EPA
United States
Environmental Protection
Agency

Per- and Polyfluoroalkyl Substances Hazard Index: A Quick Reference Guide

Overview

Rule Title	Per- and Polyfluoroalkyl Substances (PFAS) National Primary Drinking Water Regulation (NPDWR), 89 FR 32532, April 26, 2024, Vol. 89, No. 82
Focus of This Guide	This document provides an overview of the requirements in the PFAS Rule to use a Hazard Index for mixtures of at least two of the following four PFAS: perfluorobutane sulfonic acid (PFBS), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and hexafluoropropylene oxide dimer acid (HFPO-DA or GenX Chemicals).
Utilities Covered	The PFAS Rule applies to all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs), hereafter referred to collectively as water systems.
About the Hazard Index	▶ A Hazard Index helps to account for the increased health risk from mixtures of certain PFAS that may be found in contaminated drinking water. ▶ A Hazard Index is a long-established approach the EPA regularly uses to determine the health concerns associated with exposure to chemical mixtures.
Key Milestones	April 26, 2027: Initial monitoring ends and compliance monitoring begins. The Hazard Index must be calculated for each sampling date, at each entry point, to determine monitoring frequency. April 26, 2029: Deadline for Maximum Contaminant Level (MCL) compliance. Calculation of the Hazard Index to determine NPDWR compliance begins.
Code of Federal Regulations (CFR) Citations	See the following sections in Title 40, Part 141 of the CFR: ▶ For PFAS regulations, see Subpart Z. ▶ For MCLs, see 40 CFR 141.61(c)(2). ▶ For Maximum Contaminant Level Goals (MCLGs), see 40 CFR 141.50. ▶ For compliance dates, see 40 CFR 141.6(l) and 40 CFR 141.900(b).

Key Terms

Hazard Index	The sum of component hazard quotients (HQs), which are calculated by dividing the measured regulated PFAS component concentration in water (e.g., expressed as parts per trillion (ppt) or nanograms per liter (ng/L)) by the associated Health-Based Water Concentration (HBWC) expressed in the same units as the measured concentration (e.g., ppt or ng/L). For PFAS, a mixture Hazard Index greater than 1 (unitless) is an exceedance of the MCL (40 CFR 141.2).
Hazard Quotient	The ratio of the measured concentration in drinking water to the HBWC (40 CFR 141.2).
Health-Based Water Concentration	The level below which there are no known or anticipated adverse health effects over a lifetime of exposure, including sensitive populations and life stages, and allows for an adequate margin of safety (40 CFR 141.2).
Practical Quantitation Level (PQL)	The lowest level at which a contaminant can be reliably quantified within specific limits of precision and accuracy during routine laboratory operating conditions using the approved methods (89 FR 32573).
Trigger Level	The trigger levels are used to determine an appropriate monitoring frequency and are set at one-half of the MCLs for regulated PFAS, including the Hazard Index MCL for mixtures of PFHxS, HFPO-DA, PFNA, and PFBS (see 40 CFR 141.902(a)(5)).

Hazard Index MCL, MCLG, and Trigger Level[1]

The Hazard Index from a sampling event, as calculated based on the information below, is compared to the following values to support determining the appropriate monitoring frequency and MCL compliance.

Contaminant	MCLG	MCL	Trigger Level[2]
Mixture of two or more of: HFPO-DA, PFBS, PFNA, and PFHxS	Hazard Index of 1 (unitless)	Hazard Index of 1 (unitless)[3]	Hazard Index of 0.5 (unitless)

1. MCLs are listed in 40 CFR 141.61(c). MCLGs are listed in 40 CFR 141.50. Trigger levels are listed in 40 CFR 141.902(a)(5).
2. A Hazard Index less than the trigger level may allow for eligibility for reduced monitoring.
3. A Hazard Index equal to or less than the MCL does not exceed the Hazard Index MCL.

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Hazard Index Calculation

The Hazard Index calculation uses the concentrations reported of HFPO-DA, PFBS, PFNA, and PFHxS. For each, a HQ is determined by dividing the measured concentration of the contaminant by its HBWC. The Hazard Index for a sampling date is the sum of all the HQ values for each PFAS.

HBWC for each of the applicable contaminants:

Contaminant	HBWC (ppt*)
HFPO-DA	10
PFBS	2,000
PFNA	10
PFHxS	10

*Parts per trillion (ppt); also expressed as nanograms/liter (ng/L)

The Hazard Index calculation can be expressed as:

$$\text{Hazard Index (unitless)} = \left(\frac{HFPO\text{–}DA_{water}\ ppt}{10\ ppt} \right) + \left(\frac{PFBS_{water}\ ppt}{2000\ ppt} \right) + \left(\frac{PFNA_{water}\ ppt}{10\ ppt} \right) + \left(\frac{PFHxS_{water}\ ppt}{10\ ppt} \right)$$

Significant figure rounding:

► The Hazard Index MCL and MCLG each have one significant digit, and results to which they are compared are rounded based on the digit that follows the last significant digit.

► Rounding only occurs at the end of the overall calculation (i.e., sample results within the Hazard Index should not be rounded, and if calculating MCL compliance quarterly Hazard Index values should not be rounded until calculating the running annual average (RAA) Hazard Index value).

► Example: A Hazard Index value of 1.81 would be rounded to 2. A Hazard Index value of 0.92 would be rounded to 0.9.

Hazard Index PFAS PQLs (40 CFR 141.903(f)(1)(iv))

Contaminant	PQL (ppt)
HFPO-DA	5.0
PFBS	3.0
PFNA	4.0
PFHxS	3.0

► For monitoring frequency determination, all sample results, including those less than the PQL, are to be used.

► Sample results less than the PQL should be replaced with zero when calculating compliance with the MCL (see below).

► All PQLs have two significant figures.

Monitoring and Compliance Requirements

Calculating the RAA for Hazard Index MCL to determine compliance and violations.

Hazard Index MCL Violation

► The Hazard Index RAA is greater than 1 and two or more of the PFAS compounds included in the Hazard Index calculation are at or above their respective PQLs in at least one quarter's sample result.

  ► If only one PFAS is present in all quarters (even if it is a different PFAS in each quarter) and the Hazard Index MCL is exceeded, only an individual PFAS MCL violation may be assessed (unless it is PFBS, in which case no MCL violations will apply). (See 40 CFR 141.903(f)(2)(i))

► For purposes of all MCL compliance calculations, and specifically for the Hazard Index (see 40 CFR 141.903(f)(2)(iv)), if a sample result is less than the PQL for a regulated PFAS, zero is to be used for that analyte solely to calculate the RAA for MCL compliance.

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Requirements for determining compliance monitoring frequency (40 CFR 141.902(a)):

► To determine compliance monitoring frequency, each water system must ensure that all results provided by a laboratory are reported to the primacy agency (a State, territory, Tribe, or EPA Region with oversight responsibilities for the NPDWR).

    ► For monitoring frequency determination, all sample results, use all values, including values below the PQLs; zero must not be used in place of reported values.

    ► The compliance monitoring frequency is determined by comparison of the sample results to the trigger levels and the MCLs.

At the start of compliance monitoring (40 CFR 141.902(b)(2)):

► If all initial monitoring results at a sample location are below all trigger levels, the water system could qualify for reduced triennial monitoring at the sample location.

► If any sample result meets or exceeds a trigger level during initial monitoring, the water system must conduct quarterly sampling for all regulated PFAS at that sample location.

During compliance monitoring (40 CFR 141.903(f)(2)):

► If a sample location on quarterly monitoring has four consecutive quarters with all sample results below all MCLs, the system could be deemed reliably and consistently below the MCL to qualify for annual monitoring at the sample location.

► If during annual monitoring all sample results are below all trigger levels for three consecutive years, the system could qualify for triennial monitoring at the sample location.

► If at any time a triennial sampling result is greater than or equal to a trigger level, or an annual sampling result is greater than or equal to an MCL, the water system is required to conduct quarterly sampling for all regulated PFAS at the sample location.

Example Calculation 1: Determining Compliance with Hazard Index MCL for Mixtures of HFPO-DA, PFBS, PFNA, and PFHxS

► If the quarterly sample results at a sample location are 3.4 for HFPO-DA, 20.0 for PFBS, 4.1 for PFNA, and 2.1 ppt for PFHxS, the water system would first determine the Hazard Index value for that quarter, which is 0.42.

$$\left(\frac{0\ ppt}{10\ ppt} \right) + \left(\frac{20\ ppt}{2{,}000\ ppt} \right) + \left(\frac{4.1\ ppt}{10\ ppt} \right) + \left(\frac{0\ ppt}{10\ ppt} \right) = 0.42$$

► To then calculate the RAA Hazard Index MCL, if the preceding three quarters had unrounded Hazard Index values of 0.76, 1.10, and 0.53 at the same sample location, the resulting RAA Hazard Index MCL would be 0.7 after rounding to one significant figure at the end of the calculation.

$$\left(\frac{0.76 + 1.10 + 0.53 + 0.42}{4} \right) = 0.7025$$

► Consequently, this system has not violated the Hazard Index MCL.

Example Calculation 2: Determining Compliance with Hazard Index MCL for Mixtures of HFPO-DA, PFBS, PFNA, and PFHxS

► If the quarterly sample results at a sample location are 5.5 for HFPO-DA, 20 for PFBS, 4.1 for PFNA, and 4.2 ppt for PFHxS, the water system would first determine the Hazard Index value for that quarter, which is 1.39.

$$\left(\frac{5.5\ ppt}{10\ ppt} \right) + \left(\frac{20\ ppt}{2{,}000\ ppt} \right) + \left(\frac{4.1\ ppt}{10\ ppt} \right) + \left(\frac{4.2\ ppt}{10\ ppt} \right) = 1.39$$

► To then calculate the RAA Hazard Index MCL, if the preceding three quarters had unrounded Hazard Index values of 1.72, 1.35, and 0.89 at the same sample location:

$$\left(\frac{1.72 + 1.35 + 0.89 + 1.39}{4} \right) = 1.3375$$

► The resulting RAA Hazard Index MCL would be 1 after rounding to one significant figure at the end of the calculation. Consequently, this system has not violated the Hazard Index MCL.

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Example Calculation 3: Determining Hazard Index Monitoring Frequency for Mixtures of HFPO-DA, PFBS, PFNA, and PFHxS

► If the quarterly sample results at a sample location are not detected for HFPO-DA, 20.0 for PFBS, 4.1 for PFNA, and not detected for PFHxS, the water system calculates the Hazard Index value for the quarter, which is 0.42.

$$\left(\frac{0 \ ppt}{10 \ ppt} \right) + \left(\frac{20 \ ppt}{2{,}000 \ ppt} \right) + \left(\frac{4.1 \ ppt}{10 \ ppt} \right) + \left(\frac{0 \ ppt}{10 \ ppt} \right) = 0.42$$

► Considering significant figure rounding, this result is 0.4 (unitless).

At the start of compliance monitoring:

► The above data (Example Calculation 3) are collected during Q4 of initial monitoring.
► If the three previous quarterly Hazard Index values based on initial monitoring data at the sample location are also below the trigger level, the water system could be eligible for reduced triennial monitoring at the sample location, depending on the initial monitoring results for the other regulated PFAS (e.g., PFOA and PFOS).

During compliance monitoring:

► The above data (Example Calculation 3) are from a quarterly compliance monitoring sample set. The sample location could be a candidate for being deemed reliably and consistently below the MCL.
► The primacy agency may allow for reduced annual monitoring provided the other three most recent quarterly results are all below the Hazard Index MCL and the MCLs for the other regulated PFAS.

For additional information on the PFAS Rule

► For ease of use, the EPA is developing a technical assistance tool to provide water systems with a web-based form that will automatically calculate the Hazard Index and provide detailed information on the Hazard Index calculation; see [Forthcoming].
► For a guide to PFAS Rule significant figures and rounding requirements, see https://www.epa.gov/system/files/documents/2024-12/pfas-sigfigs-rounding-dec24.pdf.
► For additional information, please visit the EPA PFAS NPDWR Implementation Web site at https://www.epa.gov/dwreginfo/pfas-rule-implementation or contact your drinking water primacy agency.

Note: The statutory provisions and the EPA regulations described in this document contain legally binding requirements. This document is not a regulation itself, nor does it change or substitute for those provisions and regulations. The examples included in this document are intended for informational purposes only.