Environment and Climate Change Canada
Environnement et Changement climatique Canada

Proposed Addition of Certain Per- and Polyfluoroalkyl Substances (PFAS) to the National Pollutant Release Inventory

Consultation document

September 2024

Canada

Executive summary

The National Pollutant Release Inventory (NPRI) is Canada's legislated, publicly accessible inventory of pollutant releases (to air, water, and land), disposals and transfers for recycling. It supports a wide number of environmental initiatives, including pollution prevention and abatement. A Multi-Stakeholder Work Group advises Environment Climate Change Canada (ECCC) on proposed changes to reporting requirements and other issues related to the NPRI. Per- and polyfluoroalkyl substances (PFAS) were identified as a priority for consideration for addition to the NPRI by environmental non-government representatives.

Per- and polyfluoroalkyl substances (PFAS) are a class of thousands of human-made substances. Some typical uses of PFAS include as surfactants, lubricants, and repellents (for dirt, water, and grease). PFAS can also be found in certain firefighting foams, food packaging, drugs, cosmetics, sunscreens, pesticides, textiles (for example, carpets, furniture, and clothing), non-stick cookware, vehicles, and electronics. Adverse environmental and health effects have been observed for well-studied PFAS and they have been shown to pose a risk to the Canadian environment.

ECCC is proposing to add reporting requirements for 131 individual PFAS (listed in Appendix A) to the NPRI starting with the 2025 reporting year. A PFAS will be required to be reported by any facility that manufactures, processes, or otherwise uses 1 kilogram or more of that PFAS at a concentration of 0.1% by weight or more. ECCC is proposing that this change would take effect as of the 2025 reporting year.

The purpose of this consultation document is to obtain input on the proposed addition of certain PFAS to the NPRI. A Multi-Stakeholder Work Group (MSWG) advises ECCC on proposed changes to reporting requirements and other issues related to the NPRI. We invite the Work Group, other interested or impacted stakeholders and the public to comment on this proposal before November 25, 2024, via email at inrp-npri@ec.gc.ca.

Table of Contents

1. Introduction

The National Pollutant Release Inventory (NPRI) is Canada's legislated, publicly accessible inventory of pollutant releases (to air, water and land), disposals and transfers for recycling. It supports a wide number of environmental initiatives, including pollution prevention and abatement. More details on the purpose of the NPRI are described on the NPRI website.

The NPRI is one of a number of information gathering tools available to Environment and Climate Change Canada (ECCC). Keeping in mind the scope of the NPRI, as well as evolving progress and knowledge about pollutants in Canada, there are a variety of potential drivers for changes to the NPRI, including (but not limited to):

- Ensuring that the NPRI substance list and reporting thresholds are appropriate for gathering data on pollutant releases in Canada;
- Ensuring that the NPRI substance list and reporting thresholds, and information collected, meet proponent (and other users) needs. For example:
    - supporting the risk management of substances,
    - supporting the development of other pollutant inventories (such as the Air Pollutant Emissions Inventory), and related international reporting commitments,
    - supporting international initiatives such as the Commission for Environmental Cooperation (CEC) Action Plan to Enhance the Comparability of Pollutant Release and Transfer Registers (PRTRs) in North America, which aims to enhance the comparability of the NPRI with other PRTRs such as the U.S. Toxics Release Inventory, where such alignment would also be in the Canadian interest and appropriate, and
    - adapting to input received from the community of NPRI stakeholders, reporters and data users and other parties;
- Strategic alignment opportunities between the NPRI and other ECCC programs such as the Chemicals Management Plan (CMP) where appropriate; and
- Consideration of substances on Schedule 1 of the *Canadian Environmental Protection Act, 1999* (CEPA), that are released by facilities.

The purpose of this consultation document is to obtain input on the proposed addition of certain PFAS to the NPRI. ECCC is proposing that this change would take effect as of the 2025 reporting year.

A Multi-Stakeholder Work Group (MSWG) advises ECCC on proposed changes to reporting requirements and other issues related to the NPRI. We invite the Work Group, other interested or impacted stakeholders and the public to comment on this proposal before November 25, 2024, via email at inrp-npri@ec.gc.ca.

ECCC will consider comments received in response to this consultation and will provide a consultation summary once a decision has been made. ECCC plans to publish the final reporting requirements for reporting years 2025, 2026, and 2027 in Part I of the *Canada Gazette* in early 2025.

2. Proposed Change

Per- and polyfluoroalkyl substances (PFAS) are a class of thousands of human-made substances. Some typical uses of PFAS include as surfactants, lubricants, and repellents (for dirt, water, and grease). PFAS can also be found in certain firefighting foams, food packaging, drugs, cosmetics, sunscreens, pesticides, textiles (for example, carpets, furniture, and clothing), non-stick cookware, vehicles, and electronics. New PFAS are continually being developed and notified to the Government of Canada. New PFAS are assessed for potential risks to human health and the environment and, if appropriate, control measures are put in place before they are imported into or manufactured in Canada.

Adverse environmental and health effects have been observed for well-studied PFAS [including perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), long-chain perfluorocarboxylic acids (LC-PFCAs), and their salts and precursors] and they have been shown to pose a risk to the Canadian environment. In Canada, PFOS, PFOA, and LC-PFCAs (and their salts and precursors) are prohibited through regulations, with a limited number of exemptions; however, scientific evidence to date indicates that other PFAS, including those used to replace regulated PFOS, PFOA, and LC-PFCAs may also be associated with environmental and human health effects of concern.

For more information on PFAS, refer to the Government of Canada's PFAS web page and the Updated Draft State of Per- and Polyfluoroalkyl Substances (PFAS) Report (published July 2024).

ECCC is proposing to add the 131 PFAS listed in Appendix A to the NPRI. Appendix B provides a detailed description of the sources and methods for selecting these PFAS. Briefly, the 131 PFAS were selected based on the following criteria, established in consultation with stakeholders:

- PFAS for which Canadian or international guidelines exist
- PFAS that have been detected in Canadian biomonitoring by Health Canada (HC) or in the Canadian environment by ECCC
- PFAS that have been reported to the US Toxic Release Inventory (TRI)
- PFAS that have been identified by stakeholders as being a priority

The proposed list includes polymeric and non-polymeric per- and polyfluoroalkyl substances. It includes PFOS, PFOA, and some LC-PFCAs, which are already regulated in Canada. Thirty of the substances are on the Domestic Substances List (DSL), 11 are on the Non-Domestic Substances List (NDSL), and 42 are subject to at least partial prohibitions under the *Prohibition of Certain Toxic Substances Regulations* (PCTSR). Eighteen are also included in the list of PFAS to be reported under the mandatory PFAS survey published under section 71 of CEPA in July 2024. Canadian or international guidelines or standards have been identified for 34 of the 131. A standard analytical method has been identified by NPRI for 63, and 36 of them have been estimated and reported in the US based on methods other than analytical methods (mass balance, emission factors, and engineering estimates).

Facilities that meet the employee threshold[1] and that manufacture, process or otherwise use (MPO) 1 kilogram (kg) or more of a listed PFAS at a concentration of 0.1% by weight or more[2] with some exceptions,[3] will be required to report quantities of that PFAS that are released, disposed of and recycled. The mass and concentration thresholds apply to each listed PFAS individually (i.e., if reporting is required for a certain PFAS, this does not automatically trigger reporting for all listed PFAS). ECCC is proposing to create a new Group C under Part 1 of the NPRI substance list for PFAS. Aside from the mass and concentration thresholds, the requirements under Group C will be the same as for Group B.[4] For more information on NPRI thresholds and exceptions, refer to the Guide for reporting to the NPRI, 2022-2024.

3. Background

3.1. Government of Canada action on PFAS

The manufacture, use, sale, offer for sale, and import of certain PFAS (PFOS, PFOA, LC-PFCAs, and their salts and precursors) and products that contain them are prohibited in Canada through regulations under CEPA, with a limited number of exemptions. However, other PFAS are not prohibited and could be used as alternatives to prohibited PFAS.

The Government of Canada published a notice of intent to address the class of PFAS on April 24, 2021. Considering PFAS as a class reduces the chance of regrettable substitution and better addresses situations where exposure occurs to multiple PFAS at the same time. In the notice of intent, the Government committed to publish a state of PFAS report within two years. Stakeholders and interested parties were invited to provide feedback on the notice of intent and will have further opportunities to provide input on Government of Canada activities related to addressing PFAS as a class.

In response to the commitment described in the notice of intent, the Government of Canada published a Draft State of Per- and polyfluoroalkyl substances (PFAS) Report and a Risk Management Scope for Per- and Polyfluoroalkyl Substances (PFAS) for a 60-day public comment period in May 2023. Based on comments received and information submitted in response to the draft report, along with other

[1] Facilities where the employees work a total of 20,000 hours or more (10 full-time employee equivalents) during the calendar year (the employee threshold) are required to report to the NPRI, if the thresholds for at least one substance are met. There are some exceptions to the employee threshold, including for wastewater treatment facilities (with an annual average flow rate of 10,000 m^3/day) and incinerators (incineration of 26 tonnes or more of non-hazardous waste, incineration of 26 tonnes or more of biomedical or hospital waste, or incineration of any quantity of hazardous waste or sewage sludge).
[2] The concentration threshold does not apply to substances that are incidentally manufactured, processed, or otherwise used (i.e., by-products).
[3] Examples include processing or otherwise using manufactured items (articles) containing NPRI substances where no release of the substances occurs; wholesale or retail sale of the substance or articles or products that contain the substance; and exploration for oil or gas, or the drilling of oil or gas wells.
[4] For example, the requirements will apply to contiguous and offshore installations, facilities will be required to consider PFAS in tailings and waste rock at any concentration, and salts of PFAS listed with the qualifier “and its salts” will be required to be reported as an equivalent weight of the listed acid.

information, an Updated Draft State of Per- and Polyfluoroalkyl substances (PFAS) Report and a Revised Risk Management Scope for Per- and Polyfluoroalkyl Substances (PFAS) were published in July 2024 for another 60-day public comment period. A summary of comments received on the initial draft report and risk management scope (published in May 2023), and the Government's responses is also available. A Section 71 survey notice was also issued July 2024 to collect information on 312 individual PFAS, with reports due by January 2025.

3.2. The United States Toxics Release Inventory

The United States Toxics Release Inventory (TRI) is the US equivalent to the NPRI. Starting in 2020, the TRI listed 172 individual PFAS with a manufacture, process, or otherwise use threshold of 100 lbs (approximately 45 kg) and concentration thresholds of either 0.1% for carcinogenic PFAS (only PFOS was identified as carcinogenic) or 1% for the remaining PFAS. New PFAS have been added to the TRI list each year since 2020 and for the 2024 reporting year, 196 individual PFAS substances are listed. Also in 2024, the concentration threshold was removed, since it was identified as a barrier to comprehensive reporting.

Between 2020 and 2022, 63 individual PFAS have been reported to the TRI by 75 facilities in four sectors (manufacturing, merchant wholesalers, waste, and national security). For more information, see the TRI PFAS web page.

3.3. NPRI stakeholder consultation process for PFAS

In January 2022, environmental non-government organization members of the NPRI MSWG submitted a proposal to add PFAS to the NPRI beginning with the 2025 reporting year. Due to the complexity of considering PFAS for addition to the NPRI, a Sub-Group was formed to provide recommendations to ECCC regarding if and how PFAS should be added to the NPRI. The Sub-Group reached the following consensus recommendation after deliberations:

> Perfluoroalkyl and polyfluoroalkyl substances (PFAS) meet the decision factors for reporting to the NPRI and should be added to the NPRI 2025-2027 Gazette Notice. PFAS are known to be processed or used and to be incidentally manufactured in Canada, are of environmental and human health concern, and are released into and present in the Canadian environment.

While the Sub-Group did not reach consensus on specific recommendations for how to list PFAS on the NPRI, they found common ground on various elements of potential reporting requirements, along with providing their divergent views. ECCC used this information to develop this consultation document.

4. Rationale

4.1. Rationale for deciding if PFAS should be added to the NPRI

Proposals to make changes to the NPRI are evaluated according to the Process for proposing and considering changes to NPRI, which includes an evaluation of four decision factors as well as additional considerations such as value versus cost, the capability of facilities to provide the required information, coverage and comprehensiveness and other data gathering planned.

Substance-specific information is lacking for most PFAS, including information on which PFAS are currently used in Canada, what PFAS are used for and what quantities are used. On the basis of what is known about well-studied PFAS and the potential for other PFAS to behave similarly, ECCC evaluated the decision factors based on known information about well-studied PFAS instead of evaluating each individual PFAS that is proposed for addition to the NPRI. ECCC agrees that PFAS meet the decision factors for addition to the NPRI, as summarized below. For more detailed information, refer to Health Canada's PFAS Information Sheet and the reports linked on the page.

1. Does the substance meet NPRI criteria?

a) Is the substance manufactured, processed or otherwise used by facilities in Canada?

PFAS have a wide range of uses in industrial and specialized applications. PFAS are used in products such as lubricants, cosmetics, sunscreens, pesticides, surfactants, certain firefighting foams, non-stick cookware, food packaging materials, drugs, repellents (for dirt, water, and grease), textiles (carpets, furniture, and clothing), vehicles, and electronics. PFAS can also be found in certain firefighting foams, textiles, cosmetics, and in food packaging materials. Wastewater treatment systems can also act as pathways of PFAS to aquatic environments. Due to these widespread industrial uses, ECCC has determined that PFAS are manufactured, processed, or otherwise used by facilities in Canada.

b) Is the substance of human health and/or environmental concern?

Exposure to PFAS can affect multiple human organs and systems. The main targets include the liver, kidney, thyroid, immune system, nervous system, metabolism and bodyweight, and reproduction and development. Effects on these organs and systems have been observed in both laboratory and human epidemiological studies with well-studied PFAS.

In the environment, effects of PFAS on wildlife include toxicity to the immune and nervous systems, and general effects on growth, reproduction and development. Certain PFAS have been found to bioaccumulate in living organisms. PFAS have been reported to significantly biomagnify (accumulate to increasingly higher levels up the food chain) in air-breathing organisms (for example, mammals, birds), which may increase the likelihood of adverse effects being seen. Certain PFAS have also been shown to have hazardous effects on plants.

Humans and the environment are likely to be exposed to multiple PFAS at the same time. This cumulative exposure could increase the potential for adverse effects.

c) Is the substance released to the Canadian environment or disposed of by facilities, and do facilities contribute significant releases of the substance?

There is a lack of specific information on what facilities in Canada may be manufacturing, processing, otherwise using, releasing, disposing of, and recycling PFAS. NPRI is one mechanism by which this information can be obtained. Some of this information may be obtained through the section 71 survey that was published on July 27, 2024, which requires companies to report on quantities of 312 specified PFAS that are imported into, or manufactured or used, in Canada. Reports are due by January 29, 2025, but results will not be available in time to inform consultations on adding PFAS to the NPRI for 2025. Extrapolating from US and European use and release data,[5] NPRI has concluded that PFAS are released and disposed of by facilities in Canada and that facilities can contribute significant releases of PFAS.

d) Is the substance present in the Canadian environment?

In Canada, PFAS are routinely detected in various environmental samples collected from coast to coast to coast, including ambient air, aquatic ecosystems, landfill leachate, wastewater, and biosolids as well as aquatic and terrestrial wildlife.

2. Does inclusion of the substance support one or more of the objectives of the NPRI?

- **To improve public understanding**
- **To identify priorities for action**
- **To encourage voluntary action to reduce releases**
- **To allow tracking of progress in reducing releases (including successful reductions)**
- **To support targeted regulatory initiatives**
- **To support development of other pollutant release inventories, such as the Air Pollutant Emissions Inventory, and related international reporting obligations, where appropriate.**

The addition of PFAS to the NPRI will improve public understanding by providing data on which facilities are releasing PFAS, in what quantities and to which media (air, water, land, off-site disposals and transfers).

Data on releases and transfers of PFAS can be used in identifying priorities of action, especially as risk management actions are being considered and developed. Over time, ECCC, HC, industry and the public will be able to review any trends in releases of PFAS to the environment and use that knowledge to make changes to existing risk management actions and for industry, to their operations. Communities can use the information to highlight issues of concern, request changes within their neighbourhoods and promote any success stories. Effectiveness of risk management actions and/or reductions in releases can also be monitored and highlighted by government.

[5] Data from the US Toxics Release Inventory, the US Toxic Substances Control Act Inventory (as summarized in Glüge et al, 2020), and the European Chemicals Agency PFAS Restriction Proposal. Data are summarized in this interactive dashboard prepared by NPRI, available online.

3. Is the substance reported elsewhere in Canada? If it is reported elsewhere, is there nonetheless additional value in reporting the information through the NPRI?

Public information on annual PFAS releases from facilities is not reported elsewhere in Canada.

4. Is the substance already on the NPRI in some form? If it is already on the NPRI in some form, is there nonetheless additional value in including it in another form?

None of the PFAS proposed to be listed are already on the NPRI. None of the current NPRI substances meet the OECD 2021 definition of PFAS.

4.2. Rationale for which PFAS to list on the NPRI

The proposed list of 131 PFAS was selected based on four criteria, described in sections 4.2.1 to 4.2.4 below. These criteria are based on some of the common ground found by the PFAS Sub-Group. There is considerable overlap between the four lists below and when duplicate CAS RNs are removed, the resulting number of CAS RNs proposed to be listed is 131 (the sources and methods used to create this list are described in Appendix B).

4.2.1. PFAS for which Canadian or international guidelines exist

This criterion was selected because the existence of a guideline indicates that the substance has been well-studied, with strong evidence of environmental and/or health risk. It also indicates that the substance can be measured using existing analytical methods. However, because guidelines can take years to develop, PFAS in current use are likely not all covered by this criterion. For this reason, ECCC has determined that this criterion should be used in combination with other criteria.

NPRI compiled a list of 41 individual PFAS for which Canadian federal and provincial guidelines have been developed, 30 PFAS for which US federal and state guidelines exist, and 23 PFAS for which international guidelines exist.[6] With some overlap between the three lists, 45 individual PFAS with at least one guideline were identified. All of these PFAS are included in the list of proposed NPRI PFAS.

4.2.2. PFAS that have been detected in Canadian biomonitoring by Health Canada (HC) or in the Canadian environment by ECCC

PFAS that have been detected in the Canadian environment or in Canadian human biomonitoring studies are relevant in the Canadian context. While their presence can be the result of long-range transport, they can also be present due to facility releases, making them appropriate for tracking through the NPRI. In addition, if they are being monitored and detected in Canada, then measurement techniques are available for facilities to use to report to NPRI. ECCC determined that this was a good criterion for identifying PFAS to list on the NPRI but not sufficient on its own, given that the list is limited to only the most well-studied PFAS.

[6] Australia, European Union, Denmark, Germany, Italy, Netherlands, Norway, and Sweden.

A non-exhaustive list of 40 PFAS that have been monitored by ECCC or Health Canada was prepared by ECCC. The acid and anionic forms of all of these PFAS are included in the list of proposed NPRI PFAS.

4.2.3. PFAS that have been reported to the US Toxic Release Inventory

The use pattern of PFAS in the US is different from Canada (e.g., large-scale manufacture of PFAS), so there may be PFAS reported to the TRI that are not relevant to the Canadian context. However, PFAS manufactured in the US may be imported into and released by facilities in Canada. All 63 PFAS reported to the TRI at least once from 2020-2022 will be captured in the proposed list of NPRI PFAS.[7]

4.2.4. PFAS identified as being a priority for listing on the NPRI

Through the Sub-Group process, ECCC heard that there may be certain PFAS that are identified in the scientific literature and are of concern to the public but that were not captured by the above criteria. One such substance is trifluoroacetic acid (CAS RN 76-05-1). ECCC has determined that this PFAS meets the NPRI Decision Factors, and it is included in the list of proposed NPRI PFAS. ECCC will consider other specific PFAS identified during the consultation process for addition to the NPRI as well.

4.2.5. Other PFAS considered for addition to the NPRI

ECCC also considered options for requiring reporting on the full class of PFAS using semi-quantitative analytical methods such as Total Organic Fluorine (TOF), Total Fluorine (TF) or Total Oxidizable Precursors (TOP), as recommended by some Sub-Group members. However, these methods are used as indicators to estimate PFAS presence and will not provide data on actual releases and transfers of PFAS. They are not available for all media, might be costly (TOP) and are not suited to any of the accepted methods for reporting to the NPRI, except source testing. Therefore, ECCC is not proposing to add the class of PFAS to the NPRI. Methods for measuring PFAS are continuously being developed and if a quantitative method for measuring total PFAS is developed, ECCC can reconsider including the entire class of PFAS in the NPRI at that time.

4.3. Rationale for the threshold levels

NPRI uses thresholds to determine which facilities are required to report based on the principle that the reporting requirements should not pose an unreasonable burden on facilities that have to report, and that small facilities may not have the technical expertise to report quality data. Thresholds have been reduced or removed over the years in cases where there is information to demonstrate them to be barriers to comprehensive reporting, for example:

- There is no mass threshold for reporting of dioxins, furans and hexachlorobenzene, instead facilities must report if they engage in specified activities (e.g., incineration), since these substances are toxic even in extremely low quantities
- There is no concentration threshold for reporting of criteria air contaminants, since these substances are released in very low concentrations

[7] Nine of the 63 TRI PFAS are salts which are not proposed to be listed individually in NPRI but would still be required to be reported. They would be captured by the listing for their corresponding acids. See Appendix B for more information on acids and salts.

- The employee threshold does not apply to specified activities where releases from facilities with few employees are known to be significant (e.g., wastewater treatment facilities and incinerators)

ECCC does not have enough evidence at this time to justify not having thresholds for PFAS. PFAS are known to be used in small quantities at small concentrations and given the health and environmental concerns associated with PFAS, ECCC is proposing low manufacture, process or otherwise use (MPO) thresholds:

- 1 kg manufactured, processed or otherwise used, which applies to each PFAS individually. Once the MPO threshold is met for a PFAS, all releases and transfers of that PFAS must be reported, regardless of quantity. This will be the lowest MPO threshold of any substances listed on NPRI with MPO thresholds
- 0.1% concentration by weight. The concentration threshold does not apply to by-products, i.e., substances that are by-products must be included in threshold calculations regardless of concentration. Once the concentration threshold is met, all releases and transfers must be reported regardless of concentration. The 0.1% level was selected to align with the requirements for disclosing substances on Safety Data Sheets (SDSs)[8] which are used by many facilities to calculate and report quantities of NPRI substances

ECCC also does not have enough evidence at this time to justify reducing or removing the employee threshold for PFAS reporting and is therefore proposing that the current employee threshold (20,000 hours or more, or 10 full-time employee equivalents) will apply.

5. Impact on Reporting Facilities

5.1 Facilities that may need to report

The proposed requirements to report PFAS to the NPRI will potentially impact facilities in all sectors in Canada. PFAS are used in many industrial sectors and are found in a wide range of products, the processing or use of which may be reportable to the NPRI, including certain firefighting foams (aqueous film-forming firefighting foams or AFFF), textiles (including carpets, furniture, and clothing), cosmetics, and food packaging materials. PFAS are used as solvents; processing aids; oil/water repellents in packaging; levelling agents in paints, ink, and adhesive formulations; and refrigerants/blowing agents. PFAS releases from municipal solid waste (MSW) landfills, MSW incineration, composting of PFAS-containing food packaging, wastewater treatment systems (including the transfer off-site of biosolids for land application) may also need to be reported to NPRI.

[8] Substances in mixtures that are health hazards, like some PFAS, must be disclosed on SDSs if they occur in concentrations of 1% or more, unless they are carcinogenic, mutagenic, or toxic to reproduction, like some PFAS, in which case they must be disclosed in concentrations of 0.1% or more.

Due to a lack of quantitative data, ECCC is unable to indicate the number of existing NPRI facilities that would be required to report for PFAS, nor how many facilities that have not previously reported to NPRI will need to start reporting for PFAS.

5.2 Methods for estimating threshold and release/transfer quantities

NPRI reporting is based on information that the owner or operator of a facility has or can be reasonably expected to have access to. Facilities select their method for reporting to NPRI from a list of allowable methods:

- Continuous emission monitoring systems
- Predictive emission monitoring
- Source testing
- Remote quantification
- Mass balance
- Site-specific emission factor
- Published emission factor
- Speciation profile
- Engineering estimates

All of these methods, except remote quantification and speciation profile, have been used by facilities in the US to report to the TRI. This is indicated, where applicable, for the proposed NPRI PFAS in Appendix A.

ECCC has concluded that facilities in Canada will be able to estimate MPO and release/transfer quantities of PFAS in order to report to the NPRI. The ability of facilities to report should improve over time since methods are continuously being developed. Summary information for some of the NPRI methods is provided below. NPRI intends to provide guidance for reporting facilities with more detailed information on calculating PFAS quantities.

5.2.1 Analytical methods

There are several accredited commercial labs in Canada with standard methods to measure PFAS. NPRI compiled a list of standard analytical methods from the following jurisdictions and organizations:

- American Society for Testing and Materials (ASTM)
- Germany
- International Organization for Standardization (ISO)
- United States
    - Environmental Protection Agency (EPA)
    - Department of Defense (DoD)
    - Department of Agriculture (USDA)
    - Centers for Disease Control and Prevention (CDC)
    - Food and Drug Administration (FDA)

These methods cover 105 individual PFAS, including 63 PFAS proposed to be added to the NPRI (indicated in Appendix A), in 22 matrices:

- AFFF
- air
- biosolids
- drinking water
- feed processing equipment
- food
- food contact materials
- ground water
- liquids
- packaging
- plasma
- sand
- sea water
- sediment
- serum
- sludge
- soil
- solid fuels
- surface water
- textiles
- tissue
- wastewater

5.2.2 Emission factors

Facilities in the US have reported to the TRI using published emission factors for 13 PFAS and site-specific emission factors for 24 PFAS that are proposed to be added to the NPRI (indicated in Appendix A). Published emission factors are available in the literature and from several organizations (e.g., the Organisation for Economic Co-operation and Development and the European Chemicals Agency).

Government of Canada data on concentrations of PFAS monitored in Canada are also available and can be used by facilities to estimate releases (e.g., the concentration of PFAS measured in wastewater effluent from one wastewater treatment facility could be used by another to estimate releases). Monitored concentrations of PFAS can also be found in the literature.

ECCC intends to compile information on emission factors and monitoring data to provide guidance for reporting facilities with more detailed information on calculating PFAS quantities.

Appendix A – List of PFAS proposed to be added to the NPRI

Notes

- CAS RN: Chemical Abstracts Service Registry Number
- DSL: Domestic Substances List
- NDSL: Non-Domestic Substances List
- PCTSR: Prohibition of Certain Toxic Substances Regulations non-exhaustive list
- s71: July 2024 CEPA section 71 notice for reporting of certain PFAS
- CGL: List of PFAS for which one or more Canadian guidelines or standards exist
- UGL: List of PFAS for which one or more US guidelines or standards exist
- IGL: List of PFAS for which one or more international guidelines or standards exist
- DIC: Non-exhaustive list of PFAS detected in the Canadian environment or Canadian biomonitoring by Health Canada/Environment and Climate Change Canada. This column also indicates that concentration data are available on Open Data that can be used by facilities to estimate releases
- TRI: List of PFAS reported to the TRI since 2020
- TRI BoE: Bases of estimate used to report to the TRI
- X = presence on list

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
NON-POLYMERIC PFAS														
Perfluoroalkyl Substances														
24448-09-7	1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-N-methyl-	Me-FOSE		X		X					X	X	Emission Factor, Site-specific; Other Approaches	EPA Other Test Method 45; EPA Method 1633
31506-32-8	1-Octanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-methyl-	N-MeFOSA		X		X					X	X	Emission Factor, Published; Emission Factor, Site-specific; Monitoring, Periodic/Random; Other Approaches	EPA Method 1633; EPA Other Test Method 45

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
2263-09-4	1-Octanesulfonamide, N-butyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-	N-BuFOSA			X							X	Emission Factor, Site-specific; Other Approaches	
4151-50-2	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-	N-EtFOSA		X		X					X	X	Emission Factor, Site-specific; Monitoring, Periodic/Random; Other Approaches	EPA Method 1633; EPA Method 1633
1691-99-2	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-(2-hydroxyethyl)-	EtFOSE		X		X					X			EPA Other Test Method 45; EPA Method 1633
1652-63-7	1-Propanaminium, 3-[[(heptadecafluorooctyl)sulfonyl]amino]-N,N,N-trimethyl-, iodide			X								X	Emission Factor, Site-specific	
67584-58-1	1-Propanaminium, N,N,N-trimethyl-3-[[(pentadecafluoroheptyl)sulfonyl]amino]-, iodide			X			X					X		
68957-58-4	1-Propanaminium, N,N,N-trimethyl-3-[[(tridecafluorohexyl)sulfonyl]amino]-, iodide			X								X		
68957-57-3	1-Propanaminium, N,N,N-trimethyl-3-[[(undecafluoropentyl)sulfonyl]amino]-, iodide			X			X					X		
2991-50-6	2-(N-Ethylperfluorooctanesulfonamido)acetic acid	EtPFOSA-AcOH	and its salts					X	X		X			US CDC Method 6304.09; EPA Other Test Method 45; EPA Method 1633; EPA Method 537.1; EPA Test Method 8327; ISO 21675:2019; ISO 21675:2019

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
2355-31-9	2-(N-Methylperfluorooctanesulfonamido)acetic acid	MePFOSA-AcOH	and its salts					X	X		X			US CDC Method 6304.09; EPA Other Test Method 45; EPA Method 1633; EPA Method 537.1; EPA Test Method 8327; ISO 21675:2019; ISO 21675:2019
25268-77-3	2-[[(Heptadecafluorooctyl)sulfonyl]methylamino]ethyl acrylate					X						X	Emission Factor, Site-specific; Other Approaches	
1799325-94-2	2H,2H,3H,3H-Perfluorooctanoate	FTCA (5:3)									X			
914637-49-3	2H,2H,3H,3H-Perfluorooctanoic acid	FTCA (5:3)	and its salts								X			EPA Method 1633
812-70-4	3-(Perfluoroheptyl)propanoic acid	FTCA (7:3)	and its salts								X			EPA Method 1633
919005-14-4	4,8-Dioxa-3H-perfluorononanoic acid	ADONA	and its salts					X						EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; ISO 21675:2019; US CDC Method 6304.09
1799325-95-3	7:3 Perfluorodecanoate	PFD (7:3)									X			
76-05-1	Acetic acid, trifluoro-	TFA	and its salts	X			X							
56773-42-3	Ethanaminium, N,N,N-triethyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonic acid (1:1)			X		X						X	Mass Balance Calculations	
39187-41-2	Methyl perfluoro-3,6-dioxaheptanoate	Me-PFDiOHp												
165457-57-8	Methyl perfluorohexadecanoate	Me-PFHxD												
376-27-2	Methyl perfluorooctanoate	Me-PFOc				X						X	Other Approaches	

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
16517-11-6	Octadecanoic acid, pentatriacontafluoro-	PFOcDA (C18)	and its salts			X					X			EPA Other Test Method 45; ISO 21675:2019; USDA
335-66-0	Octanoyl fluoride, pentadecafluoro-					X						X	Other Approaches	
1621485-21-9	Perfluoro(2-((6-chlorohexyl)oxy)ethanesulfonate)	9Cl-PF3ONS												
756426-58-1	Perfluoro(2-((6-chlorohexyl)oxy)ethanesulfonic acid)	9Cl-PF3ONSA	and its salts					X						EPA Method 533; EPA Method 1633; EPA Method 537.1; EPA Other Test Method 45
220689-13-4	Perfluoro-2-ethoxyethanesulfonate	PFEES												
113507-82-7	Perfluoro-2-ethoxyethanesulfonic acid	PFEESA (C2)	and its salts					X						EPA Method 1633; EPA Method 533
122499-17-6	Perfluoro-2-propoxypropanoate	PFPrOPr												
13252-13-6	Perfluoro-2-propoxypropanoic acid	FPO-DA	and its salts					X	X	X		X	Emission Factor, Published	EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; ISO 21675:2019; US CDC Method 6304.09
151772-58-6	Perfluoro-3,6-dioxaheptanoic acid	PFDHA (C7)	and its salts					X						EPA Method 1633; EPA Method 533
377-73-1	Perfluoro-3-methoxypropanoic acid	PFMPA (C4)	and its salts					X						EPA Method 1633; EPA Method 533
1432017-36-1	Perfluoro-4-methoxybutanoate	PFMB (C3)									X			
863090-89-5	Perfluoro-4-methoxybutanoic acid	PFMBA (C3)	and its salts					X			X			EPA Method 1633; EPA Method 533
30334-69-1	Perfluorobutanesulfonamide	FBSA (C3)									X			
45187-15-3	Perfluorobutanesulfonate	PFBS (C3)									X			EPA Method 1633

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
375-73-5	Perfluorobutanesulfonic acid	PFBS (C4)	and its salts		X			X	X	X		X	Monitoring, Periodic/Random; Other Approaches	EPA Other Test Method 45; EPA Test Method 8327; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method C-010.02; USDA
45048-62-2	Perfluorobutanoate	PFB (C3)									X			EPA Method 1633
375-22-4	Perfluorobutanoic acid	PFBA (C4)	and its salts		X			X	X	X				ASTM D7968-17a; ASTM D7979-20; EPA Method 1633; EPA Method 533; EPA Other Test Method 45; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method C-010.02
126105-34-8	Perfluorodecanesulfonate	PFDS (C10)									X			EPA Method 1633
335-77-3	Perfluorodecanesulfonic acid	PFDSA (C10)	and its salts						X	X				EPA Other Test Method 45; EPA Test Method 8327; ASTM D8421-22; EPA Method 1633; ISO 21675:2019; USDA
73829-36-4	Perfluorodecanoate	PFD (C10)									X			EPA Method 1633

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
335-76-2	Perfluorodecanoic acid	PFDA (C10)	and its salts			X		X	X	X		X	Mass Balance Calculations; Other Approaches	US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method C-010.02; USDA
343629-43-6	Perfluorododecanesulfonate	PFDoS (C12)									X			EPA Method 1633
79780-39-5	Perfluorododecanesulfonic acid	PFDoSA (C12)	and its salts											ASTM D8421-22; EPA Other Test Method 45; EPA Method 1633
171978-95-3	Perfluorododecanoate	PFDoD (C12)									X			EPA Method 1633
307-55-1	Perfluorododecanoic acid	PFDoDA (C12)	and its salts			X		X	X	X	X	X	Mass Balance Calculations	ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; ISO 21675:2019; ISO 23702-1:2023; USDA; EPA Method 1633; EPA Other Test Method 45
146689-46-5	Perfluoroheptanesulfonate	PFHpS (C7)									X			EPA Method 1633

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
375-92-8	Perfluoroheptanesulfonic acid	PFHpSA (C7)	and its salts					X	X	X	X			US CDC Method 6304.09; EPA Other Test Method 45; EPA Test Method 8327; ASTM D8421-22; EPA Method 1633; EPA Method 533; ISO 21675:2019; US FDA Method C-010.02
375-85-9	Perfluoroheptanoic acid	PFHpA (C7)	and its salts		X			X	X	X				US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method
67905-19-5	Perfluorohexadecanoic acid	PFHxDA (C16)	and its salts			X					X			USDA; EPA Other Test Method 45; ISO 21675:2019
108427-53-8	Perfluorohexanesulfonate	PFHxS (C6)												EPA Method 1633
355-46-4	Perfluorohexanesulfonic acid	PFHxSA (C6)	and its salts					X	X	X	X	X	Emission Factor, Site-specific; Monitoring, Periodic/Random; Other Approaches	EPA Other Test Method 45; EPA Test Method 8327; US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method
92612-52-7	Perfluorohexanoate	PFHx (C6)												EPA Method 1633

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
307-24-4	Perfluorohexanoic acid	PFHxA (C6)	and its salts		X			X	X	X	X			US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method
382-21-8	Perfluoroisobutene	PFIB (C4)						X						
474511-07-4	Perfluorononanesulfonate	PFNS (C9)									X			EPA Method 1633
68259-12-1	Perfluorononanesulfonic acid	PFNSA (C9)	and its salts											ASTM D8421-22; EPA Other Test Method 45; EPA Test Method 8327; EPA Method 1633
72007-68-2	Perfluorononanoate	PFN (C9)									X			EPA Method 1633
375-95-1	Perfluorononanoic acid	PFNA (C9)	and its salts			X		X	X	X	X	X	Mass Balance Calculations; Other Approaches	US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method
798556-82-8	Perfluorooctadecanoate anion	PFOcD (C18)												
45298-90-6	Perfluorooctanesulfonate	PFOS (C8)									X			EPA Method 1633

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
1763-23-1	Perfluorooctane sulfonic acid	PFOSA (C8)	and its salts			X		X	X	X	X	X	Emission Factor, Published	US CDC Method 6304.09; EPA Other Test Method 45; EPA Test Method 8327; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; Europe DIN CEN/TS 15968:2010-11; German National Standard DIN 38407-42; ISO 21675:2019;
754-91-6	Perfluorooctanesulfonamide	FOSA							X	X	X			EPA Other Test Method 45; EPA Test Method 8327; ISO 21675:2019; US CDC Method 6304.09; ASTM D8421-22; EPA Method 1633; ISO 23702-1:2023
45285-51-6	Perfluorooctanoate	PFO (C8)				X					X			EPA Method 1633
335-67-1	Perfluorooctanoic acid	PFOA (C8)	and its salts			X		X	X	X	X	X	Emission Factor, Published; Emission Factor, Site-specific; Mass Balance Calculations; Monitoring, Periodic/Random; Other Approaches	US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; ISO 25101:2009
507-63-1	Perfluorooctyl iodide	PFOI										X	Emission Factor, Site-specific; Mass Balance Calculations; Other Approaches	

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
307-35-7	Perfluorooctylsulfonyl fluoride	PFOSF				X						X	Emission Factor, Published; Emission Factor, Site-specific	
175905-36-9	Perfluoropentanesulfonate	PFPeS (C5)									X			EPA Method 1633
2706-91-4	Perfluoropentanesulfonic acid	PFPeSA (C5)	and its salts					X						EPA Other Test Method 45; EPA Test Method 8327; ASTM D8421-22; EPA Method 1633; EPA Method 533; US FDA Method C-010.02
45167-47-3	Perfluoropentanoate	PFPe (C5)									X			EPA Method 1633
2706-90-3	Perfluoropentanoic acid	PFPeA (C5)	and its salts		X			X	X	X				ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Other Test Method 45; EPA Test Method 8327; German National Standard DIN 38407-42; ISO 21675:2019; ISO 23702-1:2023; US FDA Method C-010.02; USDA
365971-87-5	Perfluorotetradecanoate	PFTeD (C14)									X			EPA Method 1633
376-06-7	Perfluorotetradecanoic acid	PFTeDA (C14)	and its salts			X		X	X	X	X	X		ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; ISO 21675:2019; ISO 23702-1:2023; USDA
862374-87-6	Perfluorotridecanoate	PFTrD (C13)									X			EPA Method 1633

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
72629-94-8	Perfluorotridecanoic acid	PFTrDA (C13)	and its salts			X		X	X	X				ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; ISO 21675:2019; ISO 23702-1:2023; USDA
196859-54-8	Perfluoroundecanoate	PFUnD (C11)												EPA Method 1633
2058-94-8	Perfluoroundecanoic acid	PFUnDA (C11)	and its salts			X		X	X	X	X			US CDC Method 6304.09; ASTM D7968-17a; ASTM D7979-20; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; EPA Test Method 8327; ISO 21675:2019; ISO 23702-1:2023; USDA
68412-69-1	Phosphinic acid, bis(perfluoro-C6-12-alkyl) derivs.	PFPiA (C6/C12)	and its salts	X		X	X					X		
68412-68-0	Phosphonic acid, perfluoro-C6-12-alkyl derivs.	PFPoA (C6/C12)	and its salts	X		X	X					X		
93572-72-6	Sulfonic acids, C6-12-alkane, perfluoro		and its salts											
Polyfluoroalkyl Substances														
34362-49-7	1,1,2,2-Tetrahydroperfluorohexadecyl acrylate											X		
2196242-82-5	2-[(8-Chloro-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-hexadecafluorooctyl)oxy]-1,1,2,2-tetrafluoroethanesulfonate	8:2 Cl-PFAES												

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
763051-92-9	11-Chloroperfluoro-3-oxaundecanesulfonic acid	11Cl-PF3OUdSA	and its salts					X	X					EPA Method 1633; EPA Method 533; EPA Method 537.1; EPA Other Test Method 45; US FDA Method C-010.02
678-39-7	1-Decanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluoro-	FTOH (8:2)		X		X					X	X	Emission Factor, Published; Emission Factor, Site-specific; Other Approaches	
865-86-1	1-Dodecanol, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluoro-	FTOH (10:2)		X		X					X			
19430-93-4	1-Hexene, 3,3,4,4,5,5,6,6,6-nonafluoro-	PFBE			X			X						
27619-97-2	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-	FTSA (6:2)	and its salts		X			X	X	X	X			EPA Test Method 8327; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Other Test Method 45; ISO 21675:2019
647-42-7	1-Octanol, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-	FTOH (6:2)		X			X				X			
70983-60-7	1-Propanaminium, 2-hydroxy-N,N,N-trimethyl-, 3-[(γ-ω-perfluoro-C6-20-alkyl)thio] derivs., chlorides				X	X						X	Emission Factor, Published; Emission Factor, Site-specific; Mass Balance Calculations; Monitoring, Periodic/Random; Other Approaches	
1078715-61-3	1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-[2-[(γ-ω-perfluoro-C4-20-alkyl)thio]acetyl] derivs., inner salts											X	Mass Balance Calculations	

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
68187-47-3	1-Propanesulfonic acid, 2-methyl-, 2-[[1-oxo-3-[(γ-ω-perfluoro-C4-16-alkyl)thio]propyl]amino] derivs., sodium salts			X		X	X					X	Emission Factor, Site-specific; Mass Balance Calculations; Monitoring, Periodic/Random; Other Approaches	
757124-72-4	2-(Perfluorobutyl)-1-ethanesulfonic acid	FTSA (4:2)	and its salts					X			X			EPA Test Method 8327; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Other Test Method 45
53826-12-3	2-(Perfluorohexyl)ethanoic acid	FTCA (6:2)	and its salts								X			ASTM D7968-17a
27854-31-5	2-(Perfluorooctyl)ethanoic acid	FTCA (8:2)	and its salts								X			
2127366-90-7	2,2,3-Trifluoro-3-[1,1,2,2,3,3-hexafluoro-3-(trifluoromethoxy)propoxy]propanoate	ADONA												
70887-84-2	2H-Perfluoro-2-decenoic acid	FTUCA (8:2)	and its salts								X			ASTM D7968-17a; ASTM D7979-20; ISO 21675:2019
70887-88-6	2H-Perfluoro-2-octenoic acid (6:2)	FTUCA (6:2)	and its salts								X			ASTM D7968-17a; ASTM D7979-20
27905-45-9	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl ester	FTAcr (8:2)		X		X						X		
17741-60-5	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluorododecyl ester	FTMAC (14:2)		X		X						X		
34395-24-9	2-Propenoic acid, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafluorotetradecyl ester				X	X						X		

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
425670-75-3	3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooctane-1-sulfonate	FTS (6:2)									X			
481071-78-7	3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Heptadecafluorodecane-1-sulfonate	FTS (8:2)									X			
1169706-83-5	3:3 Fluorotelomer carboxylate, ion(1-)	FTC (3:3)									X			
356-02-5	3:3 Fluorotelomer carboxylic acid	FTCA (3:3)	and its salts								X			EPA Method 1633
414911-30-1	4:2 Fluorotelomer sulfonate	FTS (4:2)									X			
39108-34-4	8:2 Fluorotelomer sulfonic acid	FTSA (8:2)	and its salts					X	X	X	X			EPA Test Method 8327; ASTM D8421-22; EPA Method 1633; EPA Method 533; EPA Other Test Method 45; ISO 21675:2019
68391-08-2	Alcohols, C8-14, γ-ω-perfluoro			X		X	X					X	Emission Factor, Site-specific	
2043-53-0	Decane, 1,1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8-heptadecafluoro-10-iodo-	FTI (8:2)				X						X	Emission Factor, Published; Emission Factor, Site-specific	
38436-16-7	Dichloromethyl(3,3,4,4,5,5,6,6,6-nonafluorohexyl)silane							X						
65530-64-5	Ethanol, 2,2'-iminobis-, compd. with α,α'-[phosphinicobis(oxy-2,1-ethanediyl)]bis[ω-fluoropoly(difluoromethylene)] (1:1)			X		X	X					X	Emission Factor, Published; Emission Factor, Site-specific	
65530-63-4	Ethanol, 2,2'-iminobis-, compd. with α-fluoro-ω-[2-(phosphonooxy)ethyl]poly(difluoromethylene) (2:1)			X		X	X					X	Emission Factor, Published; Emission Factor, Site-specific; Other Approaches	
21652-58-4	Perfluorooctyl Ethylene	PFOEt				X						X	Emission Factor, Published; Emission Factor, Site-specific	

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
65530-62-3	Poly(difluoromethylene), α,α'-[phosphinicobis(oxy-2,1-ethanediyl)]bis[ω-fluoro-		and its salts	X		X	X					X		
65530-83-8	Poly(difluoromethylene), α-[2-[(2-carboxyethyl)thio]ethyl]-ω-fluoro-		and its salts	X		X	X							
65530-61-2	Poly(difluoromethylene), α-fluoro-ω-[2-(phosphonooxy)ethyl]-		and its salts	X		X	X					X		
68140-21-6	Thiols, C10-20, γ-ω-perfluoro											X	Other Approaches	
68140-18-1	Thiols, C4-10, γ-ω-perfluoro											X	Other Approaches	
68140-20-5	Thiols, C6-12, γ-ω-perfluoro											X	Other Approaches	
70969-47-0	Thiols, C8-20, γ-ω-perfluoro, telomers with acrylamide			X		X	X					X	Emission Factor, Published; Emission Factor, Site-specific; Mass Balance Calculations; Monitoring, Periodic/Random; Other Approaches	
POLYMERIC PFAS														
65104-45-2	2-Propenoic acid, 2-methyl-, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluorododecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-methyl-2-propenoate, methyl 2-methyl-2-propenoate, and 3,3,4,4,5,5,6,6,7,7,8,8-tridecafluorooctyl 2-methyl-2-propenoate											X		

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
65605-58-5	2-Propenoic acid, 2-methyl-, dodecyl ester, polymer with α-fluoro-ω-[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]poly(difluoro methylene)			X		X	X					X	Emission Factor, Site-specific	
142636-88-2	2-Propenoic acid, 2-methyl-, octadecyl ester, polymer with 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,12-heneicosafluorododecyl 2-propenoate, 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl 2-propenoate and 3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,12,12,13,13,14,14,14-pentacosafluorotetradecyl 2-propenoate											X		

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
68227-96-3	2-Propenoic acid, butyl ester, telomer with 2-[[(heptadecafluorooctyl)sulfonyl]methylamino]ethyl 2-propenoate, 2-[methyl[(nonafluorobutyl)sulfonyl]amino]ethyl 2-propenoate, α-(2-methyl-1-oxo-2-propenyl)-ω-hydroxypoly(oxy-1,4-butanediyl), α-(2-methyl-1-oxo-2-propen-1-yl)-ω-[(2-methyl-1-oxo-2-propen-1-yl)oxy]poly(oxy-1,4-butanediyl), 2-[methyl[(1,1,2,2,3,3,4,4,5,5,6,6,7,7,7-pentadecafluoroheptyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl]amino]ethyl 2-propenoate, 2-[methyl[(1,1,2,2,3,3,4,4,5,5,5-undecafluoropentyl)sulfonyl]amino]ethyl 2-propenoate and 1-octanethiol											X		
65636-35-3	Ethanaminium, N,N-diethyl-N-methyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, methyl sulfate, polymer with 2-ethylhexyl 2-methyl-2-propenoate, α-fluoro-ω-[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]poly(difluoromethylene), 2-hydroxyethyl 2-methyl-2-propenoate and *N*-(hydroxymethyl)-2-propenamide			X		X	X					X		

CAS RN	Name	Abbreviation	Qualifier	DSL	NDSL	PCTSR	s71	CGL	UGL	IGL	DIC	TRI	TRI BoE	Analytical Methods
65605-73-4	Poly(difluoromethylene), α-fluoro-ω-[2-[(1-oxo-2-propenyl)oxy]ethyl]-, homopolymer				X							X		
29117-08-6	Poly(oxy-1,2-ethanediyl), α-[2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl]-ω-hydroxy-			X		X						X	Emission Factor, Site-specific; Mass Balance Calculations	
68958-60-1	Poly(oxy-1,2-ethanediyl), α-[2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl]-ω-methoxy-			X			X					X	Emission Factor, Site-specific; Other Approaches	
65545-80-4	Poly(oxy-1,2-ethanediyl), α-hydro-ω-hydroxy-, ether with α-fluoro-ω-(2-hydroxyethyl)poly(difluoromethylene) (1:1)			X		X	X					X	Emission Factor, Published; Emission Factor, Site-specific; Other Approaches	
37338-48-0	Poly[oxy(methyl-1,2-ethanediyl)], α-[2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl]-ω-hydroxy-											X	Emission Factor, Site-specific; Other Approaches	
143372-54-7	Siloxanes and Silicones, (3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecyl)oxy Me, hydroxy Me, Me octyl, ethers with polyethylene glycol mono-Me ether											X	Monitoring, Continuous	

Appendix B – Methods for selecting the proposed list of PFAS

The NPRI PFAS Sub-Group reached some common ground on a list of five criteria for selecting individual PFAS to list on NPRI:

1. PFAS for which Canadian or international guidelines exist
2. PFAS that have been detected in the Canadian environment and or in Canadian human biomonitoring studies
3. PFAS that have been reported to the US Toxic Release Inventory
4. PFAS that were identified by Sub-Group/MSWG members. Trifluoroacetic acid (TFA; CAS RN 76-05-1) was identified by the Sub-Group as a priority for addition, and others may be identified during consultations with the MSWG and the public
5. PFAS detected in environmental samples and biomonitoring studies in the scientific literature in Canada and in other jurisdictions (if linked to potential facility releases in Canada)

NPRI developed the proposed list of 131 PFAS based on the first four criteria listed above. Adding substances based on the fifth criterion is an area for potential future adjustments to the NPRI list.

A list of 108 CAS RNs was developed based on the four criteria:

- PFAS for which Canadian or international guidelines or standards exist for air, biosolids, soil, water and other matrices (45 CAS RNs) from the following sources:
    - Interstate Technology Regulatory Council PFAS Water and Soil Values Table Excel file (August 2023) and PFAS Air Criteria Table Excel File (September 2023)
    - Canadian Food Inspection Agency Interim standard for PFAS in biosolids
    - Canadian Council of Ministers of the Environment soil and groundwater quality guidelines for PFOS
    - Federal Environmental Quality Guidelines for PFOS
    - Health Canada drinking water guidelines for PFOS and PFOA and screening values for other PFAS
    - Health Canada Draft objective for PFAS in Canadian drinking water
    - Health Canada Soil Screening Values for PFAS
    - Ontario Ministry of the Environment, Conservation and Parks interim drinking water guideline for PFAS
- PFAS that have been detected by ECCC and HC in the Canadian environment and in Canadian biomonitoring studies (43 CAS RNs; non-exhaustive list prepared by ECCC November 2023)
    - PFAS detected in fish, wildlife, water, wastewater, biosolids, sediment, landfill leachate and air (CMP and other ECCC monitoring)
    - PFAS detected in human blood plasma and serum (Canadian Health Measures Survey and Maternal Infant Research on Environmental Chemicals)
- PFAS that were reported to the US TRI from 2020-2022 (63 CAS RNs; downloaded December 15, 2023)
- Trifluoroacetic acid

The list of 108 CAS RNs included a mixture of acid, anionic and salt forms of PFAS. Weak acids and bases are listed in the NPRI with the qualifier “and its salts.” Although the CAS RN that appears on the NPRI list is specific to the acid or base, all salts of these substances must be reported as an equivalent weight of the acid or base. Therefore, salt forms do not need to be listed separately in the NPRI if the corresponding acid is listed with the “and its salts” qualifier. In order to capture comprehensive reporting of all forms of the selected PFAS, the list of 108 CAS RNs was modified to

- Remove the CAS RNs for the salt forms of PFAS where the corresponding acid was captured by the selection criteria (the salt forms will still be required to be reported, but will not appear separately in the NPRI list)
- Add the CAS RN of the acid forms of PFAS where the salt form was captured by the criteria, but the corresponding acid was not, and then remove the CAS RN for salt form
- Add the “and its salts” qualifier to all the acid forms
- Add the CAS RN for the anionic forms of the acid forms that were captured by the criteria, if the anionic forms were not already captured
- Add the CAS RN of the acid forms of PFAS where the anionic form was captured by the criteria, but the corresponding acid was not

The result is a list of 131 CAS RNs, including 48 acids with the “and its salts” qualifier, which are proposed to be listed in NPRI (listed in Appendix A). This means that there will be 131 PFAS listed in the NPRI Gazette Notice, but the number of PFAS that will be reportable is higher.

The list is as complete as possible with current information sources. However, it should be noted that:

- Whether a substance is recognized as a PFAS is based on different definitions, depending on the source. CAS RNs for PFAS were obtained for this process from the following main sources, with each source using different definitions of PFAS:
    - US Environmental Protection Agency CompTox Chemicals Dashboard (downloaded Nov 27, 2023)
        - Total of 15,994 CAS RNs from two tables:
            - PFASSTRUCTV5 - August 2022: List of PFAS with a structure assigned, using a combination of a set of substructural filters and percent of fluorine in the molecular formula ignoring all hydrogen atoms (14,735 CAS RNs) and
            - PFASDEV2 - August 2021: List of PFAS without explicit structures - polymers and other UVCB chemicals (1,258 CAS RNs)
    - The Swedish Chemicals Agency (KEMI) PRIO database (downloaded Nov 27, 2023)
        - 10,924 CAS RNs
        - under the Advanced search tab, expand the Criteria list and check "PFAS, Particularly persistent substances”
    - OECD Global Database of PFAS (downloaded Nov 23, 2023)
        - 4,730 CAS RNs
        - “3_overview_with_CAS" sheet
- Once the list of 131 substances was generated from these sources, NPRI confirmed that each of these PFAS meet the OECD 2021 definition of PFAS
- When looking at abbreviated names, some PFAS can appear to have more than one CAS RN – the CAS RN is dependent on whether the substance is in anionic, acid or salt form, e.g., perfluorooctanesulfonic acid (CAS RN 1763-23-1) and the anionic form perfluorooctanesulfonate (CAS RN 45298-90-6) are both often referred to as PFOS. Potassium

perfluorooctanesulfonate (CAS RN 2795-39-3) is a salt of PFOS, sometimes referred to as PFOS-K

- Some CAS RNs are masked or not provided in the information sources and are therefore not included in the proposed list.
- The identities of some PFAS are confidential in the information sources and are therefore not included in the proposed list.