



April 12, 2023

Health Canada
Water and Air Quality Bureau, Health Canada
269 Laurier Avenue West, A.L. 4903D
Ottawa, ON K1A 0K9

RE: Draft objective for per- and polyfluoroalkyl substances in Canadian drinking water

The Natural Resources Defense Council (NRDC) appreciates the opportunity to respond to the Water and Air Quality Bureau of Health Canada's consultation on the Draft objective for per- and polyfluoroalkyl substances (PFAS) in Canadian drinking water.

Evidence supports a group based approach to regulating PFAS in drinking water.

Regulating individual PFAS chemicals in drinking water is inefficient and denies much needed health protections to exposed communities. PFAS, which are used in industrial and consumer products, are a class of thousands of chemicals.¹ Because of their widespread and continued use, PFAS are ubiquitous in the environment, including in ground, surface, and drinking water. The carbon-fluorine bond in PFAS makes them resistant to breakdown in our bodies and in the environment and is a sufficient concern for regulating all PFAS as a class.² It is currently unknown how many unique PFAS may occur in drinking water, as targeted analyses only capture a fraction of the total organofluorine present.³ To date, however, the US EPA has only validated methods to quantify 29 PFAS in drinking water,⁴ and a sensitive method to determine total organofluorine in drinking water is not currently available.

¹ US EPA, "CompTox Chemicals Dashboard - Navigation Panel to PFAS Structure Lists," August 18, 2022, <https://comptox.epa.gov/dashboard/chemical-lists/pfasstruct>.

² Ian T. Cousins et al., "The High Persistence of PFAS Is Sufficient for Their Management as a Chemical Class," *Environmental Science: Processes & Impacts* 22, no. 12 (December 16, 2020): 2307–12, <https://doi.org/10.1039/D0EM00355G>; Simona Andreea Bălan et al., "Regulating PFAS as a Chemical Class under the California Safer Consumer Products Program," *Environmental Health Perspectives* 129, no. 2 (2021): 025001, <https://doi.org/10.1289/EHP7431>.

³ Tom Perkins, "Revealed: US Water Likely Contains More 'Forever Chemicals' than EPA Tests Show," *The Guardian*, July 6, 2022, sec. US news, <https://www.theguardian.com/us-news/2022/jul/06/us-drinking-water-pfas-toxic-forever-chemicals-epa-tests>; Katherine E. Pelch, Taryn McKnight, and Anna Reade, "70 Analyte PFAS Test Method Highlights Need for Expanded Testing of PFAS in Drinking Water," *Science of the Total Environment*, April 12, 2023, <https://doi.org/10.1016/j.scitotenv.2023.162978>.

⁴ US EPA, "Method 533: Determination of Per- and Polyfluoroalkyl Substances in Drinking Water by Isotope Dilution Anion Exchange Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry," Data and Tools, December 18, 2019, <https://www.epa.gov/dwanalyticalmethods/method->

We agree with Health Canada that a “precautionary group-based approach to PFAS is warranted” and commend Health Canada for proposing a limit on a large grouping of measurable PFAS. Although this is an important first step in regulating PFAS as a class, and will result in significantly more health protections than Health Canada’s previous PFAS limits,⁵ it is still likely to leave communities with substantial levels of PFAS in their drinking water unprotected.

In order to better protect the health of Canadians from the harmful threat of PFAS exposure, we recommend that Health Canada:

- 1) lower the total objective value to no greater than 20 ng/L;
- 2) require the grouping of as many measurable PFAS as possible, ideally the 70 PFAS detectable using a commercially available modern method, or at the very least those currently measurable by **both** US EPA methods 537.1 and 533;
- 3) Include additional health based limits on well studied individual PFAS (for example PFOA, PFOS, PFNA, PFHxS, and GenX).

The rationale and supporting information for each of these recommendations is elaborated below. We also present the impact of each of these recommendations on a real-world data set that we recently published and have summarized below. Given the limited monitoring of PFAS in Canada to-date, it is unclear how our dataset, collected in the US, compares to specific locations in Canada. However, there is likely to be some similarities as communities that were included in our study were chosen due to proximity to known discharges of firefighting foam, industrial activity, landfills or waste treatment facilities or known spreading of PFAS contaminated biosolids, all of which may also impact drinking water in Canada.

Overview of new drinking water dataset to provide context for recommendations of draft objective limit.

In collaboration with Eurofins Environment Testing and impacted community partners, we conducted a survey of PFAS in drinking water samples from 44 locations in 16 US states.⁶ The

[533-determination-and-polyfluoroalkyl-substances-drinking-water-isotope](#); US EPA, “Method 537.1: Determination of Selected Per- and Polyfluorinated Alkyl Substances in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS),” 2018, https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=343042&Lab=NERL.

⁵ Health Canada, “Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Perfluorooctanoic Acid (PFOA),” Guideline Technical Document, December 7, 2018, <https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-technical-document-perfluorooctanoic-acid/document.html>; Health Canada, “Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Perfluorooctane Sulfonate (PFOS),” Guideline Technical Document, December 7, 2018, <https://www.canada.ca/en/health-canada/services/publications/healthy-living/guidelines-canadian-drinking-water-quality-guideline-technical-document-perfluorooctane-sulfonate/document.html>; Health Canada, “Health Canada’s Drinking Water Screening Values for Perfluoroalkylated Substances (PFAS),” February 2016.

⁶ Pelch et. al., “70 Analyte PFAS Test Method Highlights Need for Expanded Testing of PFAS in Drinking Water.”

goal of the study was to evaluate the utility of an expanded analyte test from Eurofins that allowed for the quantification of 70 PFAS versus the 29 PFAS that are currently measurable by US EPA methods 537.1 and 533. In this study, we detected 12 PFAS that were not covered by US EPA methods leading us to conclude that the currently available US EPA methods underestimate the PFAS burden in some communities. This study provides a dataset in which we can demonstrate the importance of each of our three recommendations on the draft objective. Figure 1 highlights that only five of the samples in our dataset would exceed the draft objective as it is currently written (noted by dark blue stars), even though other communities have high burdens of PFAS contamination.

FIGURE 1. HEALTH CANADA'S DRAFT OBJECTIVE WILL LEAVE COMMUNITIES UNPROTECTED

Using a commercial test for 70 PFAS, NRDC detected one or more PFAS in 30 out of 44 samples of drinking water. Fifteen of the samples have >30 ng/L (denoted by the gray dashed line), yet only six samples would exceed Health Canada's Draft Objective Limit for 18 PFAS (denoted by dark blue stars).

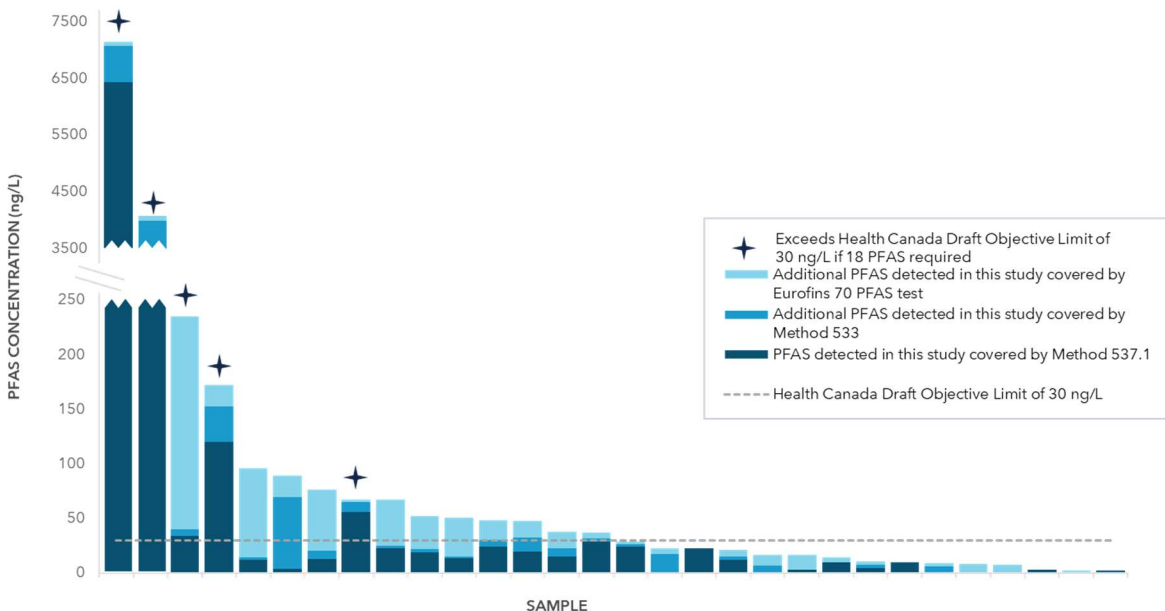


Figure adapted from Pelch, McKnight, Reade (2023) Science of the Total Environment.

To protect as many people as possible, the objective value for the total concentration of PFAS in drinking water should not be greater than 20 ng/L.

Health Canada acknowledged the potential for negative health impacts from exposure to multiple PFAS in developing the rationale for the draft objective. However the proposed draft objective limit of 30 ng/L is not health protective. A stricter limit is feasible and warranted, and we urge Health Canada to lower this limit to no greater than 20 ng/L.

A lower objective limit is technologically feasible, and therefore the risk to public health from PFAS can be lowered. Health Canada states that “Despite the approach not being health-based, the toxicity data are generally supportive of the proposed objective.” However, the vast

majority of recent risk assessments for PFAS have been in the low single digit ng/L range or stricter (i.e. 10 ng/L or less), suggesting that the drinking water objective should be below 30 ng/L.⁷ For example, the US EPA’s hazard index of 1 that includes individual toxicity values of 9 and 10 support an objective limit lower than 30 ng/L. We agree with the statement in the support document, “The lower the levels of PFAS, the lower the risk to public health.”

Health Canada’s draft objective limit of 30 ng/L is based on:

- “published treatment data with a focus on the median removal efficacy of the reported PFAS for a variety of water qualities at both pilot- and full-scale treatment operations (Sanexen, 2022);
- the concentration of PFAS consistently achieved at pilot- and full-scale for each of GAC, AIX and RO treatment technologies with influent concentrations similar to those found in Canadian waters;
- reporting levels for PFAS for which a validated and recognized analytical method is available (U.S. EPA, 2019, 2020);
- Canadian monitoring data (MELCC, 2022; Kleywegt et al., 2020; Lalonde and Garron, 2022; Kaboré et al., 2018; Saskatchewan Water Security Agency, 2022);
- and the lowest concentrations that are technically achievable for a larger number of quantifiable PFAS to reduce potential exposure to PFAS in drinking water.”

Not only can levels of PFAS <30 ng/L be accurately and precisely measured with existing methods, but Health Canada has also indicated that these limits are technologically achievable in drinking water. Appendix A lists the detection limits and minimum reporting levels for PFAS covered by US EPA Methods 537.1 and 533. With the exception of NFDHA (CASRN 151772-58-6) at 20 ng/L, the limits are all 8 ng/L or less. This supports the feasibility and practicality of setting a drinking water objective at 20 ng/L. To our knowledge, NFDHA (the PFAS with the

⁷ In September 2022, the Drinking Water Work Group of the World Health Organization (WHO) released a draft background document on the development of WHO guidelines for drinking water quality for PFOA and PFOS, in which a combined limit of 100 ng/L for the two chemicals was proposed. However, we and other experts find this proposal to be scientifically unsupported and dangerous. In short, the WHO proposal dangerously mischaracterizes the extent of scientific evidence of health impacts associated with exposure to PFOA and PFOS, ignores contemporary risk assessments from authoritative bodies and makes the unsupported claim that the “uncertainties in identifying the key endpoint applicable to human health following exposure to PFOS and/or PFOA are too significant to derive a [health based guidance value] with confidence.” WHO also mischaracterized the evidence that currently available treatment technologies are capable of reducing PFAS in drinking water to low (single digit ng/L) levels, below the 100 ng/L proposed.

See: Pelch, Katie. “WHO’s PFAS Guidance May Increase Global Health Inequities.” *NRDC* (blog), December 12, 2022. <https://www.nrdc.org/experts/katie-pelch/whos-pfas-guidance-may-increase-global-health-inequities>; Environmental Working Group. “Flawed WHO Report on ‘Forever Chemicals’ Fails Human Health, EWG Scientists Find,” October 7, 2022. <https://www.ewg.org/news-insights/news/2022/10/flawed-who-report-forever-chemicals-fails-human-health-ewg-scientists>; Green Science Policy Institute. “RE: Scientists Letter: The World Health Organization Should Significantly Revise or Withdraw Its Draft PFAS Drinking Water Guideline,” November 10, 2022. <https://greensciencepolicy.org/docs/General/pfas-scientists-letter-to-who-20221110.pdf>.

highest minimum reporting limit) has not yet been widely detected in drinking water. Further, there is precedent for setting a combined standard for several PFAS at 20 ng/L. The US states of Massachusetts and Vermont have enforceable drinking water limits of 20 ng/L for a combination of 5 and 6 PFAS, respectively. Likewise, the state of Connecticut has an action limit of 20 ng/L for a combination of 5 PFAS.

Using the dataset from our recently published paper, we show in Figure 2 that a limit of 30 ng/L for the 18 PFAS measured with Method 537.1 would leave many communities with PFAS in their drinking water at significant risk. Only 5 samples in our study would exceed the draft objective of 30 ng/L based on the PFAS measured by Method 537.1 (noted with dark blue stars in Figures 1 and 2). However, if the limit were lowered to 20 ng/L an additional 5 samples with high levels of PFAS would be in exceedance (noted with gray stars in Figure 2), and would therefore be eligible for drinking water protections.

FIGURE 2. A COMBINED LIMIT FOR 18 OR MORE PFAS SHOULD NOT EXCEED 20 ng/L

Using a commercial test for 70 PFAS, NRDC detected one or more PFAS in 30 out of 44 samples of drinking water. The gray dashed line indicates Health Canada's Draft Objective limit of 30 ng/L. The yellow dashed line indicates our recommended maximum limit of 20 ng/L. When the limit is lowered to 20 ng/L, five additional samples are in exceedance (as indicated by the gray stars).

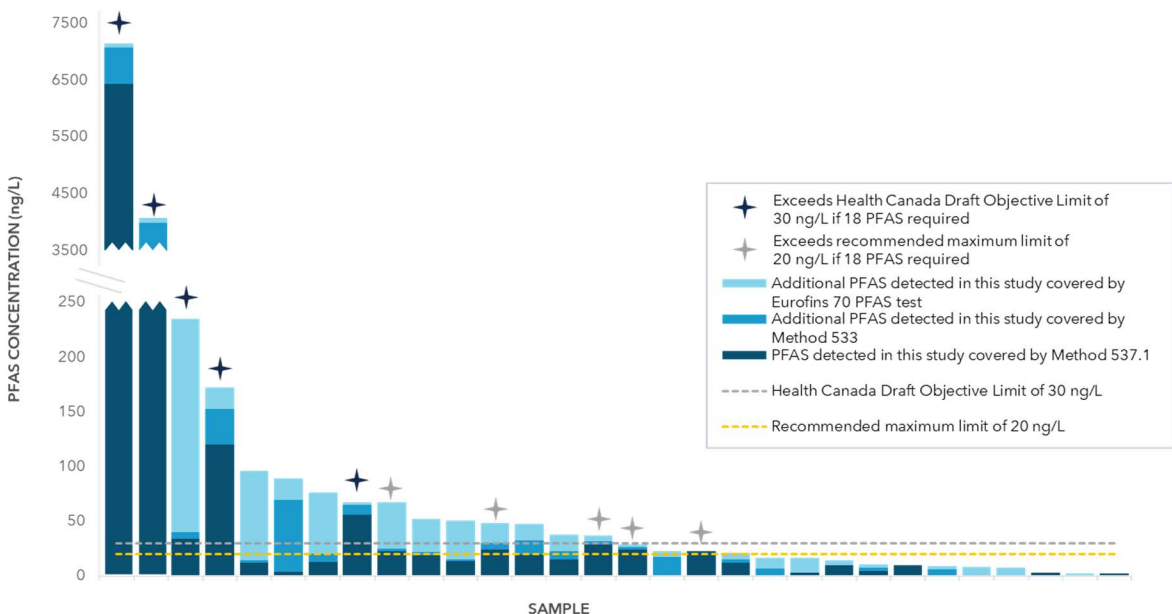


Figure adapted from Pelch, McKnight, Reade (2023) Science of the Total Environment.

The objective should require the measurement of 70 PFAS detectable by a commercially available modern method, but at a minimum should include at least the 29 PFAS covered by US EPA Methods 537.1 and 533 to protect more communities.

To increase health protections, a group based approach should include the 70 PFAS detectable using the commercially available method, or at an absolute minimum should include all PFAS that are currently quantifiable using current US EPA Methods. US EPA Method 537.1 covers 18

PFAS and Method 533 covers 25 PFAS, including newer, commercially relevant PFAS such as GenX and other GenX-related chemicals. When both tests are used, a total of 29 PFAS can be quantified. Additionally, as noted, there are now commercially available tests that can quantify 70 or more individual PFAS.⁸ Using the 70 PFAS test from Eurofins, we found 12 PFAS in the drinking water that are not currently covered by US EPA Methods 537.1 or 533.⁹ We recommend that Health Canada require the use of test methods that have the greatest coverage of PFAS. Specifically, we recommend (in order of preference) that Health Canada require:

- The use of a commercial test that quantifies 70 or more PFAS; or
- The use of both US EPA Methods 537.1 and 533 to quantify 29 PFAS; or
- The use of US EPA Method 533 over 537.1 to quantify 25 PFAS.

If it is not possible to require water providers to use methods that have not yet been validated by a national government and only one test method is to be required, then our analysis supports a transition away from US EPA Method 537.1 in favor of US EPA Method 533. Specifically, in our study we did not detect the four PFAS that are measured in US EPA Method 537.1 but not measured in US EPA Method 533 (NEtFOSAA, NMeFOSAA, PFTeA, and PFTrDA). This finding is consistent with those from the state of California where these four PFAS are infrequently detected.¹⁰

In the rationale for the draft objective, Health Canada states that “Total PFAS should be calculated using the full list of substances in EPA Method 533 or EPA Method 537.1 (or both),” which suggests utility in measuring more PFAS, but the guidance ultimately falls short of requiring all quantifiable PFAS to be measured. By stating that a method “that measures a minimum of 18 PFAS” is acceptable, the draft objective allows water providers to choose to use a test method that has been shown to underestimate the presence of PFAS in drinking water. Water providers should not be able to choose to use a less protective test when a better, more comprehensive, option is available and at a comparable cost.

The US EPA is currently requiring the use of **both** US EPA Method 537.1 and 533 for the ongoing fifth Unregulated Contaminant Monitoring Rule, a national drinking water monitoring program that covers all drinking water systems serving between 3,300 and 10,000 people.¹¹ The cost to water providers to conduct both tests is minimal (~\$800 USD) compared to the health

⁸ Eurofins Environment Testing, “PFAS Analyte List,” July 1, 2021, <https://www.eurofinsus.com/environment-testing/pfas-testing/pfas-analyte-lists/>; Enthalpy Analytical, “PFAS,” accessed April 9, 2023, <https://enthalpy.com/pfas/>.

Of note, many other commercial labs cover at least 40 PFAS, including many that are participating in the US national monitoring program (UCMR5).

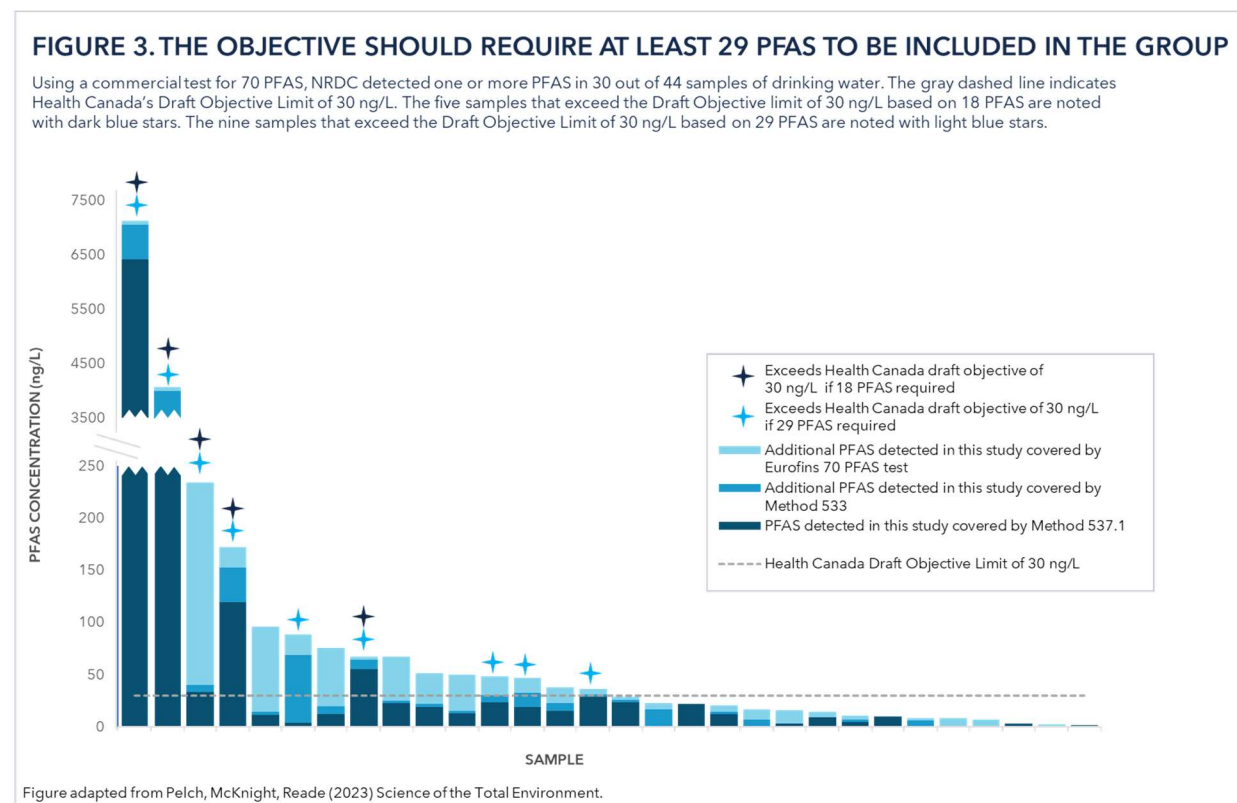
⁹ Pelch et. al., “70 Analyte PFAS Test Method Highlights Need for Expanded Testing of PFAS in Drinking Water.”

¹⁰ California Water Board, “GeoTracker PFAS Map,” 2022, https://geotracker.waterboards.ca.gov/map/pfas_map.

¹¹ US EPA, “Fifth Unregulated Contaminant Monitoring Rule,” January 11, 2021, <https://www.epa.gov/dwucmr/fifth-unregulated-contaminant-monitoring-rule>.

benefits that are afforded when PFAS contamination is removed from drinking water. Health Canada should also take this approach in order to more fully create a “precautionary group-based approach” to PFAS that are known to contaminate drinking water.

Using the dataset from our recently published paper, we show in Figure 3 that a limit of 30 ng/L for the 18 PFAS measured with Method 537.1 would leave many communities with PFAS in their drinking water at significant risk. Only 5 samples in our study would exceed the draft objective of 30 ng/L based on the 18 PFAS measured by Method 537.1 (noted with dark blue stars in Figure 3). However, if the objective required all 29 PFAS covered by US EPA Methods 537.1 and 533 to be included in the group, then an additional 4 samples with concerning levels of PFAS would be in exceedance (noted with light blue stars in Figure 3), and would therefore be eligible for drinking water protections. If combined with the recommendation to lower the limit to 20 ng/L, 15 of the samples in our data set would be in exceedance (Figure 4).



To better protect more impacted communities, Health Canada should supplement the group-based total concentration limits with health-based limits for well-studied individual PFAS.

Even a group based approach for 29 PFAS set at 20 ng/L leaves open the possibility of communities drinking water at unsafe levels of well known, highly toxic PFAS. For example, if a water system has 15 ng/L of just PFOA it is well established that this level is unsafe, yet the

community would not be eligible for water treatment. The addition of health-based limits for individual well-studied PFAS would ensure these communities are still protected.

As the PFAS health effects evidence grows, health-based guidance and regulatory values for PFAS have continued to fall precipitously.¹² In 2016 US EPA set lifetime health advisories for PFOA and PFOS at 70 ng/L.¹³ However, more recently in March 2023, the US EPA proposed health-based maximum contaminant level goals (MCLGs) for PFOA and PFOS of 0 ng/L based on a determination that PFOA and PFOS are “likely” carcinogenic to humans.¹⁴ Concurrently, US EPA proposed enforceable maximum contaminant levels (MCL) for PFOA and PFOS of 4 ng/L, each, as well as a combined MCL for PFBS, HFPO-DA (GenX), PFNA, and PFHxS based on a hazard index (HI) of 1 (unitless), with toxicity values of 2,000, 10, 10, and 9 ng/L, respectively. US EPA’s proposed MCLs consider the evidence of health impacts associated with PFAS exposure as well as the technological feasibility of measuring and treating PFAS to these levels.

Using the dataset from our recently published paper, we show in Figure 4 that 15 of the samples exceed the MCLs for 6 PFAS proposed by the US EPA (noted with orange stars in Figure 4). In comparison, a similar but unique set of 15 of the samples would exceed a drinking water objective of 20 ng/L for 29 PFAS (noted with yellow stars in Figure 4) that we have recommended in these comments. Of interest, there are six samples in our dataset that have high levels of PFAS (> 20 ng/L) but that do not exceed US EPA’s proposed MCLs because they do not have >4 ng/L PFOA or PFOS and/or do not exceed the combined hazard index of 1 for PFNA, PFHxS, PFBS and GenX. However, four of these samples would be in exceedance of a drinking water objective set at 20 ng/L for 29 PFAS as we have recommended here (those samples marked only with yellow stars). In addition, there are four samples that have > 4 ng/L PFOA or PFOS but < 20 ng/L of the 29 PFAS covered by US EPA Methods 537.1 and 533 (those samples marked only with orange stars). These samples are in exceedance of the US EPA’s proposed MCLs but are not in exceedance of the recommendations we have thus far provided on the draft objective.

This analysis therefore highlights the importance of having 1) a total objective value of no more than 20 ng/L; 2) based on the requirement to group as many measurable PFAS as possible; and 3) additional health-based limits for well-studied individual PFAS like PFOA and PFOS. If all three recommendations were to be enacted, 19 of the communities with samples with higher

¹² Alissa Cordner et al., “Guideline Levels for PFOA and PFOS in Drinking Water: The Role of Scientific Uncertainty, Risk Assessment Decisions, and Social Factors,” *Journal of Exposure Science & Environmental Epidemiology* 29, no. 2 (2019): 157–71, <https://doi.org/10.1038/s41370-018-0099-9>.

¹³ US EPA, “Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA),” May 2016, https://www.epa.gov/sites/production/files/2016-05/documents/pfoa_health_advisory_final-plain.pdf; US EPA, “Drinking Water Health Advisory for Perfluorooctanesulfonate (PFOS),” EPA 822-R-16-004, May 2016, https://www.epa.gov/sites/production/files/2016-05/documents/pfos_health_advisory_final-plain.pdf.

¹⁴ US EPA. “PFAS National Primary Drinking Water Regulation Rulemaking.” 3/29/23. *Federal Register*. Accessed March 29, 2023. <https://www.federalregister.gov/documents/2023/03/29/2023-05471/pfas-national-primary-drinking-water-regulation-rulemaking>.

levels of PFAS in our data set would clean up their water, thus highlighting that a multi-pronged approach would be a more health protective strategy for addressing PFAS in drinking water than has currently been proposed by Health Canada.

FIGURE 4. THE OBJECTIVE SHOULD INCLUDE HEALTH BASED LIMITS FOR WELL STUDIED PFAS

Using a commercial test for 70 PFAS, NRDC detected one or more PFAS in 30 out of 44 samples of drinking water. The yellow dashed line indicates our recommended maximum limit of 20 ng/L. The 15 samples that exceed the US EPA proposed MCLs are noted with orange stars. The 15 samples that would exceed our recommended maximum limit of 20 ng/L for 29 PFAS are noted with yellow stars.

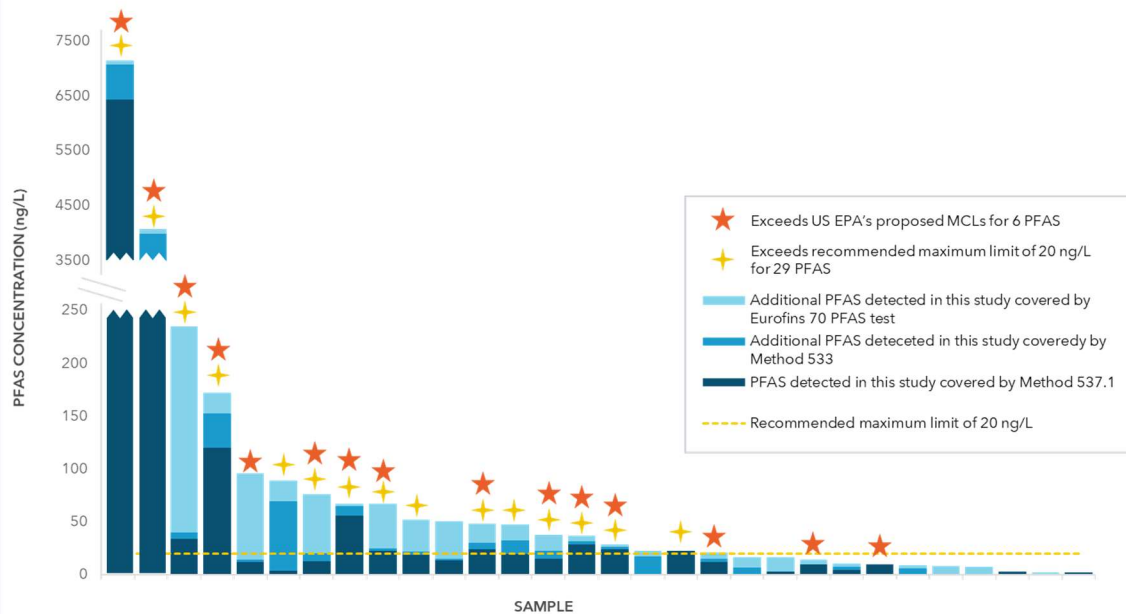


Figure adapted from Pelch, McKnight, Reade (2023) Science of the Total Environment.

In conclusion, we have used a dataset from a recent drinking water sampling project to demonstrate that Health Canada’s draft objective for PFAS is likely to leave communities with concerning levels of PFAS in their drinking water unprotected. We suggest that the limit be lowered to 20 ng/L, require the inclusion of 70 PFAS currently detectable using a commercially available method, or at a minimum 29 or more PFAS detectable using US EPA’s methods, and also incorporate health-based limits for well-studied individual PFAS such as PFOA, PFOS, PFNA, PFHxS, and GenX.

Sincerely,

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