have zero disinfectant tolerance and breakdown in the presence of any amount of chlorine. Since the media is very costly and relatively short-lived, any reduction in the life-span of the media directly and negatively impacts the cost and viability of the treatment method.

4.1.3 - Granular Activated Carbon (GAC)

Granular Activated Carbon (GAC) is a very similar process to the Resin Exchange above. The difference is the GAC's tolerance to disinfectant. The levels of chlorine that are present in our post-filter water are within the tolerance of the GAC media.

It is my recommendation that we pursue a plan to retrofit a 5 MGD (million gallon-per-day) permanent GAC system after the filtration treatment process at the Collinsville Water Plant.

4.2 - Relative Costs compared

Of the three treatment options available for PFAS removal, RO is far and away the most expensive over time. The costs to install, operate, maintain, and recharge both the Resin Exchange and GAC systems are comparable as they would require the same sized holding tanks and pressure providing pumps. The footprint of a Resin exchange system would be roughly 30% smaller than a GAC system, but its operation would be identical. The required incineration disposal of the Resin Exchange media is the primary cost differential between Resin Exchange and GAC. GAC's media can be recycled and "recharged" to be reapplied in other GAC systems.

4.3 - Start-up investment costs

After interviewing two separate PFAS removal systems suppliers, Water Surplus and Calgon Carbon, we discussed startup figures for a 5 MGD water treatment facility. Their estimates varied between $3.0 to $3.5 million. These estimates include equipment and labor but not modifications to existing equipment and the construction of another ~1.0 million-gallon clearwell necessary for our application.

5.0 - Drilling new wells?

We have considered the option of drilling new wells further north near the well field of the Troy IL water plant. The publicly available PFAS results from Troy's water plant show PFAS has not been detected in their finished water. The cost to drill a new well to the depth of the aquifer, according to Brotcke Well and Pump (Collinsville's retained well specialists), is around $350,000. Not including the boring and plumbing to the Collinsville Water Plant.

Abandoning the current wells and drilling a complete new well field would be roughly half the start-up cost of a GAC system. However, due to a critical nuance of Troy's water plant's PFAS result, I do not recommend this strategy. Ultimately, drilling new wells in hopes of dodging PFAS contamination amounts to an expensive gamble.

We spoke with the operations staff at the Troy Water Plant who disclosed that only a single finished water sample has been analyzed for the presence of PFAS. To compare, Collinsville's finished water has been analyzed for PFAS seven times; three of those tests had non-detect results.

The Troy water plant has not directly tested their wells for PFAS nor have they elected to perform follow-up samples of their finished water after their original analysis. It is entirely possible that the Troy water plant may have PFAS contaminated wells that were simply not in use on the day their only sample was taken.

There is no effective, reliable method of testing new construction well locations for the presence of PFAS prior to drilling. Additionally, there is always the possibility that a new well with no detectible PFAS may become contaminated in the future. In which case, Collinsville's PWS should be prepared with a permanent PFAS treatment solution to prevent the distribution of PFAS contaminated water.

6.0 - Engineering challenges

The recommendation to place a PFAS removal method at the end of the treatment process and not the headworks where well pumps already provide pressure and no addition holding tank would be required, comes down to annual average operation costs.

Installation at the headworks would eliminate the need for an additional ~1.0 million-gallon clearwell and additional pumps to provide pressure. Despite the startup cost savings, it is not cost-effective in the long-term to utilize expensive specialized removal media on raw untreated water.

All three known PFAS treatments are capable of removing far more than PFAS. The raw water would clog the specialized filter media with non-PFAS materials like heavy metals, unwanted solids, and calcium hardness.

The Collinsville Water Plant already removes heavy metals, unwanted solids and calcium hardness with its current design. The extra removal of these parts at the headworks would be unnecessarily redundant and a waste of the premium specialized removal media. Ultimately, the best practice is to use the specialized media to remove PFAS and PFAS alone.

Currently we estimate that after startup, operation and treatment costs will increase by roughly ~$200,000 annually with a post-filter method. Estimates for the operation and treatment costs for a headworks located system would be a minimum $500,000 annually. The post-filter location is simply more sustainable long term.

7.0 - Final Thoughts and Recommendations

I have laid out my recommendations and explained my reasoning based on my research above. I have spoken to dozens of people including specialists, suppliers, operators, and regulators. I believe that the best course of action is the safest course of action. Our customers and their families and friends trust that we supply them with safe drinking water. We know, based on the U.S. EPA's decades-long research that our water poses a long-term health risk if not addressed.

I recommend a 5 MGD Granular Activated Carbon (GAC) system be designed, engineered, and installed post-filters at the Collinsville Water Plant.

The PFAS in our water supply is not our fault, but it is our responsibility. Good faith estimates of the ongoing PFAS settlement exceed the startup cost estimates for a post-filter GAC system. The order of operations is our biggest hurdle now. The city will have to start taking action before the settlement is received if we are to be compliant by 2029. Below is a rough timeline submitted to me by Scott Hunt from WHKS. It demonstrates that moving forward now is necessary to remain compliant with the regulatory deadlines.

8.0 - Estimated design and implementation timeline: (Per Scott Hunt)

1. WHKS submits PSA to prepare a Preliminary Engineering Report (PER) to City (February 2025)
    a. Note: PER is just a preliminary engineering report to define the project scope and determine a preliminary overall project budget, and should not be considered "engineering design", as that will follow under a separate agreement
2. City approves WHKS PSA (February 2025)
3. WHKS/City submits Funding Nomination Form (FNF) to IEPA SRF Loan Section (March 2025) – this is just a rough guess of what the overall project costs will be just to get the City's name in the SRF funding hat and a Loan # assigned
4. WHKS completes PER and submits Project Planning report and updated FNF to IEPA for review (July 2025)
5. IEPA Project Planning approval (March 2026) – please note that this is only 8 months from our Project Planning submittal, but I don't know that we can get the PER completed in less than 4 months

6. WHKS & City execute PSA for design of the PFAS project (April 2026)
7. WHKS completes design and submits to IEPA for permitting (April 2027)
8. IEPA issues construction permit (July 2027)
9. IEPA issues Loan Commitment Letter (December 2027) – This assumes that the City is able to score high enough to get by-pass funding during IEPA's FY 2028 by-pass funding, but it is likely the City may not get funding until FY2029, which starts July 1, 2028 and is announced as early as May or June 2028
10. Project Bids (January 2028) – This may need pushed back to July or August 2028 depending on IEPA funding
11. Construction Starts (February 2028)
12. Construction Complete (February 2029)

9.0 - PFAS Regulation - list of compounds and hazard index formula

How do I calculate the Hazard Index?

The Hazard Index (HI) is made up of a sum of fractions. Each fraction compares the level of each PFAS measured in the water to the highest level determined not to have risk of health effects.

Step 1. Divide the measured concentration of Gen X by the health-based value of 10 ppt
Step 2. Divide the measured concentration of PFBS by the health- based value of 2000 ppt
Step 3. Divide the measured concentration of PFNA by the health-based value of 10 ppt
Step 4. Divide the measured concentration of PFHxS by the health-based value of 9 ppt
Step 5. Add the ratios from steps 1, 2, 3 and 4 together

Equation

$$\text{Hazard Index} = \left(\frac{[\text{HFPO-DA}]}{[10\text{ ppt}]}\right) + \left(\frac{[\text{PFBS}_{\text{water}}]}{[2000\text{ ppt}]}\right) + \left(\frac{[\text{PFNA}_{\text{water}}]}{[10\text{ ppt}]}\right) + \left(\frac{[\text{PFHxS}_{\text{water}}]}{[9.0\text{ ppt}]}\right)$$

Step 6. To determine HI compliance, repeat steps 1-5 for each sample collected in the past year and calculate the average HI for all the samples taken in the past year.
Step 7. If the running annual average HI greater than 1.0, it is a violation of the proposed HI MCL.

Compound	Final MCLG	Final MCL (enforceable levels)
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

10.0 - PFAS Sample Analysis Results by Date and Source compared to MCL

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
11/24/2020	Source						11	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA							2.2 ppt	4.0 ppt
PFOS							ND	4.0 ppt
PFHxS							ND	10.0 ppt
PFNA							ND	10.0 ppt
HFPO-DA							ND	10.0 ppt
Hazard Index							0.0	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
1/7/2021	Source						8, 15	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA							21.0 ppt	4.0 ppt
PFOS							8.0 ppt	4.0 ppt
PFHxS							13.0 ppt	10.0 ppt
PFNA							ND	10.0 ppt
HFPO-DA							ND	10.0 ppt
Hazard Index							1.4	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
1/27/2021	Source						8, 15	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA							25.0 ppt	4.0 ppt
PFOS							8.0 ppt	4.0 ppt
PFHxS							14.0 ppt	10.0 ppt
PFNA							ND	10.0 ppt
HFPO-DA							ND	10.0 ppt
Hazard Index							1.6	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
5/10/2021	Source						11	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA	ND	ND	ND	5.2 ppt		14.0 ppt	ND	4.0 ppt
PFOS	ND	ND	ND	ND		15.0 ppt	ND	4.0 ppt
PFHxS	ND	ND	ND	ND		8.7 ppt	ND	10.0 ppt
PFNA	ND	ND	ND	2.9 ppt		ND	ND	10.0 ppt
HFPO-DA	ND	ND	ND	ND		ND	ND	10.0 ppt
Hazard Index	0.0	0.0	0.0	0.3		0.0	0.0	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
6/7/2021	Source							
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA					2.9 ppt			4.0 ppt
PFOS					ND			4.0 ppt
PFHxS					2.0 ppt			10.0 ppt
PFNA					ND			10.0 ppt
HFPO-DA					ND			10.0 ppt
Hazard Index					0.2			>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
9/7/2021	Source						11, 14	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA	44.0 ppt	6.3 ppt	ND	8.6 ppt	5.8 ppt	2.5 ppt	ND	4.0 ppt
PFOS	23.0 ppt	ND	ND	ND	ND	ND	ND	4.0 ppt
PFHxS	28.0 ppt	3.6 ppt	ND	5.4 ppt	ND	ND	ND	10.0 ppt
PFNA	ND	ND	ND	ND	3.4 ppt	ND	ND	10.0 ppt
HFPO-DA	ND	ND	ND	ND	ND	ND	ND	10.0 ppt
Hazard Index	3.1	0.4	0.0	0.6	0.3	0.0	0.0	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
8/30/2023	Source							
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA	1.5 ppt	ND	1.7 ppt	5.0 ppt	13 ppt	44.0 ppt		4.0 ppt
PFOS	ND	0.9 ppt	1.0 ppt	0.95 ppt	2.0 ppt	17.0 ppt		4.0 ppt
PFHxS	ND	ND	2.2 ppt	2.0 ppt	3.6 ppt	21.0 ppt		10.0 ppt
PFNA	ND	ND	ND	4.2 ppt	ND	1.2 ppt		10.0 ppt
HFPO-DA	ND	ND	ND	ND	ND	ND		10.0 ppt
Hazard Index	0.0	0.0	0.2	0.6	0.4	2.5		>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
2/22/2024	Source						8, 14	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA							ND	4.0 ppt
PFOS							ND	4.0 ppt
PFHxS							ND	10.0 ppt
PFNA							ND	10.0 ppt
HFPO-DA							ND	10.0 ppt
Hazard Index							0.0	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
8/1/2024	Source						8, 14, 15	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA							18.0 ppt	4.0 ppt
PFOS							8.9 ppt	4.0 ppt
PFHxS							12.0 ppt	10.0 ppt
PFNA							ND	10.0 ppt
HFPO-DA							ND	10.0 ppt
Hazard Index							1.3	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
5/2/2025	Source						9, 12	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA		REJECTED		REJECTED			11.0 ppt	4.0 ppt
PFOS		REJECTED		REJECTED			2.16 ppt	4.0 ppt
PFHxS		REJECTED		REJECTED			6.05 ppt	10.0 ppt
PFNA		REJECTED		REJECTED			1.4 ppt	10.0 ppt
HFPO-DA		REJECTED		REJECTED			ND	10.0 ppt
Hazard Index		REJECTED		REJECTED			0.81	>1.0 (unitless)

Sample Date:	PFAS Sample Analysis Result						Wells:	Maximum Contaminant Level (MCL)
6/26/2025	Source						9, 12	
Contaminent	**Well 8**	**Well 9**	**Well 11**	**Well 12**	**Well 14**	**Well 15**	**Tap 02**	
PFOA		26.0 ppt		26.0 ppt			17.0 ppt	4.0 ppt
PFOS		5.4 ppt		5.5 ppt			3.8 ppt	4.0 ppt
PFHxS		11.0 ppt		11.0 ppt			7.5 ppt	10.0 ppt
PFNA		2.3 ppt		2.4 ppt			1.5 ppt	10.0 ppt
HFPO-DA		ND		ND			ND	10.0 ppt
Hazard Index		1.46		1.47			0.99	>1.0 (unitless)

***ND = Non-Detect**
***ppt = Parts Per Trillion**