# PFAS in the Colorado River Basin
# Austin to Smithville

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## INTRODUCTION

Environmental Stewardship (ES) is an environmental non-profit in the Bastrop, Texas area which conducts environmental research to inform policy and decision-making in Texas. From December 2022 through November 2023, ES conducted a preliminary study of surface water and groundwater contamination of per-, and polyfluoroalkyl substances (PFAS, also commonly known as forever chemicals) in the Colorado River Basin, between Austin and Smithville, Texas. Samples were collected from the mainstem, tributaries, alluvial aquifer, and domestic wells. The objective of this study was to ascertain the existence of PFAS contamination and report the results to the proper authorities. Our goal is to facilitate informed decisions about the environmental condition and stimulate discussions on regulatory measures for moving forward.

PFAS, a widely utilized industrial chemical group, is employed to create fluoropolymer coatings and products that resist heat and water. Some of these products include non-stick cooking products, clothing, furniture, food packaging, adhesives, and wire insulation. Due to their composition and multifunctional applications, PFAS compounds are ubiquitous and globally widespread. Notably, PFAS chemicals are resistant to natural breakdown in the environment, making them ecologically pervasive as they bioaccumulate in fish and wildlife, and infiltrate soil and water. The persistent nature of their composition and capacity for bioaccumulation have resulted in the detection of the compound in the blood of humans and animals (Domingo, 2019).

Definitive claims about the impact of long-term exposure to PFAS on human health cannot be made as research is currently rudimentary and ongoing (Fenton, 2021). However, the EPA released an updated drinking water Health Advisory[1] (HA) about PFAS, for which the results of this study have been framed upon. This new HA states that the advised level of exposure to PFOA and PFOS are 0.004 ppt[2] (ng/L) and 0.004 ppt (ng/L), respectively[3].

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[1] Health Advisories Explained: https://www.epa.gov/sdwa/drinking-water-health-advisories-has
[2] ppt, parts per trillion
[3] EPA Notice of PFAS Health Advisory, Federal Register Vol. 87 Number 118, June 21, 2022, page 36848.

On February 8, 2024, EPA published two proposed rules designed to provide EPA enforcement power[4] to clean up PFAS contamination under the Resource Conservation and Recovery Act ("RCRA"). These rules, if adopted, would list nine PFAS as "hazardous constituents" under RCRA. If finalized, the rules will expand EPA's ability to require PFAS cleanup at sites that are subject to RCRA jurisdiction.

The second proposal issued would broaden the definition of "hazardous waste" during cleanups at waste facilities. According to EPA, this proposed rule would harmonize the regulations with the statutory definition of "hazardous waste." If this rule is adopted, there could be stricter and potentially more expensive cleanup requirements for PFAS and other emerging contaminants at RCRA corrective action sites. These proposed rules would expand the cleanup obligations at existing sites managed under RCRA corrective action orders and provide the EPA authority to issue new corrective action orders to address these nine PFAS *or any emerging contaminants*.

On April 26, 2024, EPA also issued its first national drinking water regulation[5] to limit PFAS contamination in drinking water. The rule establishes enforceable Maximum Contaminant Levels ("MCLs") for six PFAS that have been identified in drinking water. The rule sets the MCL for the specific set of PFAS at 4 nanograms per liter or parts per trillion ("ppt") for PFOS and PFOA and includes 10 ppt for four additional PFAS compounds.

On May 8, 2024, the EPA issued a final rule designating two PFAS, perfluorooctanoic acid ("PFOA") and perfluorooctanesulfonic acid ("PFOS"), as "hazardous substances"[6] under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA").

On April 8, 2024, EPA issued revised interim guidance on the destruction and disposal of PFAS and PFAS-containing materials[7]. This guidance is the second of its type, as EPA issued an initial guidance in 2020[8] as required by the National Defense Authorization Act ("NDAA"). The NDAA directs EPA to address the storage, disposal, and destruction of PFAS and PFAS-containing materials and requires EPA to review and update its guidance periodically. The new guidance retains three established technologies from the 2020 initial guidance that can destroy PFAS or control PFAS release into the environment: thermal destruction (high heat treatment), landfilling, and underground deep well injection. The guidance raises associated uncertainties and key data gaps that EPA has indicated require additional research and evaluation.

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https://www.govinfo.gov/content/pkg/FR-2022-06-21/pdf/2022-13158.pdf

[4] EPA, February 8, 2024. PFAS Proposed Rule Listing of Specific PFAS as Hazardous Constituents. 40 CFR Parts 261 and 271. https://www.federalregister.gov/documents/2024/02/08/2024-02324/listing-of-specific-pfas-as-hazardous-constituents

[5] EPA, April 26, 2024. PFAS National Primary Drinking Water Regulation. Federal Register / Vol. 89, No. 82 / Friday, April 26, 2024 / Rules and Regulations, page 32532.

[6] EPA, May 8, 2024. Designation of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substance. Federal Register / Vol. 89, No. 90 / Wednesday, May 8, 2024 / Rules and Regulations, page 39124.

[7] EPA, April 8, 2024. Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and polyfluoroalkyl Substances and Materials Containing Perfuoroalkyl and Polyfluoroalkyl Substances - Version 2 (2024). https://www.epa.gov/system/files/documents/2024-04/2024-interim-guidance-on-pfas-destruction-and-disposal.pdf .

[8] EPA, December 18, 2020. Interim Guidance on Destroying and Disposing of Certain PFAS and PFAS-Containing Materials. https://www.epa.gov/newsreleases/epa-releases-interim-guidance-destroying-and-disposing-certain-pfas-and-pfas .

The EPA is a regulatory agency with enforcement authority. However, the agency has authorized most states by a delegation process, whereby a memorandum of agreement guides the state in implementing and enforcing federal regulations on a local level. Nonetheless, states maintain the ability to independently establish and enforce limits. Despite the Texas Commission on Environmental Quality (TCEQ) being delegated this authority, it has yet to issue regulatory standards or advisories about PFAS. Environmental Stewardship provided comments[10] to TCEQ regarding the Corix/McKinney Roughs wastewater treatment plant application, noting the presence of PFAS compounds in the unnamed tributary where wastewater was being discharged and the Colorado River just below confluence with the tributary.

**TCEQ's Response to PFAS in the Colorado River and Tributaries**

Environmental Stewardship informed[11] TCEQ that it sampled eleven locations in this river segment and detected per- and polyfluoroalkyl substances (PFAS) at levels warranting investigation before finalizing the permit. Kermit Heaton additionally commented that PFAS compounds are linked to human health problems and have the potential to bioaccumulate in the tissues of fish and other aquatic animals.

The TCEQ Executive Director responded[12] that:

> *"TCEQ has not investigated the potential effects of emerging contaminants, in effluent. Neither the TCEQ nor the EPA has promulgated rules or criteria limiting emerging contaminants in wastewater. The EPA is investigating emerging contaminants and has stated that scientists have not found evidence of adverse human health effects from emerging contaminants in the environment. Removal of some emerging contaminants has been documented during municipal wastewater treatment; however, standard removal efficiencies have not been established. In addition, there are currently no federal or state effluent limits for emerging contaminants. So, while the EPA and other agencies continue to study the presence of emerging contaminants, there is currently no clear regulatory regime available to address the treatment of emerging contaminants in domestic wastewater. Accordingly, neither the TCEQ nor the EPA has rules on the treatment of contaminants."*

The Executive Director evades the question and provides a generalized response to all "emerging contaminants" without specifically addressing PFAS compounds. In contrast to the assertion that the EPA has not discovered evidence of adverse human health effects, it’s worth noting that the EPA has issued proposed Drinking Water Standards[13] on PFOA, PFOS, GenX, and PFBS compounds,

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[10] Environmental Stewardship. May 28, 2023. RE: Corix Utilities (Texas) Inc., McKinney Roughs Permit Application WQ0013977001 - PFAS Compounds in River/Tributary and Review of Integrated Assessments of Segment 1428.

[11] Environmental Stewardship Comment number 11 and TCEQ Executive Director's replay (Comment 7).

[12] TCEQ. August 7, 2023. Corix Utilities (Texas) Inc. TPDES Permit No. WQ0013977001. Decision of the Executive Director.

[13] *EPA, Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances Federal Register / Vol. 87, No. 118 / Tuesday, June 21, 2022 / Notices, Pages 36848-9.*

detailing the associated health effects of these compounds. Furthermore,[14] on September 28, 2023, the EPA implemented final rules requiring the reporting of PFAS data[15], aiming to enhance community protection from forever chemicals.

Environmental Stewardship further asked whether the proposed discharge adversely impact the health of the members of Environmental Stewardship and their families, as a result of consumption of fish caught in the Colorado River, e.g., exposure to PFAS and other toxic chemical in the discharge.

The TCEQ Executive Director responded that:

> *"Specifically, the methodology is designed to ensure that no source will be allowed to discharge any wastewater that: 1) results in instream aquatic toxicity; 2) causes a violation of an applicable narrative or numerical state water quality standard; 3) results in the endangerment of a drinking water supply; or 4) results in aquatic bioaccumulation that threatens human health."*

By dodging the question, the Executive Director failed to demonstrate that the methodology used to permit the discharge of wastewater containing PFAS, "chemicals that are known to persist and bioaccumulate in aquatic environments", adequately ensures the protection of human health and the environment. A 2023 study[16] published in Environmental Research reported that "Ingestion of PFAS from contaminated food and water results in the accumulation of PFAS in the body and is considered a key route of human exposure. Exposure assessment suggests that a single serving of freshwater fish per year with the median level of PFAS as detected by the U.S. EPA monitoring programs translates into a significant increase of PFOS levels in blood serum".

On the contrary, the data reveals that PFAS are present in the Texas Colorado River below Austin in quantities that 1) result in instream aquatic toxicity, 2) result in the endangerment of the drinking water supply, and 3) result in aquatic bioaccumulation that threatens human health – all of which, appear to be in violation of Texas laws.

**Effects of Groundwater Flow into the River (a "gaining" river).**

The Colorado Alluvial Aquifer, which exchanges water with the Colorado River, was anticipated to exhibit PFAS contamination, along with other aquifers. Contrary to expectation, this was not the case. Neither the Colorado Alluvial Aquifer nor the wells completed in the other major and minor aquifers sampled showed contamination by PFAS compounds. We hypothesize that the absence of contamination in these aquifers may be related to the "gaining" relationship of the river to these aquifers, wherein the aquifers provide groundwater flow to the river during most river stages.

[14] EPA News Release. September 28, 2023. *<https://epa.gov/newsreleases/search/press_office/headquarters-226129>*

[15] TSCA Section *8(a)(7) Reporting and Recordkeeping Perfluoroalkyl and Polyfluoroalkyl Substances*: https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/forms/assessing-and-managing-chemicals-under-tsca

[16] Environmental Research 220 (2023) 115165. Locally caught freshwater fish across the United States are likely a significant source of exposure to PFOS and other perfluorinated compounds. https://doi.org/10.1016/j.envres.2022.115165.

This hypothesis is based on a pilot surface water-groundwater interaction study[17] conducted in the Pope Bend segment of the Colorado River. This study found that alluvial groundwater levels rise above the top of the permeable alluvium materials screened, suggesting primarily artesian hydrogeologic conditions at the site. An average baseflow rate of about 186 ft3/hr. was calculated from the monitoring data, which equates to approximately 0.2 ft3/day per foot of riverbank. The average groundwater flux is from the alluvium toward the river (indicating "gaining" stream conditions). When applied to the 4.5-mile bank length of the Pope Bend point bar structure, it is estimated that alluvium contributes groundwater to the river at an average rate of approximately 4,460 ft3/day [37.4 acre-feet per year (ac-ft/yr)] in that area.

The data collected from summer 2020 through February 2021 reveals that groundwater levels respond rapidly to fluctuations in river levels. This indicates that there is a robust hydraulic connection between the river and the alluvium at the site. However, water temperature and conductivity measurements suggest that only minor exchanges in water volume take place between the river and alluvium in response to high-water fluctuations in river stage.

In other words, during a high river fluctuation period, the inflow of surface water into the alluvium is not as substantial as might be expected. As such, our hypothesis is that the constant "back pressure" generated by groundwater flowing to the river is adequate to minimize or eliminate the flow into the alluvium and other aquifer formations.

## METHODS

ES worked with Cyclopure labs for PFAS testing of water samples. All thirty-five samples discussed in this report were collected with a Cyclopure product called "Water Test Kit Pro". These kits do not require the collecting and shipping of large water samples, rather, water is filtered through Cyclopure's patented filtration device DEXSORB®. This lab uses an isotope dilution method to determine the existence of 55 PFAS chemicals, including all that are listed in the EPA health advisories. Cyclopure is not a certified lab, therefore these results serve as preliminary information and demand further inspection by a certified lab to be considered by state and federal regulatory agencies. For more information on Clyclopure's patented technology and laboratory efficacy, please consult their website[18].

Thirty-five samples were collected along the Colorado River, its tributaries, the alluvial aquifer, and groundwater wells in and around Bastrop County. Each sample location was publicly accessible from main roads and did not broach private property (Images 3-5). The directions for use outlined by Cyclopure were followed. Before collecting the sample from the site, the data card from the test kit was filled out with the appropriate information from the sample location. Once all the location and sample data were recorded, gloves were applied, and about 250 ml of water was collected directly into the Cyclopure sample cup. When taking the sample, the cup was faced up-stream with little to no disturbance of the river/stream bottom. Each sample collection was executed with precaution. The inside of the sample cup was not touched, and the blue extraction filter at the bottom of the cup

[17] Surface Water-Groundwater Interaction Pilot Study Prepared for Texas Water Development Board, Lower Colorado River Authority, Brazos River Authority, Post Oak Savannah Groundwater Conservation District. TWDB Contract No. 1900012305. Prepared by R W Harden and Associates, and INTERA. July 2021

[18] More information about Cyclopure Water Test Kit and DEXSORB® technology can be found here: https://cyclopure.com/product-information/

containing the DEXSORB® was not detached or disturbed.

Once all the collected water was filtered through the testing kit, which took roughly about 15-20 minutes depending on turbidity, they were sealed, labeled, and returned to Cyclopure labs for analysis.

Results of the study are illustrated in Figures 1-8, while the original Cyclopure analysis results are included in the appendices. Based upon these results, numerous river test sites exhibit contamination levels beyond the advisory levels published by the EPA.

The sampling locations, relative levels of contamination, and locations of wastewater treatment plants discharging into the Colorado River basin[19] are depicted in Figure 1. Cedar Creek (ES-6) and Piney Creek (ES-7) were the only tributaries tested that contained levels of PFOA, and PFOS that are below the EPA's Health Advisory Standards.

Big Sandy Creek (ES-9), Alum Creek (ES-5), and Wilbarger Creek (ES-8) contained low levels of PFOS and PFBS but exceeded the Health Advisory levels for PFOA. All remaining samples, including Onion Creek (ES-1), Gilliand Creek (ES-2), Decker Creek (ES-3), Colorado River at Smithville (ES-4), Colorado River at Webberville Upstream (U), and Colorado River at Bastrop Downstream (D), indicated contamination levels of PFOA and PFOS that exceeded the thresholds defined by the EPA in the 2022 update to the health advisory.

Other PFAS compounds that currently lack drinking water Health Advisory levels were detected at all sites.

[19] The Colorado River Basin covers 40,0000 square miles from eastern New Mexico to the Gulf of Mexico. Onion Creek (ES-1) is an important tributary to the Colorado River Basin.

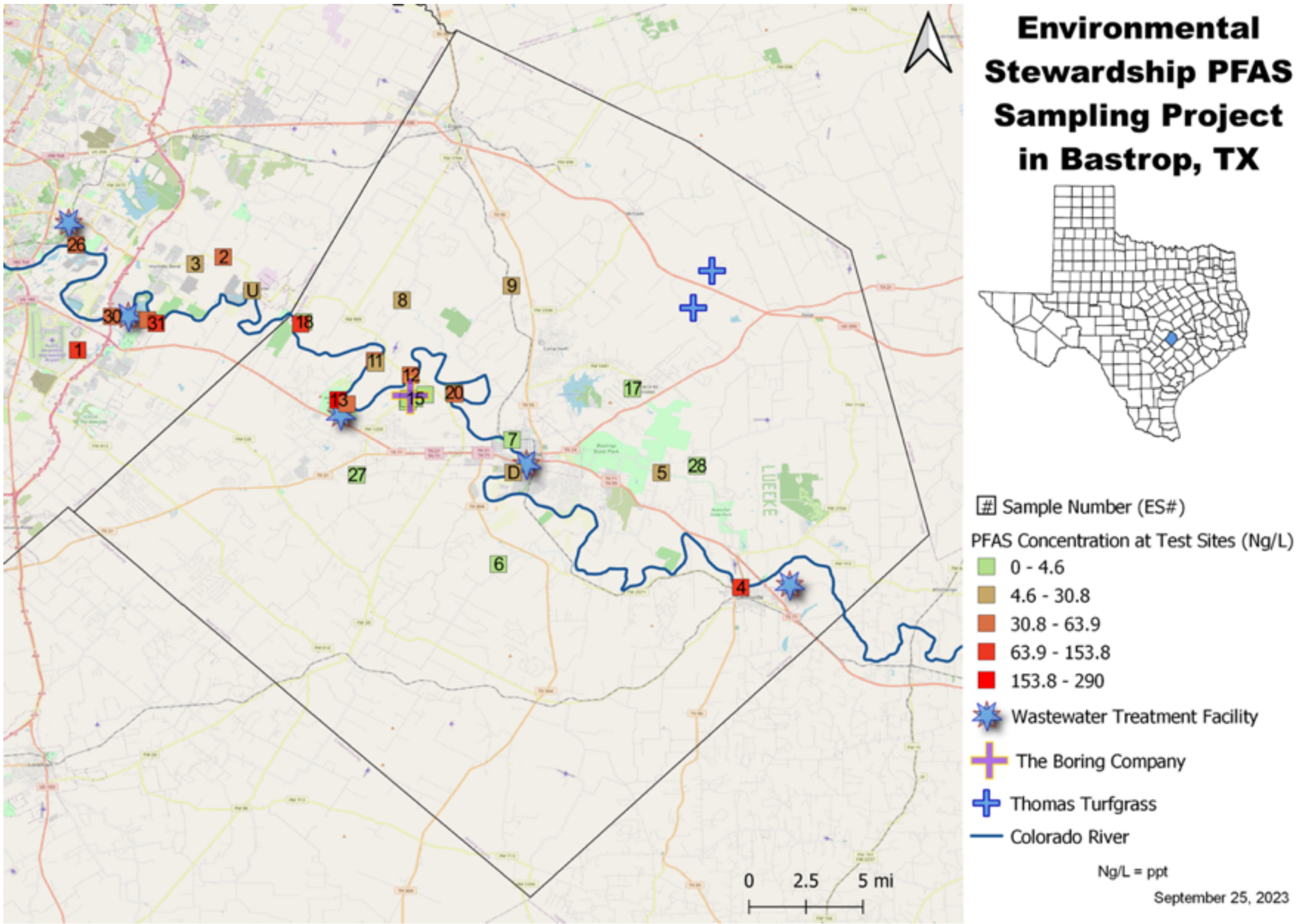
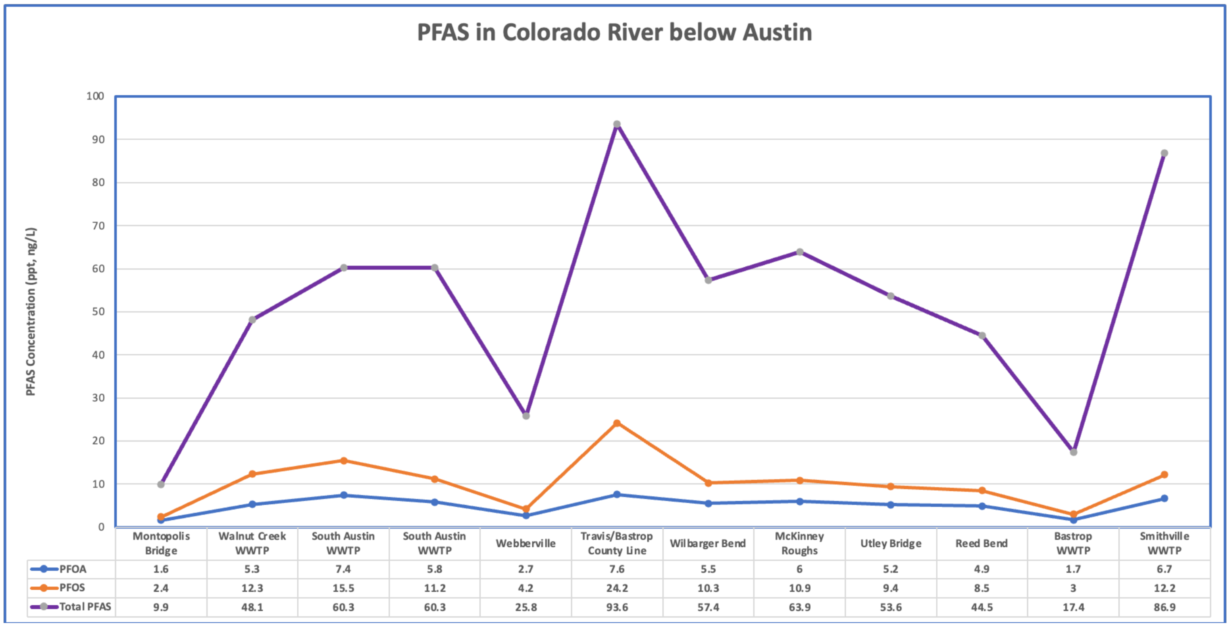



**Figure 1: Map showing the location of samples taken, the relative level of contamination present, and the location of wastewater treatment plants discharging into the river basin in the region.**

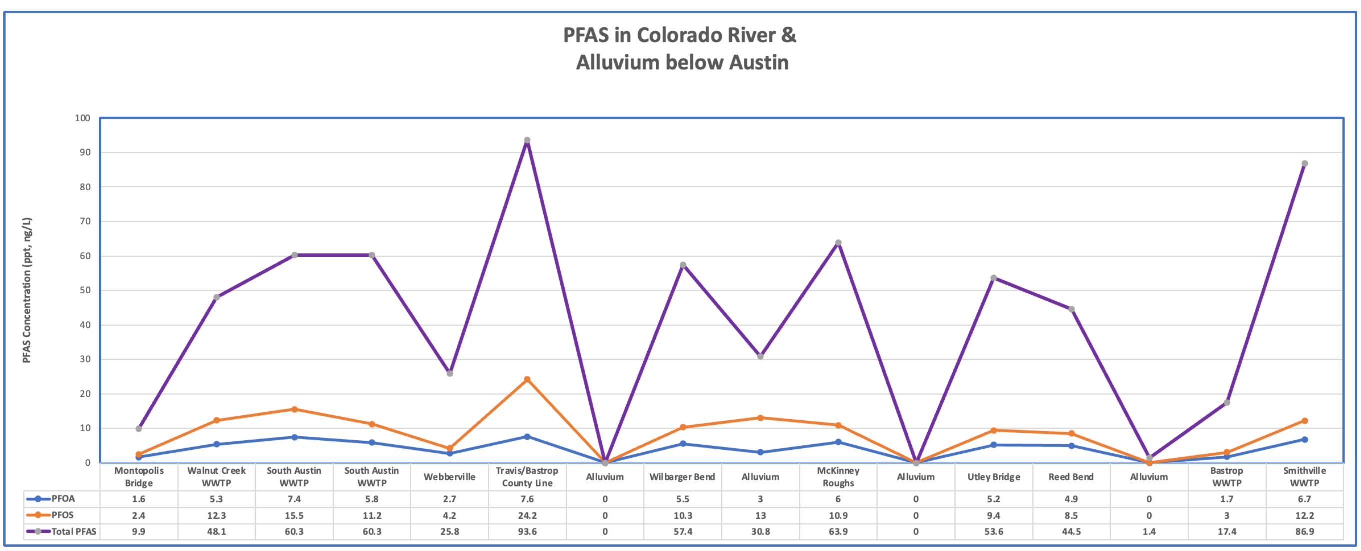
## A. COLORADO RIVER AND ALLUVIAL AQUIFER




| | Montopolis Bridge | Walnut Creek WWTP | South Austin WWTP | South Austin WWTP | Webberville | Travis/Bastrop County Line | Wilbarger Bend | McKinney Roughs | Utley Bridge | Reed Bend | Bastrop WWTP | Smithville WWTP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PFOA | 1.6 | 5.3 | 7.4 | 5.8 | 2.7 | 7.6 | 5.5 | 6 | 5.2 | 4.9 | 1.7 | 6.7 |
| PFOS | 2.4 | 12.3 | 15.5 | 11.2 | 4.2 | 24.2 | 10.3 | 10.9 | 9.4 | 8.5 | 3 | 12.2 |
| Total PFAS | 9.9 | 48.1 | 60.3 | 60.3 | 25.8 | 93.6 | 57.4 | 63.9 | 53.6 | 44.5 | 17.4 | 86.9 |

**Figure 2. PFAS in the Colorado River Mainstem in Bastrop & Travis Counties, TX.**

PFAS contamination in the Colorado River mainstem exhibited an increase below the Montopolis Bridge in Austin, attributed to wastewater treatment plants within the stretch extending down to Webberville. Another rise is contamination occurred near the Travis/Bastrop county line, revealing a second peak in the reach that includes the Corix/McKinney Roughs wastewater treatment plant, followed by a decrease below the Bastrop wastewater treatment plant outfall. Additionally, another spike was noted below the Smithville wastewater treatment plant outfall.




| | Montopolis Bridge | Walnut Creek WWTP | South Austin WWTP | South Austin WWTP | Webberville | Travis/Bastrop County Line | Alluvium | Wilbarger Bend | Alluvium | McKinney Roughs | Alluvium | Utley Bridge | Reed Bend | Alluvium | Bastrop WWTP | Smithville WWTP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PFOA | 1.6 | 5.3 | 7.4 | 5.8 | 2.7 | 7.6 | 0 | 5.5 | 3 | 6 | 0 | 5.2 | 4.9 | 0 | 1.7 | 6.7 |
| PFOS | 2.4 | 12.3 | 15.5 | 11.2 | 4.2 | 24.2 | 0 | 10.3 | 13 | 10.9 | 0 | 9.4 | 8.5 | 0 | 3 | 12.2 |
| Total PFAS | 9.9 | 48.1 | 60.3 | 60.3 | 25.8 | 93.6 | 0 | 57.4 | 30.8 | 63.9 | 0 | 53.6 | 44.5 | 1.4 | 17.4 | 86.9 |

**Figure 3. PFAS in the Colorado River Mainstem and Alluvium in Bastrop & Travis Counties.**

It is notable that there is little, if any, contamination observed in the Colorado Alluvial

Aquifer (alluvium) at the sampled locations. All samples from the alluvial aquifer were taken from domestic alluvial wells.

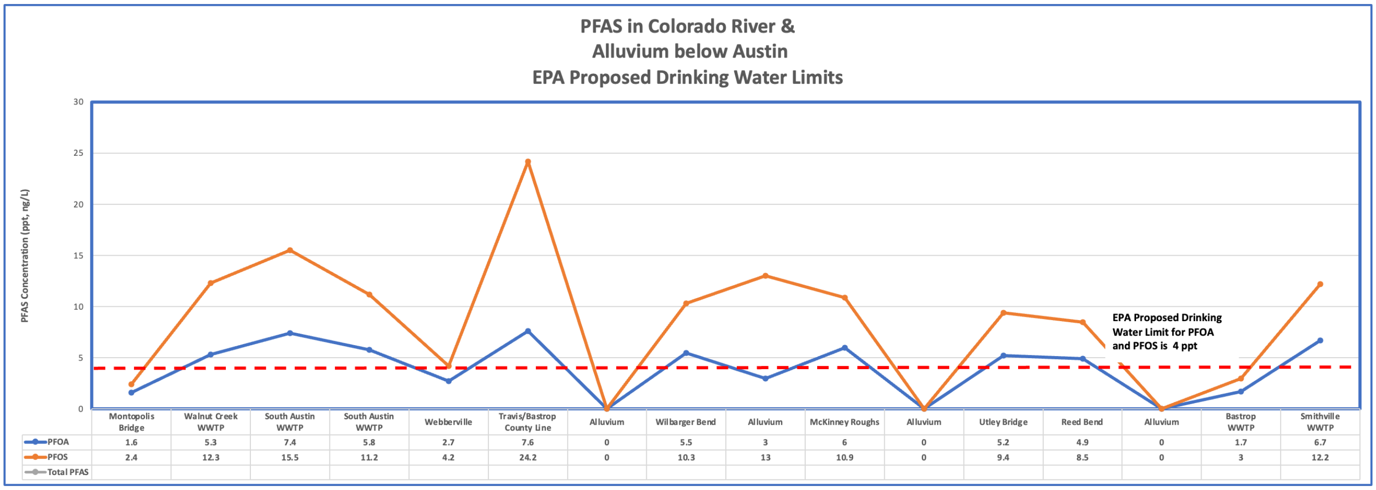



**Figure 4. PFOS and PFOA in the Colorado River Mainstem and Alluvium in relationship to the EPA's Proposed Drinking Water Limits**. (See also Appendix)

The trends in PFOS and PFOA contamination in both the mainstem and alluvial aquifer are consistent with the observations noted in Figure 3. For the most part, the alluvium currently is devoid of contamination.

## B. COLORADO RIVER TRIBUTARIES

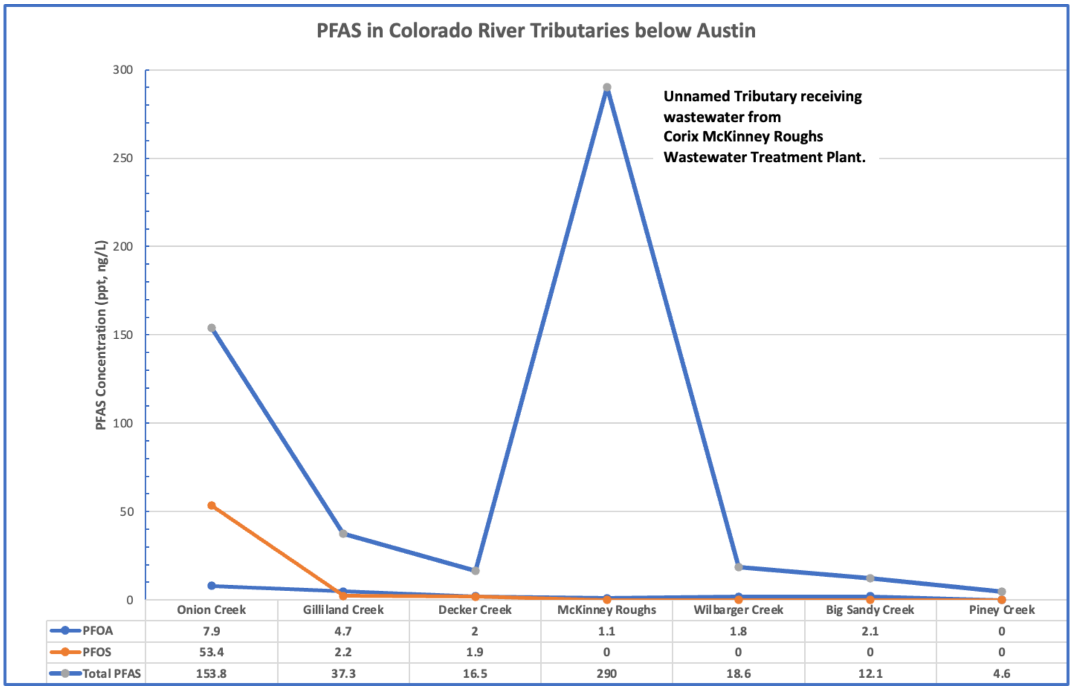



**Figure 5. PFAS in the Colorado River Tributaries in Bastrop & Travis Counties, TX.**

The most notable contamination was for PFOA in the unnamed tributary receiving treated wastewater from the Corix/McKinney Roughs wastewater treatment plant.

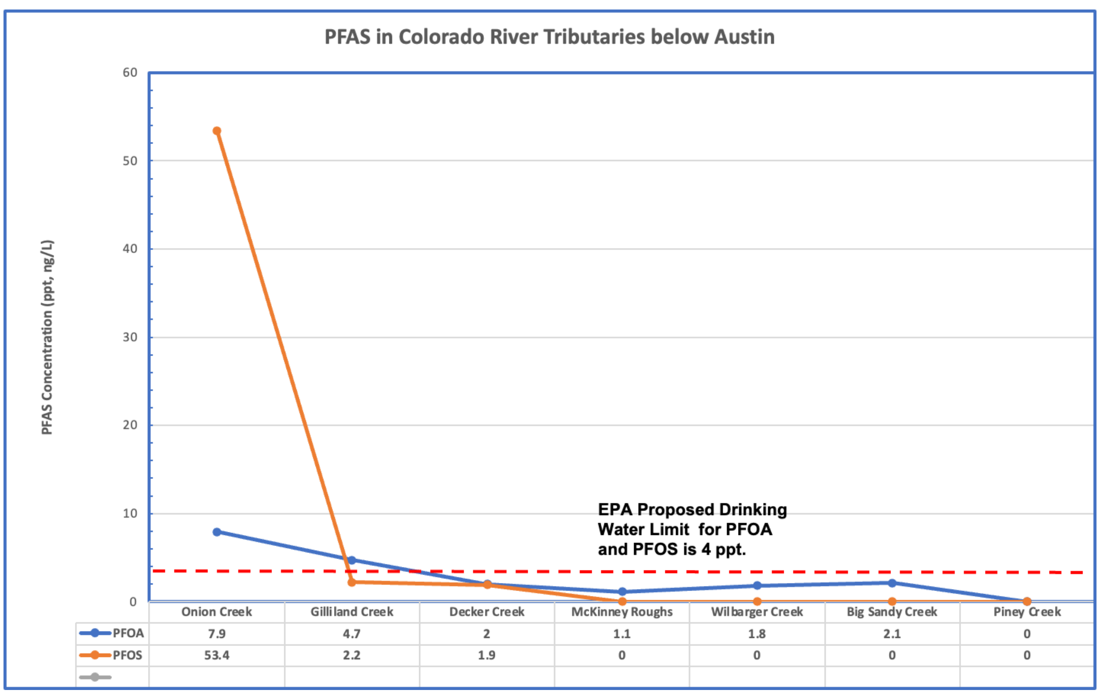
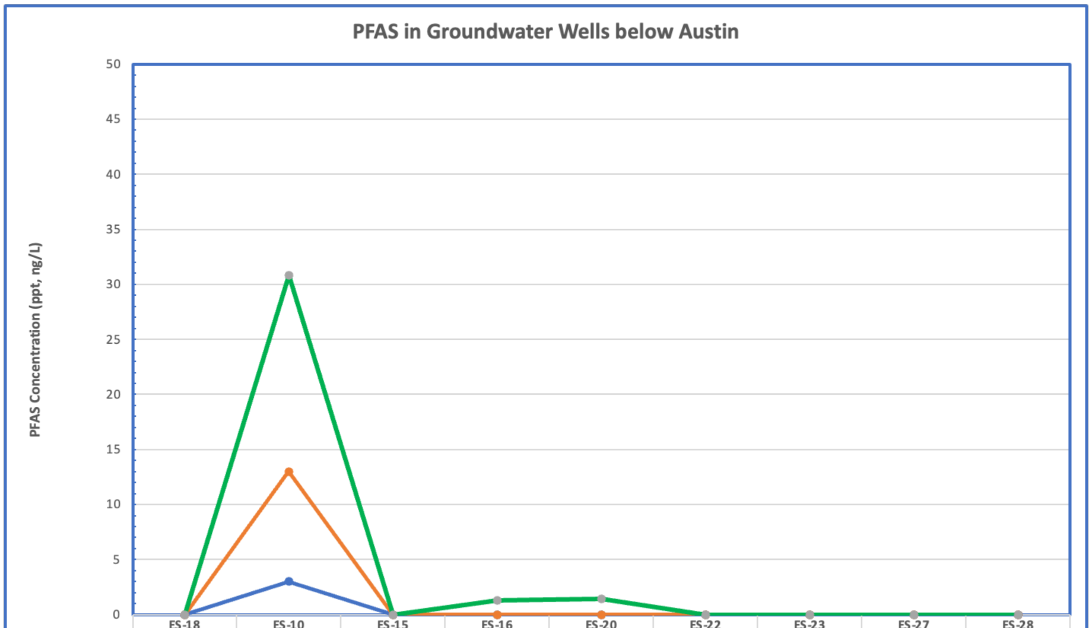



**Figure 6. PFOS and PFOA in the Colorado River Tributaries in relationship to the EPA's Proposed Drinking Water Limits.**

With the exceptions of PFOS in Onion Creek, Travis County, and PFOA in Onion and Gilliland Creeks in Travis County, contamination in the other tributaries was below the proposed drinking water limit.

## C. GROUNDWATER WELLS




| | ES-18 | ES-10 | ES-15 | ES-16 | ES-20 | ES-22 | ES-23 | ES-27 | ES-28 |
|---|---|---|---|---|---|---|---|---|---|
| PFOA | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PFOS | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total PFAS | 0 | 30.8 | 0 | 1.3 | 1.4 | 0 | 0 | 0 | 0 |

**Figure 7. PFAS in Groundwater Wells in Bastrop & Travis Counties, TX** (See also Appendix)

Most of the wells sampled were either free of contamination or contained minimal contamination. The only exception is well ES-10, which was recently drilled. The owner is letting the well flush for a period to assess if the contamination is associated with the drilling operations.

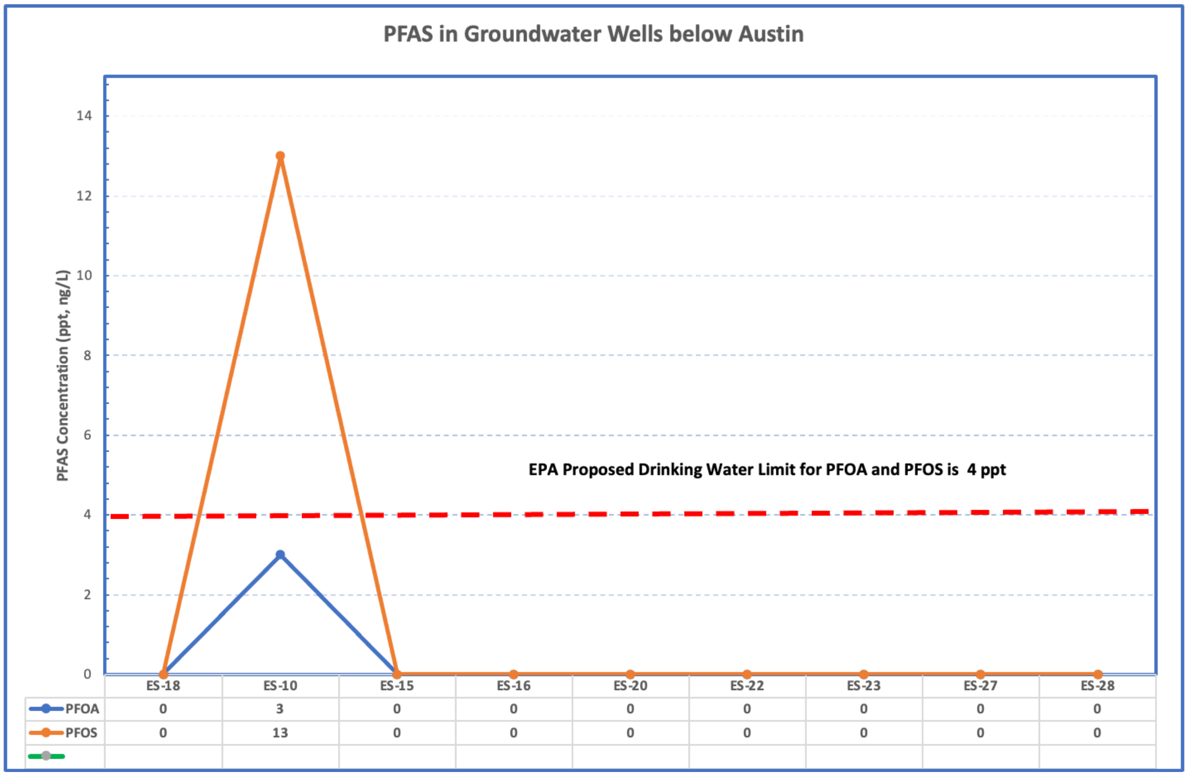



**Figure 8. PFOS and PFOA in Groundwater Wells in relationship to the EPA's Proposed Drinking Water Limits**.

With the exception of ES-10, all wells were below the detection limits for PFOA and PFOS contamination, and their contamination levels were also below the proposed drinking water limits.

## DISCUSSION

The study conducted is preliminary and not designed to comment on the impact of this contamination on potential adverse effects on citizens in this area, fish and wildlife, or consumption of fish and wildlife containing PFAS compounds. The impacts of PFAS on human health and wildlife require further study.

The widespread contamination of PFAS in surface water was the expected outcome, due to the prolific and widespread use of PFAS chemicals for industrial purposes. This study does not provide a comprehensive view of PFAS contamination in Bastrop County, and further field research must be conducted to grasp the entirety of the current outlook on PFAS contamination. Furthermore, the testing methods employed in this study do not meet the federal and state standards for toxicity testing. ES does not claim these results should serve as the basis for legislation; rather, they aim to inform policy and decision-makers of the existence of contamination and draw attention to the need for more comprehensive research in this area. As a preliminary study, we have identified contamination in most testing sites and must further research the extent of PFAS in the ecosystem.

## CONCLUSIONS

The Colorado Alluvial Aquifer exchanges water with the Colorado River, and it was anticipated that PFAS contamination would also be found in the alluvial aquifer and other aquifers. However, this is not the case. Both the Colorado Alluvial Aquifer and wells completed in the other major and minor aquifers sampled showed no contamination by PFAS compounds. We hypothesize that the absence of contamination in these aquifers relates to the "gaining" relationship between the river to these aquifers, which contribute groundwater flow to the river during most river stages. This constant "back pressure" from the aquifers appears to minimize or eliminate flow into these formations.

In conclusion, while TCEQ avoids answering questions concerning the PFAS contamination in the Colorado River, their explanation is intended to guarantee that toxic contaminants will not be permitted to degrade the water quality or aquatic-life use of the river. However, it is clear that, contrary to their claims, PFAS contamination is present in the river and is likely contributing to degradation of the aquatic-life and recreational use. This situation may be in violation of the standards established for managing the river.

## REFERENCES

Domingo, José L., and Martí Nadal. "Human exposure to per-and polyfluoroalkyl substances (PFAS) through drinking water: A review of the recent scientific literature." *Environmental research* 177 (2019): 108648.

EPA Notice of PFAS Health Advisory, Federal Register Vol. 87 Number 118, June 21, 2022, page 36848. https://www.govinfo.gov/content/pkg/FR-2022-06-21/pdf/2022-13158.pdf

Fenton, Suzanne E., et al. "Per-and polyfluoroalkyl substance toxicity and human health review: Current state of knowledge and strategies for informing future research." *Environmental toxicology and chemistry* 40.3 (2021): 606-630.

Health Advisories Explained: https://www.epa.gov/sdwa/drinking-water-health-advisories-has

# Environmental Stewardship, TX: PFAS Test Results

**Confidential**

Environmental Stewardship — A Sustainable Ecosphere

WATERKEEPER® ALLIANCE AFFILIATE

Detects in Yellow — Exceeding Proposed Limit

Format part per trillion (ng/L) — Of Concern (>2.0)

| Water Source | | Colorado River at Webberville Boat Ramp Upstream | | Colorado River below Bastrop WWTP Downstream | | Onion Creek | | Gilliland Creek | | Decker Creek | | CR at Smithville | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | | Bastrop, TX 78602<br>ES-U ; Upstream | | Bastrop, TX 78602<br>ES-D ; Downstream | | Austin, TX 78617<br>ES-1 ; ONC | | Manor, TX 78653<br>ES-2 ; GILC | | Austin, TX 78725<br>ES-3 ; DEC | | Smithville, TX 78957<br>ES-4 ; CRS | |
| **ES Sample #** | **EPA Drinking Water Limits (ng/L)** | **ES - Upstream** | Level Exceeding (#/limit) | **ES - Downstream** | Level Exceeding (#/limit) | **ES - 1** | Level Exceeding (#/limit) | **ES - 2** | Level Exceeding (#/limit) | **ES - 3** | Level Exceeding (#/limit) | **ES - 4** | Level Exceeding (#/limit) |
| **Filtration** | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | |
| **Sampling Date** | | 6/29/22 | | 6/29/22 | | 12/16/22 | | 12/16/22 | | 12/16/22 | | 12/17/22 | |
| **Barcode** | | WTK_2022_0242 | | WTK_2022_0243 | | WTK_2022_2528 | | WTK_2022_2527 | | WTK_2022_2529 | | WTK_2022_2530 | |
| **Order Number** | | wtk-22-00126 | | wtk-22-00126 | | P-140680472 | | P-140680472 | | P-140680472 | | P-140680472 | |
| *PFBA* | | 2.3 | | 1.9 | | 4.8 | | 2.4 | | 3 | | 7.8 | |
| *PFPeA* | | 3.9 | | 2.8 | | 12.4 | | 10.3 | | 3 | | 12 | |
| *PFHxA* | | 3.8 | | 3.1 | | 13.9 | | 6 | | 2.1 | | 12.7 | |
| *PFHpA* | | 1.9 | | 1.5 | | 8 | | 1.7 | | 1.2 | | 5.1 | |
| *PFOA* | **4.0** | 2.7 | 0.7 | 1.7 | 0.4 | 7.9 | 2.0 | 4.7 | 1.2 | 2 | 0.5 | 6.7 | 1.7 |
| *PFNA* | **Group** | < 1 ng/L | Group | < 1 ng/L | Group | 1.1 | Group | 1.2 | Group | < 1 ng/L | Group | 1.6 | Group |
| *PFDA* | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | |
| *GenX* | **Group** | | Group | | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group |
| *PFBS* | **Group** | 1.9 | Group | 1.3 | Group | 7.1 | Group | 6.7 | Group | 1.9 | Group | 7.4 | Group |
| *PFHxS* | **Group** | 5.1 | Group | 2.1 | Group | 37.5 | Group | 2.1 | Group | 1.4 | Group | 16.2 | Group |
| *PFOS* | **4.0** | 4.2 | 1.1 | 3 | 0.8 | 53.4 | 13.4 | 2.2 | 0.6 | 1.9 | 0.5 | 12.2 | 3.1 |
| **Group Hazard Index** | 1.0 | 0.6 | 0.6 | 0.2 | 0.2 | 4.3 | 4.3 | 0.4 | 0.4 | 0.2 | 0.2 | 2.0 | 2.0 |
| **Total PFAS (11 Compounds)** | | **25.8** | | **17.4** | | **146.1** | | **37.3** | | **16.5** | | **81.7** | |
| ***Additional PFAS*** | | | | | | | | | | | | | |
| *6:2 FTS* | | | | | | 1.8 | | | | | | 2.5 | |
| *FBSA* | | | | | | 1.4 | | | | | | 1.2 | |
| *PFHpS* | | | | | | 1.3 | | | | | | < 1 ng/L | |
| *PFPeS* | | | | | | 3.2 | | | | | | 1.5 | |
| **Total PFAS (All Detected)** | | **25.8** | | **17.4** | | **153.8** | | **37.3** | | **16.5** | | **86.9** | |

**Analysis by:**

cyclopure

PFAS compounds collected in the DEXSORB extractiondisc are eluted for anlysis on a HPLC-MS/MS.

Isotope dilution methods are applied to measure a total of 55 PFAS, including all PFASlisted under EPA PFAS test methods.

Cyclopure Inc

**EPA PFAS Regulations**

EPA has proposed drinking water limits of for (i) PFOA (4.0 ppt) and PFOS (4.0 ppt) and (ii) the group of GenX, PFBS, PFNA, and PFHxS using a Hazard Index calculated from the individual PFAS measurement and an assigned health risk value. See link to Hazard Index calculation.

**Texas PFAS Regulations.**

Texas Commission on Environmental Quality has not established PFAS drinking limits at this time.

**GenX, PFBS, PFNA and PFHxS Hazard Group**

**What is a Hazard Index?**

The Hazard Index is a long-established tool that EPA regularly uses, for example in the Superfund program, to understand health risk from chemical mixtures. EPA is proposing a Hazard Index MCL to limit any mixture containing one or more of PFNA, PFHxS, PFBS, and/or GenX Chemicals. The Hazard Index considers the different toxicities of PFNA, GenX Chemicals, PFHxS, and PFBS. For these PFAS, water systems would use a hazard index calculation to determine if the combined levels of these PFAS in the drinking water at that system pose a potential risk and require action.

**Equation**

Hazard Index (HI) = ([GenXwater][10 ppt]) + ([PFBSwater][2000 ppt]) + ([PFNAwater][10 ppt])+ ([PFHxSwater][9.0 ppt])

**If the running annual average Hazard Indexos greater than 1.0,it is a violation of the proposed HI MCL**

**See EPA Hazard Index Fact Sheet**

**ES Rev 0, 5/23/24**

# Environmental Stewardship, TX: PFAS Test Results

**Confidential**

Environmental Stewardship — A Sustainable Ecosphere

WATERKEEPER® ALLIANCE AFFILIATE

Detects in Yellow

Format part per trillion (ng/L)

Exceeding Proposed Limit

Of Concern (>2.0)

| Water Source | | Alum Creek | | Cedar Creek | | Piney Creek | | Wilbarger Creek | | Big Sandy Creek | | Alluvial Well | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | | Smithville, TX 78957<br>ES-5 ; ALC | | Bastrop, TX 78602<br>ES-6 ; CEDC | | Bastrop, TX 78602<br>ES-7 ; PINC | | Elgin, TX 78621<br>ES-8 ; WILC | | Bastrop, TX 78602<br>ES-9 ; BSC | | Bastrop, TX 78602<br>ES-10 ; WELL - New | |
| **ES Sample #** | **EPA Drinking Water Limits (ng/L)** | **ES - 5** | Level Exceeding (#/limit) | **ES - 6** | Level Exceeding (#/limit) | **ES - 7** | Level Exceeding (#/limit) | **ES - 8** | Level Exceeding (#/limit) | **ES - 9** | Level Exceeding (#/limit) | **ES - 10** | Level Exceeding (#/limit) |
| **Filtration** | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Likely Filtered | |
| **Sampling Date** | | 12/17/22 | | 12/17/22 | | 12/17/22 | | 12/17/22 | | 12/17/22 | | 3/17/23 | |
| **Barcode** | | WTK_2022_2526 | | WTK_2022_2523 | | WTK_2022_2522 | | WTK_2022_2525 | | WTK_2022_2521 | | WTK_2023_2524 | |
| **Order Number** | | P-140680472 | | P-140680472 | | P-140680472 | | P-140680472 | | P-140680472 | | P-140680472 | |
| *PFBA* | | 2.1 | | 1.9 | | 1.6 | | 2.2 | | 1.6 | | 3.3 | |
| *PFPeA* | | 2.6 | | < 1 ng/L | | < 1 ng/L | | 8.4 | | 4.4 | | < 1 ng/L | |
| *PFHxA* | | 3.5 | | < 1 ng/L | | < 1 ng/L | | 2.8 | | 2.9 | | < 1 ng/L | |
| *PFHpA* | | 1.1 | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | |
| *PFOA* | 4.0 | 1.4 | 0.4 | < 1 ng/L | | < 1 ng/L | | 1.8 | 0.5 | 2.1 | 0.5 | 3 | 0.8 |
| *PFNA* | Group | < 1 ng/L | Group | < 1 ng/L | Group | < 1 ng/L | Group | < 1 ng/L | Group | < 1 ng/L | Group | 1.2 | Group |
| *PFDA* | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | |
| *GenX* | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group |
| *PFBS* | Group | 4.3 | Group | < 1 ng/L | Group | 1.2 | Group | 3.4 | Group | 1.1 | Group | 4 | Group |
| *PFHxS* | Group | < 1 ng/L | Group | < 1 ng/L | Group | 1.8 | Group | < 1 ng/L | Group | < 1 ng/L | Group | 6.3 | Group |
| *PFOS* | 4.0 | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 | 13 | 3.3 |
| **Group Hazard Index** | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.8 |
| **Total PFAS (11 Compounds)** | | **15.0** | | **1.9** | | **4.6** | | **18.6** | | **12.1** | | **30.8** | |
| ***Additional PFAS*** | | | | | | | | | | | | | |
| *6:2 FTS* | | | | | | | | | | | | | |
| *FBSA* | | | | | | | | | | | | | |
| *PFHpS* | | | | | | | | | | | | | |
| *PFPeS* | | | | | | | | | | | | | |
| **Total PFAS (All Detected)** | | **15** | | **1.9** | | **4.6** | | **18.6** | | **12.1** | | **30.8** | |

**Analysis by:**

cyclopure

PFAS compounds collected in the DEXSORB extractiondisc are eluted for anlysis on a HPLC-MS/MS.

Isotope dilution methods are applied to measure a total of 55 PFAS, including all PFASlisted under EPA PFAS test methods.

Cyclopure Inc

**EPA PFAS Regulations**

EPA has proposed drinking water limits of for (i) PFOA (4.0 ppt) and PFOS (4.0 ppt) and (ii) the group of GenX, PFBS, PFNA, and PFHxS using a Hazard Index calculated from the individual PFAS measurement and an assigned health risk value. See link to Hazard Index calculation.

**Texas PFAS Regulations.**

Texas Commission on Environmental Quality has not established PFAS drinking limits at this time.

**GenX, PFBS, PFNA and PFHxS Hazard Group**

**What is a Hazard Index?**

The Hazard Index is a long-established tool that EPA regularly uses, for example in the Superfund program, to understand health risk from chemical mixtures. EPA is proposing a Hazard Index MCL to limit any mixture containing one or more of PFNA, PFHxS, PFBS, and/or GenX Chemicals. The Hazard Index considers the different toxicities of PFNA, GenX Chemicals, PFHxS, and PFBS. For these PFAS, water systems would use a hazard index calculation to determine if the combined levels of these PFAS in the drinking water at that system pose a potential risk and require action.

**Equation**

Hazard Index (HI) = ([GenXwater][10 ppt]) + ([PFBSwater][2000 ppt]) + ([PFNAwater][10 ppt])+ ([PFHxSwater][9.0 ppt])

**If the running annual average Hazard Indexos greater than 1.0,it is a violation of the proposed HI MCL**

**See EPA Hazard Index Fact Sheet**

**ES Rev 0, 5/23/2024**

# Environmental Stewardship, TX: PFAS Test Results

**Confidential**

Environmental Stewardship — A Sustainable Ecosphere

WATERKEEPER® ALLIANCE AFFILIATE

Detects in Yellow

Exceeding Proposed Limit

Format part per trillion (ng/L)

Of Concern (≥2.0)

| Water Source | | Colorado River at Upper Wilbarger Bend | | Colorado River at Utley Bridge | | Unnamed Tributary at McKinney Roughs receiving Corix WWTP | | Colorado River at McKinney Roughs | | Private Alluvium Well | | Private Alluvium Well | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Location** | | Bastrop, TX 78602<br>ES-11 ; CR | | Bastrop, TX 78602<br>ES-12 ; UTL | | Cedar Creek, TX 78612<br>ES-13 ; MRT | | Cedar Creek, TX 78612<br>ES-14 ; MRCR | | Bastrop, TX 78602<br>ES-15 ; WELL - Irrigation | | Bastrop, TX 78602<br>ES-16 ; WELL - Simsboro | |
| **ES Sample #** | **EPA Drinking Water Limits (ng/L)** | **ES - 11** | Level Exceeding (#/limit) | **ES - 12** | Level Exceeding (#/limit) | **ES - 13** | Level Exceeding (#/limit) | **ES - 14** | Level Exceeding (#/limit) | **ES - 15** | Level Exceeding (#/limit) | **ES - 16** | Level Exceeding (#/limit) |
| **Filtration** | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | |
| **Sampling Date** | | 3/17/23 | | 3/17/23 | | 3/17/23 | | 3/29/23 | | 5/26/23 | | 4/26/23 | |
| **Barcode** | | WTK_2023_2676 | | WTK_2023_2680 | | WTK_2023_2668 | | WTK_2023_2652 | | WTK_2023_2664 | | WTK_2023_2687 | |
| **Order Number** | | 7058 | | 7058 | | | | 7058 | | 7058 | | 7058 | |
| *PFBA* | | 5.8 | | 4.4 | | 5.8 | | 4.6 | | < 1 ng/L | | 1.3 | |
| *PFPeA* | | 7.5 | | 6.4 | | 200.4 | | 8.4 | | < 1 ng/L | | < 1 ng/L | |
| *PFHxA* | | 9.4 | | 9.3 | | 79.2 | | 9.4 | | < 1 ng/L | | < 1 ng/L | |
| *PFHpA* | | 3.8 | | 4 | | 2 | | 4.2 | | < 1 ng/L | | < 1 ng/L | |
| *PFOA* | **4.0** | 5.5 | 1.4 | 5.2 | 1.3 | 1.1 | 0.3 | 6 | 1.5 | < 1 ng/L | | < 1 ng/L | |
| *PFNA* | **Group** | 1.7 | Group | 1.5 | Group | < 1 ng/L | Group | 1.8 | Group | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFDA* | | 1 | | 1 | | < 1 ng/L | | 1.1 | | < 1 ng/L | | < 1 ng/L | |
| *GenX* | **Group** | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group |
| *PFBS* | **Group** | 5.5 | Group | 5.1 | Group | 1.5 | Group | 5.8 | Group | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFHxS* | **Group** | 6.9 | Group | 7.3 | Group | < 1 ng/L | Group | 9.6 | Group | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFOS* | **4.0** | 10.3 | 2.6 | 9.4 | 2.4 | < 1 ng/L | 0.0 | 10.9 | 2.7 | < 1 ng/L | | < 1 ng/L | |
| **Group Hazard Index** | **1.0** | 0.9 | 0.9 | 1.0 | 1.0 | 0.0 | 0.0 | 1.2 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total PFAS (11 Compounds)** | | **57.4** | | **53.6** | | **290** | | **61.8** | | **0** | | **1.3** | |
| ***Additional PFAS*** | | | | | | | | | | | | | |
| *6:2 FTS* | | | | | | | | | | | | | |
| *FBSA* | | | | | | | | 1.1 | | | | | |
| *PFHpS* | | | | | | | | | | | | | |
| *FOUEA* | | | | | | | | | | 3.6 | | 1.4 | |
| *N-MeFOSAA* | | | | | | | | | | < 1 ng/L | | < 1 ng/L | |
| *PFPeS* | | | | | | | | 1.0 | | < 1 ng/L | | < 1 ng/L | |
| *PFUnA* | | | | | | | | | | < 1 ng/L | | < 1 ng/L | |
| **Total PFAS (All Detected)** | | **57.4** | | **53.6** | | **290** | | **63.9** | | **3.6** | | **2.7** | |

**Analysis by:**

cyclopure

PFAS compounds collected in the DEXSORB extractiondisc are eluted for anlysis on a HPLC-MS/MS.

Isotope dilution methods are applied to measure a total of 55 PFAS, including all PFASlisted under EPA PFAS test methods.

Cyclopure Inc

**EPA PFAS Regulations**

EPA has proposed drinking water limits of for (i) PFOA (4.0 ppt) and PFOS (4.0 ppt) and (ii) the group of GenX, PFBS, PFNA, and PFHxS using a Hazard Index calculated from the individual PFAS measurement and an assigned health risk value. See link to Hazard Index calculation.

**Texas PFAS Regulations.**

Texas Commission on Environmental Quality has not established PFAS drinking limits at this time.

**GenX, PFBS, PFNA and PFHxS Hazard Group**

**What is a Hazard Index?**

The Hazard Index is a long-established tool that EPA regularly uses, for example in the Superfund program, to understand health risk from chemical mixtures. EPA is proposing a Hazard Index MCL to limit any mixture containing one or more of PFNA, PFHxS, PFBS, and/or GenX Chemicals. The Hazard Index considers the different toxicities of PFNA, GenX Chemicals, PFHxS, and PFBS. For these PFAS, water systems would use a hazard index calculation to determine if the combined levels of these PFAS in the drinking water at that system pose a potential risk and require action.

**Equation**

Hazard Index (HI) = ([GenXwater][10 ppt]) + ([PFBSwater][2000 ppt]) + ([PFNAwater][10 ppt])+ ([PFHxSwater][9.0 ppt])

**If the running annual average Hazard Indexos greater than 1.0,it is a violation of the proposed HI MCL**

**See EPA Hazard Index Fact Sheet**

**ES Rev 0, 5/23/2024**

# Environmental Stewardship, TX: PFAS Test Results

**Confidential**

Environmental Stewardship — A Sustainable Ecosphere ™

WATERKEEPER® ALLIANCE AFFILIATE

Detects in Yellow

Format part per trillion (ng/L)

Exceeding Proposed Limit

Of Concern (>2.0)

| Water Source | | Private Domestic Well | | Private Alluvial Well | | Private Colorado River Access | | Private Domestic Well | | Private Colorado River Access | | Private Domestic Well | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | | Bastrop, TX 78602<br>ES-17 ; WELL | | Elgin, TX 78621<br>ES-18 ; WELL | | Elgin, TX 78621<br>ES-19 ; CR | | Bastrop, TX 78602<br>ES-20 ; WELL | | Bastrop, TX 78602<br>ES-21 ; CR | | Bastrop, TX 78602<br>ES-22 ; WELL | |
| **ES Sample #** | **EPA Drinking Water Limits (ng/L)** | **ES - 17** | Level Exceeding (#/limit) | **ES - 18** | Level Exceeding (#/limit) | **ES - 19** | Level Exceeding (#/limit) | **ES - 20** | Level Exceeding (#/limit) | **ES - 21** | Level Exceeding (#/limit) | **ES - 22** | Level Exceeding (#/limit) |
| **Filtration** | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | |
| **Sampling Date** | | 5/2/23 | | 5/4/23 | | 5/4/23 | | 5/5/23 | | 5/5/23 | | 5/13/23 | |
| **Barcode** | | WTK_2023_2690 | | WTK_2023_2688 | | WTK_2023_2689 | | WTK_2023_2691 | | WTK_2023_4147 | | WTK_2023_4145 | |
| **Order Number** | | 7058 | | 7058 | | 7058 | | 7058 | | 8920 | | 8920 | |
| *PFBA* | | < 1 ng/L | | < 1 ng/L | | 5.5 | | < 1 ng/L | | 1.6 | | < 1 ng/L | |
| *PFPeA* | | < 1 ng/L | | < 1 ng/L | | 9.8 | | < 1 ng/L | | 4.9 | | < 1 ng/L | |
| *PFHxA* | | 1 | | < 1 ng/L | | 14 | | < 1 ng/L | | 7.2 | | < 1 ng/L | |
| *PFHpA* | | 2.9 | | < 1 ng/L | | 5.8 | | 1.4 | | 3.1 | | < 1 ng/L | |
| *PFOA* | **4.0** | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 | 7.6 | 1.9 | < 1 ng/L | 0.0 | 4.9 | 1.2 | < 1 ng/L | 0.0 |
| *PFNA* | **Group** | < 1 ng/L | Group | < 1 ng/L | Group | 2.3 | Group | < 1 ng/L | Group | 1.1 | Group | < 1 ng/L | Group |
| *PFDA* | | < 1 ng/L | | < 1 ng/L | | 4.6 | | < 1 ng/L | | < 1 ng/L | | < 1 ng/L | |
| *GenX* | **Group** | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group |
| *PFBS* | **Group** | < 1 ng/L | Group | < 1 ng/L | Group | 9.9 | Group | < 1 ng/L | Group | 6.2 | Group | < 1 ng/L | Group |
| *PFHxS* | **Group** | < 1 ng/L | Group | < 1 ng/L | Group | 9.9 | Group | < 1 ng/L | Group | 7 | Group | < 1 ng/L | Group |
| *PFOS* | **4.0** | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 | 24.2 | 6.1 | < 1 ng/L | 0.0 | 8.5 | 2.1 | < 1 ng/L | 0.0 |
| **Group Hazard Index** | **1.0** | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 1.3 | 0.0 | 0.0 | 0.9 | 0.9 | 0.0 | 0.0 |
| **Total PFAS (11 Compounds)** | | **3.9** | | **0** | | **93.6** | | **1.4** | | **44.5** | | **0** | |
| ***Additional PFAS*** | | | | | | | | | | | | | |
| *FOUEA* | | 1.5 | | < 1 ng/L | | 1.9 | | < 1 ng/L | | | | | |
| *N-MeFOSAA* | | < 1 ng/L | | < 1 ng/L | | 1.1 | | < 1 ng/L | | | | | |
| *PFUnA* | | < 1 ng/L | | < 1 ng/L | | 1.4 | | < 1 ng/L | | | | | |
| *6:2 FTS* | | | | | | | | | | | | | |
| *FBSA* | | | | | | | | | | | | | |
| *PFHpS* | | | | | | | | | | | | | |
| *PFPeS* | | < 1 ng/L | | < 1 ng/L | | 1 | | < 1 ng/L | | | | | |
| **Total PFAS (All Detected)** | | **5.4** | | **0** | | **99** | | **1.4** | | **44.5** | | **0** | |

**Analysis by:**

cyclopure

PFAS compounds collected in the DEXSORB extractiondisc are eluted for anlysis on a HPLC-MS/MS.

Isotope dilution methods are applied to measure a total of 55 PFAS, including all PFASlisted under EPA PFAS test methods.

Cyclopure Inc

**EPA PFAS Regulations**

EPA has proposed drinking water limits of for (i) PFOA (4.0 ppt) and PFOS (4.0 ppt) and (ii) the group of GenX, PFBS, PFNA, and PFHxS using a Hazard Index calculated from the individual PFAS measurement and an assigned health risk value. See link to Hazard Index calculation.

**Texas PFAS Regulations.**

Texas Commission on Environmental Quality has not established PFAS drinking limits at this time.

**GenX, PFBS, PFNA and PFHxS Hazard Group**

**What is a Hazard Index?**

The Hazard Index is a long-established tool that EPA regularly uses, for example in the Superfund program, to understand health risk from chemical mixtures. EPA is proposing a Hazard Index MCL to limit any mixture containing one or more of PFNA, PFHxS, PFBS, and/or GenX Chemicals. The Hazard Index considers the different toxicities of PFNA, GenX Chemicals, PFHxS, and PFBS. For these PFAS, water systems would use a hazard index calculation to determine if the combined levels of these PFAS in the drinking water at that system pose a potential risk and require action.

**Equation**

Hazard Index (HI) = ([GenXwater][10 ppt]) + ([PFBSwater][2000 ppt]) + ([PFNAwater][10 ppt])+ ([PFHxSwater][9.0 ppt])

**If the running annual average Hazard Indexos greater than 1.0,it is a violation of the proposed HI MCL**

**See EPA Hazard Index Fact Sheet**

**ES Rev 0, 5/23/2024**

Environmental Stewardship A Sustainable Ecosphere

WATERKEEPER ALLIANCE AFFILIATE

# Environmental Stewardship, TX: PFAS Test Results

**Confidential**

Detects in Yellow

Exceeding Proposed Limit

Format part per trillion (ng/L)

Of Concern (>2.0)

| Water Source | | Private Domestic Well | | Private Domestic Well | | Walnut Creek Confluence | | Colorado River above Walnut Creek Confluence | | Private Domestic Well | | Private Domestic Well | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | | Bastrop, TX 78602 ES-23 ; WELL | | Bastrop, TX 78602 ES-24 ; WELL | | Austin, TX 78725 ES-25 ; WCCC | | Austin, TX 78725 ES-26 ; CRWCC | | Cedar Creek, TX 78612 ES-27 ; WELL | | Smithville, TX 78957 ES-28 ; WELL | |
| ES Sample # | EPA Drinking Water Limits (ng/L) | ES - 23 | Level Exceeding (#/limit) | ES - 24 | Level Exceeding (#/limit) | ES - 25 | Level Exceeding (#/limit) | ES - 26 | Level Exceeding (#/limit) | ES - 27 | Level Exceeding (#/limit) | ES - 28 | Level Exceeding (#/limit) |
| Filtration | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | possibly ES N. BC4167 "PCW" | | Unfiltered | |
| Sampling Date | | 5/13/23 | | 5/13/23 | | 5/18/23 | | 5/18/23 | | 6/17/23 | | 6/17/23 | |
| Barcode | | WTK_2023_4149 | | WTK_2023_4146 | | WTK_2023_4148 | | WTK_2023_4166 | | WTK_2023_4167 | | WTK_2023_4168 | |
| Order Number | | 8920 | | Unaccounted for by Cyclopure | | | | 8991 | | 8991 | | 8991 | |
| *PFBA* | | < 1 ng/L | | | | | | 2.8 | | < 1 ng/L | | < 1 ng/L | |
| *PFPeA* | | < 1 ng/L | | | | | | 3.7 | | < 1 ng/L | | < 1 ng/L | |
| *PFHxA* | | < 1 ng/L | | | | | | 6.1 | | < 1 ng/L | | < 1 ng/L | |
| *PFHpA* | | < 1 ng/L | | | | | | 3.2 | | < 1 ng/L | | < 1 ng/L | |
| *PFOA* | 4.0 | < 1 ng/L | 0.0 | | | | | 5.3 | 1.3 | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 |
| *PFNA* | Group | < 1 ng/L | Group | | | | | 2 | Group | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFDA* | | < 1 ng/L | | | | | | 1.7 | | < 1 ng/L | | < 1 ng/L | |
| *GenX* | Group | < 2 ng/L | Group | | | | | < 2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group |
| *PFBS* | Group | < 1 ng/L | Group | | | | | 6.1 | Group | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFHxS* | Group | < 1 ng/L | Group | | | | | 4.9 | Group | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFOS* | 4.0 | < 1 ng/L | 0.0 | | | | | 12.3 | 3.1 | < 1 ng/L | 0.0 | < 1 ng/L | 0.0 |
| **Group Hazard Index** | 1.0 | 0.0 | 0.0 | | | | | 0.7 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total PFAS (11 Compounds)** | | **0** | | **0** | | **0** | | **48.1** | | **0** | | **0** | |
| ***Additional PFAS*** | | | | | | | | | | | | | |
| *6:2 FTS* | | | | | | | | | | | | | |
| *FHxSA* | | | | | | | | | | | | | |
| *FBSA* | | | | | | | | | | | | | |
| *PFHpS* | | | | | | | | | | | | | |
| *PFPeS* | | | | | | | | | | | | | |
| **Total PFAS (All Detected)** | | **0** | | **0** | | **0** | | **48.1** | | **0** | | **0** | |

**Analysis by:**

cyclopure

PFAS compounds collected in the DEXSORB extractiondisc are eluted for anlysis on a HPLC-MS/MS.

Isotope dilution methods are applied to measure a total of 55 PFAS, including all PFASlisted under EPA PFAS test methods.

Cyclopure Inc

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EPA has proposed drinking water limits of for (i) PFOA (4.0 ppt) and PFOS (4.0 ppt) and (ii) the group of GenX, PFBS, PFNA, and PFHxS using a Hazard Index calculated from the individual PFAS measurement and an assigned health risk value. See link to Hazard Index calculation.

**Texas PFAS Regulations.**

Texas Commission on Environmental Quality has not established PFAS drinking limits at this time.

**GenX, PFBS, PFNA and PFHxS Hazard Group**

**What is a Hazard Index?**

The Hazard Index is a long-established tool that EPA regularly uses, for example in the Superfund program, to understand health risk from chemical mixtures. EPA is proposing a Hazard Index MCL to limit any mixture containing one or more of PFNA, PFHxS, PFBS, and/or GenX Chemicals. The Hazard Index considers the different toxicities of PFNA, GenX Chemicals, PFHxS, and PFBS. For these PFAS, water systems would use a hazard index calculation to determine if the combined levels of these PFAS in the drinking water at that system pose a potential risk and require action.

**Equation**

Hazard Index (HI) = ([GenXwater][10 ppt]) + ([PFBSwater][2000 ppt]) + ([PFNAwater][10 ppt])+ ([PFHxSwater][9.0 ppt])

**If the running annual average Hazard Indexos greater than 1.0,it is a violation of the proposed HI MCL**

**See EPA Hazard Index Fact Sheet**

**ES Rev 0, 5/23/2024**

# Environmental Stewardship, TX: PFAS Test Results

**Confidential**

Environmental Stewardship — A Sustainable Ecosphere

WATERKEEPER® ALLIANCE AFFILIATE

Detected

Exceeding Proposed Limit

Format part per trillion (ng/L)

Of Concern (≥2.0)

| Water Source | | Colorado River at South Austin Regional WWTP Outfall | | Colorado River above South Austin Regional WWTP | | Onion Creek at Confluence with Colorado River | | Walnut Creek WTP Outfall | | Upstream from Montopolis Bridge on Colorado RIver | | Private Domestic Well | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Location | | Del Valle, TX 78617<br>ES-29 ; CRSARC2 | | Del Valle, TX 78617<br>ES-30 ; CRSARC | | Del Valle, TX 78617<br>ES-31 ; CROCC | | Austin, TX 78725<br>ES-32 ; WCO | | Austin, TX 78702<br>ES-33 ; CR | | Bastrop, TX 78602<br>ES-34 ; WELL | |
| ES Sample # | EPA Proposed Drinking Water Limits (ng/L) | **ES - 29** | Level Exceeding (#/limit) | **ES - 30** | Level Exceeding (#/limit) | **ES - 31** | Level Exceeding (#/limit) | **ES - 32** | Level Exceeding (#/limit) | **ES - 33** | Level Exceeding (#/limit) | **ES - 34** | Level Exceeding (#/limit) |
| Filtration | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | | Unfiltered | |
| Sampling Date | | 5/19/23 | | 5/19/23 | | 5/19/23 | | 9/29/23 | | 9/25/23 | | 10/5/23 | |
| Barcode | | WTK_2023_4169 | | WTK_2023_4170 | | WTK_2023_4171 | | WTK_2023_4172 | | WTK_2023_4173 | | WTK_2023_4174 | |
| Order Number | | 8991 | | 8991 | | 8991 | | 8991 | | 8991 | | 8991 | |
| *PFBA* | | 2.8 | | 3.3 | | 4.6 | | 4.1 | | < 1 ng/L | | < 1 ng/L | |
| *PFPeA* | | 4.6 | | 6.1 | | 4.2 | | 6.4 | | 1.2 | | < 1 ng/L | |
| *PFHxA* | | 7.8 | | 8.4 | | 7.8 | | 8.6 | | 1.9 | | < 1 ng/L | |
| *PFHpA* | | 3.3 | | 3.9 | | 3.7 | | 4.7 | | < 1 ng/L | | < 1 ng/L | |
| *PFOA* | 4.0 | 7.4 | 1.9 | 5.8 | 1.5 | 6.3 | 1.6 | 4.5 | 1.1 | 1.6 | 0.4 | < 1 ng/L | 0.0 |
| *PFNA* | Group | 2.7 | Group | 1.7 | Group | 1.1 | Group | 2.4 | | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFDA* | | 2.4 | | < 1 ng/L | | < 1 ng/L | | 2.1 | | < 1 ng/L | | < 1 ng/L | |
| *GenX* | Group | <2 ng/L | Group | < 2 ng/L | Group | < 2 ng/L | Group | < 1 ng/L | | < 1 ng/L | Group | < 1 ng/L | Group |
| *PFBS* | Group | 6.1 | Group | 8.7 | Group | 5.7 | Group | 4.4 | | 1.4 | Group | < 1 ng/L | Group |
| *PFHxS* | Group | 7.7 | Group | 7.9 | Group | 19.9 | Group | 1.3 | | 1.4 | Group | < 1 ng/L | Group |
| *PFOS* | 4.0 | 15.5 | 3.9 | 11.2 | 2.8 | 26.8 | 6.7 | 3.2 | 0.8 | 2.4 | 0.6 | < 1 ng/L | 0.0 |
| Group Hazard Index | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 2.3 | 2.3 | 0.1 | 0.1 | 0.2 | 0.2 | 0.0 | |
| **Total PFAS (11 Compounds)** | | **60.3** | | **57** | | **80.1** | | **41.7** | | **9.9** | | **0** | |
| *Additional PFAS* | | | | | | | | | | | | | |
| *6:2 FTS* | | < 1 ng/L | | < 1 ng/L | | 2.4 | | | | | | | |
| *FHxSA* | | < 1 ng/L | | < 1 ng/L | | 2 | | | | | | | |
| *FBSA* | | | | | | | | | | | | | |
| *PFHpS* | | | | | | | | | | | | | |
| *PFPeS* | | < 1 ng/L | | < 1 ng/L | | 1.4 | | | | | | | |
| **Total PFAS (All Detected)** | | **60.3** | | **57** | | **85.9** | | **41.7** | | **9.9** | | **0** | |

**Analysis by:**

cyclopure

PFAS compounds collected in the DEXSORB extractiondisc are eluted for anlysis on a HPLC-MS/MS.

Isotope dilution methods are applied to measure a total of 55 PFAS, including all PFASlisted under EPA PFAS test methods.

Cyclopure Inc

**EPA PFAS Regulations**

EPA has proposed drinking water limits of for (i) PFOA (4.0 ppt) and PFOS (4.0 ppt) and (ii) the group of GenX, PFBS, PFNA, and PFHxS using a Hazard Index calculated from the individual PFAS measurement and an assigned health risk value. See link to Hazard Index calculation.

**Texas PFAS Regulations.**

Texas Commission on Environmental Quality has not established PFAS drinking limits at this time.

**GenX, PFBS, PFNA and PFHxS Hazard Group**

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**See EPA Hazard Index Fact Sheet**

**ES Rev 0, 4/18/2024**