Per- and Polyfluoroalkyl Substances (PFAS) Fact Sheet

State Water Resources Control Board
Division of Drinking Water

May 2024

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List of Acronyms & Abbreviations

Acronyms/Abbreviations	Definitions
DDW	Division of Drinking Water
MCL	Maximum Contaminants Level
NPDWR	National Primary Drinking Water Regulation
OEHHA	Office of Environmental Health Hazard Assessment
PFAS	Per- and Polyfluoroalkyl Substances
PHG	Public Health Goal
State Water Board	State Water Resources Control Board
US EPA	The U.S. Environmental Protection Agency

Overview

This fact sheet provides information about Per- and Polyfluoroalkyl Substances (PFAS) and State Water Resources Control Board (State Water Board), Division of Drinking Water actions to manage PFAS issues in drinking water in California.

PFAS Background

1. PFAS definition

PFAS, or Per- and Polyfluoroalkyl Substances, are a large group of man-made substances that do not occur naturally in the environment and are resistant to heat, water, oil, grease, and stains. Since the 1940s, PFAS have been used in industry and consumer products, such as non-stick cookware, waterproof clothing, stain-resistant fabrics and carpets, some firefighting foams, and products that resist grease, water, and oil. PFAS can be found in a variety of consumer products and in groundwater.

2. PFAS concerns

Long term exposure to PFAS is potentially harmful to health. A recent review from the U.S. Centers for Disease Control and Prevention (CDC) outlines that over a long time PFAS may:

- Decrease fertility and birth weight.
- Weaken a body's ability to fight disease.
- Increase the risk for some cancers, asthma, thyroid disease, and liver damage.
- Increase cholesterol levels (which can increase the risk for heart attack or stroke).

Because of the potential health risks of PFAS, the State Water Board requires monitoring PFAS to protect drinking water quality. Monitoring PFAS in drinking water ensures that your water remains safe to drink and helps the State Water Board to protect public health.

3. PFAS found in the environment

PFAS can be found in air, water, and soil in and around manufacturing facilities. Although these releases have been declining since companies began phasing out the production and use of several PFAS in the early 2000s, PFAS are very stable in the environment and are resistant to breaking down. They remain in the environment and the human body for long periods of time. Some PFAS are volatile and can be carried long distances through the air, which may lead to contamination of soil and groundwater far from the source of the PFAS emission.

4. Sources of PFAS

The primary sources of PFAS are: fire training/fire response sites, industrial sites landfills, and wastewater treatment plants/biosolids. The following picture shows examples of products containing PFAS.

Figure 1. Examples of consumer products containing PFAS.

5. Human exposure to PFAS

The main ways that PFAS get into people's bodies are through:

- **Drinking water**: Contaminated drinking water has led to high levels of exposure to PFAS for some populations residing near manufacturing facilities that have used PFAS.
- **Food:** Food produced in water or soil contaminated with PFAS, such as vegetables fish, meat, and eggs may contain PFAS due to bioaccumulation and crop uptake. Also, food packaging made with PFAS can lead to PFAS transfer to food.
- **Consumer Products:** Hand-to-mouth contact with consumer products made with PFAS, such as carpets and textiles, or cosmetics and lotions.
- **Inhalation:** Breathing in contaminated air or household dust can expose people to PFAS. Both outdoor and indoor air or dust may contain PFAS. PFAS in outdoor air may be because of manufacturing releases. Clothing, textiles, and carpets treated with PFAS may result in higher concentrations of some PFAS in indoor air.

PFAS chemicals are not easily absorbed through the skin; therefore, dermal exposure is considered a less significant route of exposure for the general population.

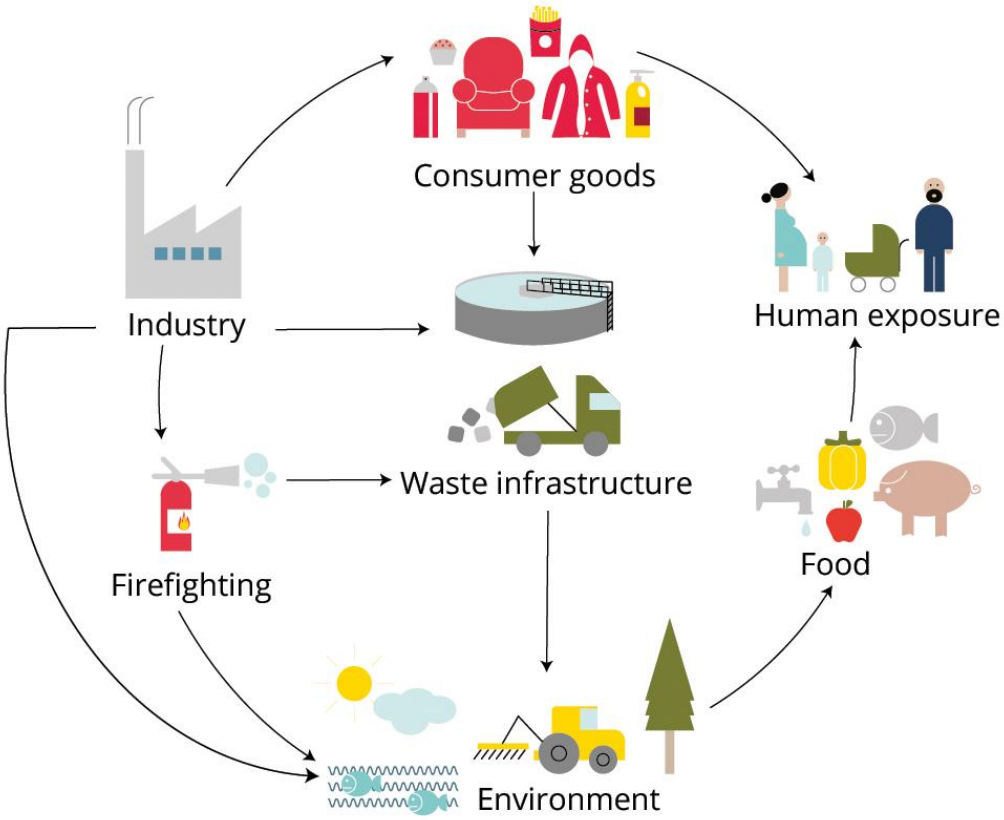

Figure 2. PFAS exposure pathways to the environment and human.
Image is adopted from https://extension.umaine.edu/livestock/dairy/pfas-and-dairy-animals/

6. PFAS in drinking water

PFAS can get into drinking water when products containing them are used or spilled onto the ground or into lakes and rivers. Once in groundwater, PFAS are easily transported large distances and can contaminate drinking wells. PFAS in the air can also end up in rivers and lakes used for drinking water. Additional information regarding PFAS fate and transport in the environment may be found on the Interstate Technology Regulatory Council (https://pfas-1.itrcweb.org/).

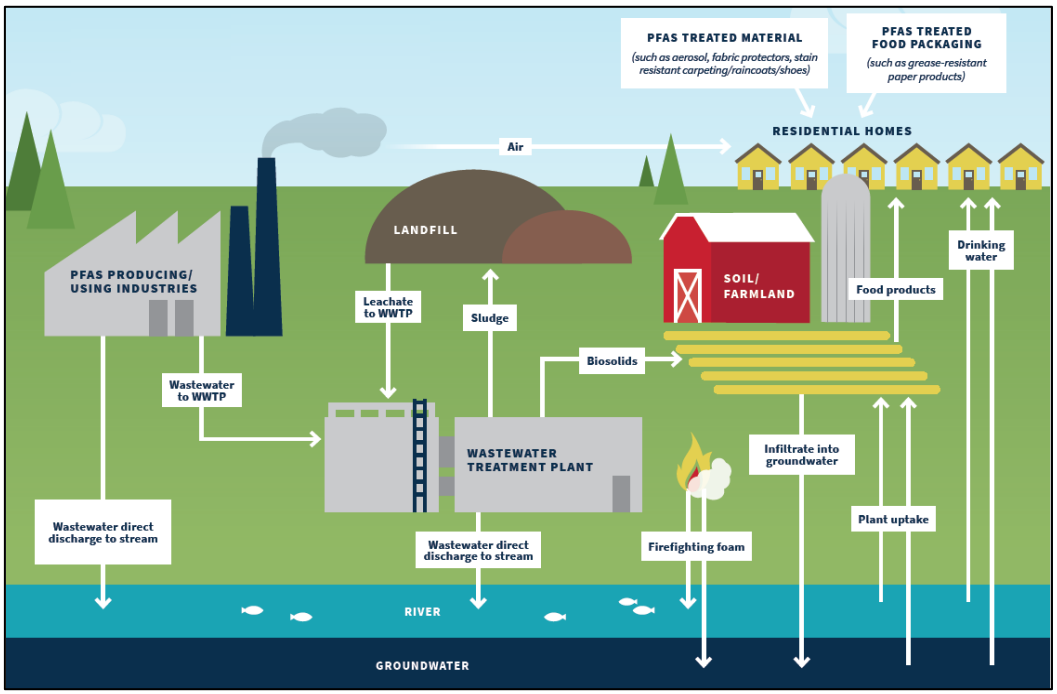

Figure 3. PFAS sources and pathways to drinking water. Image is adopted from https://health.hawaii.gov/heer/environmental-health/highlighted-projects/pfas/

7. PFAS production in the United States

The U.S. Environmental Protection Agency (US EPA) has announced that eight major PFAS producers have phased out PFAS from emissions and products. However, manufacturers have developed replacement substances in the PFAS family. Additionally, there could be some imported goods containing these substances.

8. PFAS exposure reduction

Preventing exposure to PFAS is not practical due to the widespread historic and current use of PFAS, which are commonly used in consumer products throughout the world. Exposure can be reduced by avoiding or limiting exposure with some products, as follows:

- Use non-stick coated cookware according to manufacturer guidelines (not all non-stick coatings contain PFAS).
- Use stainless steel or cast-iron cookware in place of non-stick coated items.
- Avoid oil and water-resistant food packaging.
- Avoid stain resistant coatings on carpet, furniture and clothing.

- Avoid water repellants on clothing.
- Use personal care products without “PTFE” or “Fluoro” ingredients.
- Wipe or clean household surfaces with a damp cloth regularly.

The Food and Drug Administration (FDA) recommends that people should eat different types of foods to maintain a healthy diet. They mentioned that the findings from the first tests conducted on various foods didn't show a need to avoid specific foods because of PFAS contamination. More information may be obtained from the Food and Drug Administration (https://www.fda.gov/food/process-contaminants-food/questions-and-answers-pfas-food).

Efforts by the California State Water Resources Control Board (State Water Board) to Address PFAS

9. Efforts to identify the sources of PFAS in California

Since 2019, the State Water Board, Division of Drinking Water (DDW) has been strategically planning and issuing statewide investigative orders to identify the occurrence of PFAS in areas of the highest potential impact to the environment and drinking water. These areas include industrial use of PFAS in fire-fighting foams, at certain industrial applications, and at those industries impacted secondarily by PFAS.

Based on statewide sampling efforts, PFAS has been mostly identified in areas of industrial use of firefighting foams containing PFAS at airports, bulk fuel terminals, refineries, and when PFAS-containing mist suppressants have been used as part of plating processes. However, PFAS has also been identified in landfills and at wastewater treatment plants, because they are receiving PFAS secondarily in waste streams.

10. State Water Board efforts to manage PFAS issues in drinking water

The DDW has issued several investigation orders (https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order) to public water systems requiring testing for PFAS. Most recently, General Order DW 2024-0002-DDW (2024 Order) has been issued to public water systems for monitoring PFAS in community public water systems serving disadvantaged and severely disadvantaged communities. The purpose of this monitoring is to understand PFAS impacts on drinking water in these communities.

California State Assembly Bill 756 (codified as Health and Safety Code section 116378) authorizes the State Water Board to more broadly order public water systems to monitor for PFAS and report their detections. Additional and more assessment might be required in the coming years.

In combination with investigating industrial sources, public water systems have been sampling wells in the vicinity of these areas per State Water Board General Order DW 2022-0001-DDW (https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/pfas_ddw_general_order/).

Additionally, the DDW has issued notification levels and response levels for four common PFAS compounds listed in Table 1. Additional notification and response levels could be issued in the future based on occurrence and recommendations from Office of Environmental Health Hazard Assessment (OEHHA) on the potential risks to human health.

Table 1. Four PFAS constituents with Notification and Response levels in nanograms per liter or parts per trillion.

PFAS Constituent	Notification Level (ng/L or ppt)	Response Level (ng/L or ppt)
Perfluorobutanesulfonic acid (PFBS)	500	5,000
Perfluorohexanesulfonic acid (PFHxS)	3	20
Perfluorooctanesulfonic acid (PFOS)	6.5	40
Perfluorooctanoic acid (PFOA)	5.1	10

11. Notification level and Response level

Notification levels are health-based advisory levels established by the DDW for chemicals in drinking water that lack maximum contaminant levels (MCLs). When chemicals are found at concentrations greater than their notification levels, certain requirements and recommendations apply. The law's notification requirements apply to:

- Wholesale water systems, who must notify their governing bodies and the water systems that are directly supplied with that drinking water.
- Retail water systems, who must notify their governing bodies and the governing bodies of any local agencies (i.e., city or county, or a city and county) whose jurisdictions include areas supplied with their drinking water.

- Wholesale and retail water systems regulated by the California Public Utilities Commission, who must also notify the commission.

Response level is the level at which DDW recommends removal of a drinking water source from service. When a confirmed detection exceeds the response level, a community water system or a nontransient noncommunity public water system is required to:

- Report that detection in the water system's annual consumer confidence report.
- Take a water source where detected levels exceed the response level out of use or provide public notification (as specified in Health and Safety §116378) within 30 days of the confirmed detection.

12. PFAS Notification level or Response level exceedance requirements

Currently, there are only four PFAS with notifications levels (refer to Table 1). Additional notification levels could be established for other PFAS as more data and information become available.

If the water system voluntary samples the well and performs the analytical testing and the results of a PFAS detection are confirmed to exceed its respective notification level, the water system must report the detection within 30 days after the water system is first informed by the laboratory of a confirmed detection of the contaminant that exceeds the notification level.

For the 2024 Order, if the results of a PFAS detection are confirmed to exceed its respective notification level, the State Water Board will already have been notified of the results since the State Water Board's contractor is performing the analytical testing. Therefore, the water system does not need to report the exceedance to the State Water Board.

If the results of a PFAS exceeds a response level, the water system must either (1) take the source out of service immediately; (2) utilize treatment or blending; or (3) provide public notification of the response level exceedance. Additionally, the exceedance of the response level must be reported in the annual consumer confidence report.

13. US EPA issuance of PFAS maximum contaminant levels (MCLs) for drinking water

US EPA published the final federal PFAS Rule establishing the Maximum Contaminants Levels (MCLs) as part of the National Primary Drinking Water Regulation (NPDWR) per Safe Drinking Water Act for regulating drinking water contaminants on April 26, 2024. These levels are set using health-protective standards for the specific PFAS in drinking water, feasibility of laboratory analysis and treatment, and an analysis of the costs and benefits. Water systems must comply with monitoring and related reporting and public notification requirements. Water systems must also follow the MCLs and provide public notification to consumers if the MCLs are violated. Table 2 presents the MCLs. For more information, visit EPA's website at https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas.

Table 2. PFAS constituents with EPA MCLs in nanograms per liter or parts per trillion.

Compound	EPA MCL
PFOA	4.0 ppt
PFOS	4.0 ppt
PFHxS	10 ppt
PFNA	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index*

*USEPA established MCLs for PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS using a Hazard Index MCL to account for the combined and co-occurring levels of these PFAS in drinking water. For more details about Hazard Index refer to the EPA's factsheet at: https://www.epa.gov/system/files/documents/2024-04/pfas-npdwr_fact-sheet_hazard-index_4.8.24.pdf

14. US EPA PFAS MCLs impact on California public water systems compliance

In the final federal PFAS rule establishing MCLs for PFOA, PFOS, PFNA, PFHxS, PFBS, and HFPO-DA (Table 2), the initial monitoring period was set to 3 years (2027) and the compliance period was set to 5 years (2029) after the final rule is promulgated (April 26, 2024).

The DDW must evaluate whether the US EPA MCLs are protective of public health based on the uses of drinking water in California. If DDW is to set their own MCLs they must be equal to or more restrictive than the MCLs set by US EPA. California Health & Safety Code §116365(a) requires a contaminant's MCL

to be established at a level as close to its Public Health Goal (PHG) as is technologically and economically feasible, placing primary emphasis on the protection of public health. PHGs are established by the Office of Environmental Health Hazard Assessment (OEHHA) and then adopted by the DDW.