

What are Per- and Polyfluoroalkyl Substances (PFAS)?

PFAS are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s because of their useful properties. There are thousands of different PFAS, some of which have been more widely used and studied than others. Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS), for example, are two of the most widely used and studied chemicals in the PFAS group.

PFAS were used in what products?

PFAS have been and are used in a variety of materials. Materials that may contain PFAS in your home include but are not limited to stain and water-repellent used on carpets, upholstery, clothing, and other fabrics; cleaning products; non-stick cookware; paints, varnishes, and sealants; shampoo; dental floss, and cosmetics. Manufacturing or chemical production facilities that produce or use PFAS include chrome plating, electronics, and certain textile and paper manufacturers. Food packaging may contain PFAS such as in grease-resistant paper, fast food containers/ wrappers, microwave popcorn bags, pizza boxes, and candy wrappers.

What sampling has the City of Denton completed regarding PFAS?

City of Denton staff proactively collected samples associated with the Pecan Creek Water Reclamation Plant. The sample results are summarized in the table below:

Sample Description	Sample Date	PFOS Result	PFOA Result
Influent	05/04/2020	6.3 ng/L	5.4 ng/L
Effluent	05/04/2020	5.8 ng/L	8.4 ng/L
Upper Pecan Creek ¹	05/04/2020	24 ng/L	12 ng/L
Lower Pecan Creek ²	05/04/2020	8 ng/L	16 ng/L
Beltpress (biosolids)	05/04/2020	Not Detected	Not Detected
Dyno Dirt	05/04/2020	5.9 µg/kg	9.3 µg/kg
Sample Description	Sample Date	PFOS Result	PFOA Result
Influent	09/09/2021	7.4 ng/L	4.2 ng/L
Effluent	09/09/2021	5.3 ng/L	7.3 ng/L
Upper Pecan Creek ¹	09/09/2021	17 ng/L	7.0 ng/L
Lower Pecan Creek ²	09/09/2021	5.7 ng/L	7.3 ng/L
Beltpress (biosolids)	09/09/2021	5.3 µg/kg	Not Detected
Dyno Dirt	09/09/2021	2.4 µg/kg	3.0 µg/kg

Notes:
1 = Sample collected from Pecan Creek before water reclamation plant outfall
2 = Sample collected from Pecan Creek after water reclamation plan outfall
ng/L = nanograms per liter (ppt - parts per trillion)
µg/kg = micrograms per kilograms (ppb - parts per billion)
PFOS = Perfluorooctanesulfonic acid
PFOA = Perfluorooctanoic acid

What analytical method did the City of Denton use for PFAS analysis?

USEPA Method 537. The U.S. Environmental Protection Agency (EPA) has established Method 537 Version 1.1 for analysis of per- and polyfluoroalkyl substances (PFAS). City of Denton samples were sent to a National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory for the water and solids analysis under EPA Method 537.

Are there any established regulatory limits for PFAS in wastewater or biosolids?

No. The U.S. Environmental Protection Agency (EPA) is working through their PFAS Strategic Roadmap. EPA is actively working to enhance and improve analytical methods for PFAS. EPA is working on establishing regulatory limits for PFAS in various media. The Texas Commission on Environmental Quality (TCEQ) has established values that include:

Chemical of Concern	Residential ^{TOT} SOIL _{COMB}	Residential ^{GW} GW _{Ing}
Perfluorooctanesulfonic acid (PFOS)	1,500 µg/kg	560 ng/L
Perfluorooctanoic acid (PFOA)	490 µg/kg	290 ng/L
Notes: ^{TOT} SOIL _{COMB} = Residential: Combined ingestion, dermal contact, inhalation of volatiles and particulates, and ingestion of above-ground and below-ground vegetables with COCs in soil (<i>used lowest value for potential source areas</i>) ^{GW} GW _{Ing} = Ingestion of COCs in Class 1 groundwater		

How do we summarize the City of Denton sampling and current reference values?

The results are well below the TCEQ soil limits for residential use including growing vegetables for human consumption. The water samples are well below the TCEQ limits for groundwater consumption by humans. The results are also below the PFAS concentrations for non-biosolids commercial compost (100 to 1,100 ppt) reported by The Sierra Club in the report *Sludge in the Garden* published May 2021.

Does the City of Denton plan to continue this PFAS sampling?

Yes. The next round of sampling is planned for September 2022. The City of Denton plans to continue this sampling on an annual basis.