Summary of public comments received on the Draft State of Per- and Polyfluoroalkyl substances Report and the Risk Management Scope for Per- and Polyfluoroalkyl substances

Comments on the Draft State of Per- and Polyfluoroalkyl Substances Report and the Risk Management Scope for Per- and Polyfluoroalkyl Substances were submitted by 3M Canada Company, American Chemistry Council (Virginia), American Chemistry Council's Center for the Polyurethanes Industry, American Chemistry Council's Performance Fluoropolymer Partnership, Aptar Pharma, Asahi Kasei Chemicals Corporation, Association for Contract Textiles, Association of Equipment Manufacturers, Association of Home Appliance Manufacturers, Association pour la santé environnementale du Québec & Environmental Health Association of Canada, AstraZeneca Canada Inc., B.C. Ministry of Environment & Climate Change Strategy, Ballard Power Systems, Inc., BizLink elocab Ltd., Bourque Isolation LDL, Broadway Insulation Ltd., Business and Institutional Furniture Manufacturers Association, Caliber Quality Solutions, Canadian Airports Council, Canadian Animal Health Institute, Canadian Beverage Association, Canadian Consumer Specialty Products Association, Canadian Environmental Law Association, Canadian Fuels Association (Western Division), Canadian Hydrogen and Fuel Cell Association, Canadian Manufacturers & Exporters (Ottawa), Canadian Nuclear Association, Canadian Oil & Natural Gas Producers, Canadian Paint and Coatings Association, Canadian Urethane Public Foam Contractors Association Inc., Canadian Vehicle Manufacturers Association, Chemistry Industry Association of Canada, City of Calgary, City of Toronto, Computer Time, Conservation Council of New Brunswick, Cosmetics Alliance Canada, CropLife Canada, Department of National Defence, DuPont Performance Building Solutions, Ecojustice (on behalf of Breast Cancer Action Québec, Canadian Association of Physicians for the Environment, David Suzuki Foundation, Environmental Defence and Women's Healthy Environments Network), Éco Entreprises Québec, Eco Insulation Canada Inc., Eco-Solutions, EcoStar Insulation, Elastochem Specialty Chemicals Inc., Electronics Product Stewardship Canada, Fertilizer Canada, FireRein Inc., Forest Products Association of Canada, Formathane Plastiques Industriels, Global Automakers of Canada, Government of Manitoba – Medical Officers of Health, Water Science and Watershed Management Branch, and the Office of Drinking Water, Gouvernment du Québec, Great Lakes and St. Lawrence Cities Initiative, Hearth, Patio & Barbecue Association of Canada, Heating, Refrigeration and Air Conditioning Institute of Canada, Hitachi Energy, Honeywell International Inc., Household & Commercial Products Association, Huntsman Corporation, Indigenous Services Canada, Industry Coordinating Group for CEPA, International Association of Fire Fighters, International Pharmaceutical Aerosol Consortium and International Pharmaceutical Aerosol Consortium on Regulation & Science, Invinity Energy Systems, Ionomr Innovations Inc., Iowa State University, Isolam Inc., Isolation Algon (2000) Inc., Isolation Ecoplus Inc., Isolation Fortin et Gouttières Sag-Lac, Isolation Majeau et Frère, Isolation MJ, Kingspan Insulation LLC, Le Groupe Industriel Barsatech, Les Emballages Carrousel Inc., Lystek International, MedTech Canada, Member of Parliament for Saanich-Gulf Islands, Merck Canada Inc., Metro Vancouver, National Council for Air and Stream Improvement Inc., New Brunswick Coalition of Persons with Disabilities, Ontario Biosolids Council, Ontario Environment Industry Association, Ontario Public Health Association, OTI Lumionics Inc., Ottawa Riverkeeper, Painchaud Productions, PCB Piezotronics, Performance Insulation Inc., Prism Powder Coatings Inc., Public Service Alliance of Canada, Public Services and Procurement Canada, Region of Peel (Public Works), Region of Waterloo, Réseau Environnement, Retail Council of Canada, RTX Corporation, Sands Construction Inc., Solutions Genyk Inc., Soprema Inc., Spray City Insulation, Stantec, Steve's Urethane Inc., StreamGo Water Solutions Inc., The Clorox Company of Canada Ltd., The Regional Municipality of York, Thermo Solutions Insulation Inc., Town of Bradford West Gwillimbury, Triangle Fluid Controls Ltd., Truck and Engine Manufacturers Association, US Chamber of Commerce, US Coalition of Manufacturers of Complex Products, Université Laval, University of Toronto (on behalf of academic scientists), University of Victoria,

Uréthane Supérieur de Québec, Victimes des pesticides du Québec, Walker Industries, Waste Connections of Canada, Waste to Resource Ontario, Whirlpool Canada LP, Zero Waste British Columbia, and individuals of the general public.

While the public comment period on the Draft State of Per- and Polyfluoroalkyl Substances (PFAS) Report and Risk Management Scope ended on July 19, 2023, the program accepted late submissions understanding the importance of stakeholder engagement. However, the program focused its efforts on addressing late comments that were relevant to the proposed conclusion of the Updated Draft State of PFAS Report. While efforts have been made to consider all comments submitted, those individuals or groups who submitted comments after the close of the 60-day public comment period may not be named in the above list. Late comments received regarding the risk management of PFAS will be considered as the approach to managing PFAS evolves.

Summarized public comments and responses are provided below, organized by topic:

On this page

General comments

Comment Summary 1: A commenter is concerned that the documentation is too complex. More plain language material is necessary for the public to engage in a meaningful way.

Response 1: With respect to plain text translations of the documentation, “Key Points” summary bullets found at the beginning of each chapter of the Updated Draft State of PFAS Report give a general overview of each section. In addition, summarized information on the Updated Draft State of PFAS Report and Revised Risk Management Scope is available in the following documents:

- a PFAS Information Sheet, and
- a Health Canada PFAS webpage, which is a plain language summary of information about PFAS.

Comment Summary 2: A commenter found that there are multiple and conflicting sources of information regarding risk management actions of PFAS in Canada, which led them to believe that all PFAS were already banned. They were wondering why the class of PFAS is not already banned. They requested clarification on what the Government of Canada is doing.

Response 2: Per- and polyfluoroalkyl substances (PFAS) are a class of thousands of human-made substances. Canada has addressed several substances and subgroups of PFAS for which early evidence had indicated potential concerns for the environment or its biological diversity. A limited number of subgroups of PFAS are currently subject to risk management controls in Canada:

- PFOS (perfluorooctane sulfonate, its salts and precursors)
- PFOA (perfluorooctanoic acid, which has the molecular formula $C_7F_{15}CO_2H$, its salts and precursors)
- LC-PFCAs (long-chain perfluorocarboxylic acids that have the molecular formula $C_nF_{2n+1}CO_2H$ in which $8 \leq n \leq 20$, their salts and their precursors)
- certain CFCs (chlorofluorocarbons)
- certain HCFCs (hydrochlorofluorocarbons), and
- certain HFCs (hydrofluorocarbons)

PFOS, PFOA, LC-PFCAs and their salts and precursors are regulated in Canada by the *Prohibition of Certain Toxic Substances Regulations*, 2012. These Regulations prohibit the manufacture, use, sale, offer for sale and import of these 3 PFAS subgroups and of products that contain them, with some exemptions. For more information, please visit the *Prohibition of Certain Toxic Substances Regulations*, 2012: overview webpage. Please note the Government published draft Regulations on May 14, 2022 (*proposed Prohibition of Certain Toxic Substances Regulations*, 2022) to remove or phase out most of the exemptions. For example, the proposed Regulations would further restrict exempted uses of PFOS, PFOA and LC-PFCAs, and products containing them.

The proposed Order Amending Schedule 3 to the *Canadian Environmental Protection Act, 1999 (*CEPA*)* was also published on May 14, 2022, and would add PFOA and LC-PFCAs to the Export Control List, making their exports subject to the Export of Substances on the Export Control List Regulations, similarly to PFOS which is already listed in the Export Control List.

The import, export, manufacture, and use of CFCs, HCFCs and HFCs, including some that are PFAS, as well as certain products containing or designed to contain them are controlled under the *Ozone Depleting Substances and Halocarbon Alternatives Regulations*.

As stated in the Revised Risk Management Scope, the government’s proposed objective in managing the risks of PFAS is, over time, to achieve the lowest levels of environmental and human exposure that are technically and economically feasible, taking into consideration socio-economic factors. Please refer to the Revised Risk Management Scope for more information about the government's proposed approach to manage risks caused by PFAS.

Comment Summary 3: Commenters claimed that the Draft State of PFAS Report has a biased approach to the collection and interpretation of the scientific literature. The report does not describe any literature search methodology or assessment of study quality.

Response 3: When conducting an assessment, Environment and Climate Change Canada (ECCC) and Health Canada (HC) collect information from a variety of published and unpublished sources. In the case of the Updated Draft State of PFAS Report, literature searches were conducted up to March 2022, with some additional searches up to February 2024. These searches included consideration of journal articles, review papers, electronic databases, and reports from international jurisdictions. The information cited in the updated draft report represents the most critical information to support the lines of evidence for the proposed conclusion and it does not reflect the full body of information that was considered. Public comments and referenced studies identified in public comments were considered when finalizing the report. The Supporting document: Ecological state of the science report also provides a more detailed summary of available environmental data from the published literature on 3 specific subgroups of PFAS (short-chain perfluorocarboxylic acids (SC-PFCAs), short-chain perfluorosulfonic Acids (SC-PFSAs), and long-chain perfluorosulfonic acids (LC-PFSAs)),

Comment Summary 4: Commenters asked for further detail on the evaluation of new chemical substances. They enquired about what the Government of Canada can do to ensure that substances like PFAS do not enter the market again.

Response 4: The *New Substances Notification Regulations (Chemicals and Polymers)* (NSNR) help protect people living in Canada and the environment, as they allow new chemicals and polymers to be assessed prior to being imported or manufactured in Canada above prescribed quantity thresholds. Following a New Substances Notification (NSN), ECCC and HC follow a joint assessment process to determine whether there is a potential risk to the environment and human health. When potential risks are identified, the Government of Canada imposes risk management measures. Additional information on the NSNR can be found on the New substances: Chemicals and polymers webpage.

As noted in the Updated Draft State of PFAS Report, about one-third of the approximately 280 PFAS notified under the new substances regime since 1994 were subject to actions intended to mitigate the risks to human health and/or the environment.

Since the publication of the Draft State of PFAS Report (published in May 2023), the New Substances program has considered the information included in the report, including the potential of combined exposure to multiple PFAS and the proposed class conclusion. The New Substances program will continue to consider updated information, and will inform notifiers about potential actions on PFAS, referencing the State of PFAS Report and associated risk management documents, as appropriate.

Comment Summary 5: Commenters requested clarification on how the Government of Canada plans to identify and measure new PFAS under the New Substances program, given that analytical methods have been developed for only a few PFAS.

Response 5: Under CEPA, the assessment of a new substance that is proposed to be imported or manufactured in Canada begins once the Government of Canada receives a complete New Substances Notification from the importer or manufacturer of the new substance. The New Substances Notification package must contain all required information prescribed in the NSNR (more information available at the New Substances program webpage). The New Substances program is not responsible for generating the required information prescribed in the NSNR, nor for measuring PFAS in the environment (other programs in the Government of Canada conduct monitoring activities as described in Sections 4 and 5 *Environmental occurrence* and *Human biomonitoring*, respectively of the Updated Draft State of PFAS Report). Importers and manufacturers of new PFAS are responsible for providing information, including test results (for example, from physical-chemical data tests), on new substances to be imported or manufactured in Canada. This is supplemented by information in the scientific literature and from other sources, all of which are used by the Government to assess the human and environmental health risks of the individual substance at the time of notification.

Comment Summary 6: A commenter questioned why the Supporting document: Ecological state of the science report on SC-PFCAs, SC-PFSAs, and LC-PFSAs was not issued with a formal consultation period.

Response 6: Consistent with standard program practice, the Draft State of PFAS Report and the Risk Management Scope were published with an identified public comment period. Assessments within the program frequently have supporting documentation that is available on request. In this case, the Supporting document was published, given anticipated broader interest among stakeholders in seeing this compilation of information. While there is no official public comment period for supporting documents, stakeholders are welcome to submit comments.

Comment Summary 7: A commenter noted that the scope of the Supporting document: Ecological state of the science report on SC-PFCAs, SC-PFSAs, and LC-PFSAs is much narrower than the Draft State of PFAS Report and planned data gathering notice.

The commenter requested clarity regarding the scope of the various reports relative to the planned data gathering notice.

Response 7: The Supporting document: Ecological state of the science report is intended to provide a more detailed summary of available environmental data from the published literature on three specific subgroups of PFAS (SC-PFCAs, SC-PFSAs, and LC-PFSAs), some of which are currently being used as substitutes for regulated PFAS (specifically PFOS, PFOA and LC-PFCAs and their salts and precursors). Information from the Supporting Document is referred to in the Updated Draft State of PFAS Report.

The planned CEPA section 71 notice intends to collect information on those PFAS likely to be present in Canadian commerce, not currently regulated, and that have not been recently subject to other information gathering initiatives. However, the Updated Draft State of PFAS Report and the Revised Risk Management Scope relate to the class of PFAS which is wider than the list of PFAS in the section 71 notice.

Comment Summary 8: Editorial corrections were made by commenters in both languages. A commenter also identified translation errors in the French version and requested an in-depth linguistic review.

Response 8: Changes were made to the report based on suggested revisions, where appropriate. Translation errors in the French version have been addressed in the updated draft of the report.

Comment Summary 9: A commenter is concerned that the increase in wildfires and the resulting increased use of PFAS-containing firefighting foams have accelerated the exposure to humans, wildlife, and the environment.

Response 9: PFAS-containing firefighting foams are designed to be used for class B fires, which are fires involving liquid fuels and polar solvents, and are not designed for use on wildfires. The Government of Canada is proposing to restrict firefighting foams containing PFAS not currently regulated under the *Prohibition of Certain Toxic Substances Regulations*, 2012. Proposed restrictions for PFAS in firefighting foams include provisions to ensure that their releases to the environment and exposure to humans are minimized during their entire lifecycle.

Comment Summary 10: Commenters request clarity concerning the definition of "alternatives." They requested that the definition be limited to alternatives that are technically feasible and commercially viable and that would not be regrettable substitutions.

Response 10: Alternatives to PFAS could be non-PFAS substances but could also include other technologies or processes. Any regulatory measure that prohibits PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives, socio-economic factors and health and ecological concerns.

Comment Summary 11: A commenter would like the Government of Canada to ban the use of laboratory animals for PFAS toxicity studies.

Response 11: On June 27, 2023, it was announced that the *Food and Drugs Act* was amended to ban cosmetic animal testing. Beyond cosmetics, HC and ECCC is working with the international scientific and regulatory community to develop, validate and implement effective alternatives to animal testing. Bill S-5, *Strengthening Environmental Protection for a Healthier Canada Act*, which received Royal Assent on June 13, 2023, added several provisions to CEPA aimed at replacing, reducing, or refining the use of vertebrate animals in toxicity testing. A notice of intent on the development of a strategy to guide the replacement, reduction, or refinement of vertebrate animal testing under CEPA was published for a 60-day public comment period in November 2023.

Comment Summary 12: Commenters noted that the representation of new approach methodologies (NAMs) in the Draft State of PFAS Report are superficial. The use of NAMs should be enhanced and explored further.

Response 12: The intent of this section of the report is to acknowledge that these tools are becoming increasingly important in toxicological testing and assessing many data-poor chemicals, including PFAS. It is recognized that PFAS pose unique challenges when implementing NAMs, and strategies are currently being explored within this chemical space in Canada and internationally. Although this is an active area of research and development, a comprehensive review regarding NAMs and their application is considered to be outside the scope of the Updated Draft State of PFAS Report.

Comment Summary 13: Commenters requested that the Risk Management Scope clearly indicate the right of every individual in Canada to a healthy environment.

They stated that the Risk Management Scope objectives do not align with the duty to protect the right of every individual in Canada to a healthy environment and uphold the related principles, which include upholding environmental justice and avoiding adverse effects that disproportionately affect vulnerable populations.

A commenter noted that it is inappropriate to make conclusions related to new CEPA provisions, such as the right to a healthy environment, before consultations have taken place.

Response 13: CEPA requires that the manner in which a right to a healthy environment is considered under CEPA be elaborated on in an implementation framework, to be published in June 2025. The implementation framework will be developed in consultation with interested persons, and set out how a right to a healthy environment will be considered in the administration of CEPA. Through the development of the implementation framework, ECCC and HC will examine opportunities to improve and expand on how principles, including environmental justice, are applied across programs and identify new opportunities. To learn more about opportunities to provide comments on the development of the implementation framework, please consult the Right to a Healthy Environment under CEPA webpage under CEPA webpage.

Comment Summary 14: Commenters suggested that it is important to more deeply understand the cumulative effects of PFAS and not qualitatively draw conclusions. It was also noted that there is insufficient human health data to support a human health toxic conclusion across the class of PFAS. Issues that were specifically identified included the following:

- **Several commenters cited Anderson et al. (2022) and noted that it is inappropriate to assume that hazards are equivalent across the entire diverse class of PFAS. Commenters highlighted issues such as:**
    - **lack of information regarding mode of action (MOA) across species,**
    - **data gaps, and**
    - **variability in the properties of PFAS (for example bioaccumulation and toxicokinetic differences),**
- **No analysis was provided on the relative potency of individual PFAS and no suggestions were provided on how to specifically address the wide range of potencies,**
- **No support was provided for the following statement: "on the expectation that combined exposures to multiple PFAS increase the likelihood of detrimental impacts".**

Response 14: The article by Anderson et al. (2022) summarized results from an expert panel examining the topic of grouping PFAS for human health risk assessment and includes a statement that "all PFAS" should not be grouped together; this was specifically highlighted by the commenters.

Anderson et al. (2022) explored key issues, including:

- the importance of information on the MOA of substances for grouping PFAS, and
- whether the assumption of dose additivity is justified for PFAS based on available data.

Anderson et al. (2022) noted that compound-specific MOA information is "the gold standard" and that PFAS groupings should "ideally" be based only on common toxic MOAs and/or target organs. However, Anderson et al. (2022) noted that "unfortunately, these data are the least likely to be available for the majority of PFAS", thereby indicating that this exercise is not feasible for PFAS at this time.

Anderson et al. (2022) touched on the issue of cumulative effects and indicated that "the expert panel was evenly split" on the issue of whether dose additivity is justified for PFAS based on available data. It was acknowledged that dose additivity is the default assumption used by several United States (US) Federal

Agencies (for example US Environmental Protection Agency [EPA]) in risk assessments of chemical mixtures, but important data are not available to enable the dose additive approach. In the conclusions section of their paper, Anderson et al. (2022) noted that "robust assessment of potential human health risk to a representative mixture of PFAS is not currently feasible".

The Updated Draft State of PFAS Report addresses cumulative effects in a qualitative manner, acknowledging that there are toxicity data gaps amongst many of the individual substances in the class of PFAS and that MOA for all PFAS-induced effects are not well understood, hence why a qualitative approach was taken. The Draft State of PFAS Report (published in May 2023) also acknowledged information on relative potency of PFAS (Section 5.3 *Existing human biomonitoring guidance values*) but stated that these approaches are considered to be in their early stages. It should be noted, however, that this information was not considered directly relevant to the biomonitoring guidance values section and has been removed from the updated draft report.

Given the complexity and magnitude of the class of PFAS and the persistence and ubiquity of PFAS, it is reasonable to anticipate that the environment and humans are currently exposed to multiple PFAS and that this will continue in the future. A precautionary, class-based approach to addressing PFAS is needed to adequately protect the environment and humans.

Comment Summary 15: A commenter suggested to immediately shorten the review cycle for pesticides currently on the market from 15 years to 1 year for a more comprehensive scientific review on environmental health and safety.

Response 15: After a pesticide is registered, 2 post-market review processes exist under the *Pest Control Products Act* (PCPA) to determine the continued registration of pesticides: re-evaluation and special review.

First, the Pest Management Regulatory Agency (PMRA) may initiate a re-evaluation of a registered pesticide if there has been a change in the information required or in the procedures used by the PMRA to determine whether a pesticide meets health, environment, and value standards. Second, a special review may be triggered if the Health Minister has reasonable grounds to believe that a registered pest control product poses health or environmental risks, or its value is unacceptable (among other triggers). The PMRA does not hesitate to use these mechanisms wherever appropriate, as determined by the underlying science.

Furthermore, as part of the PMRA's transformation agenda, it is modernizing its business processes. PMRA is strengthening human health and environmental protection through a continuous oversight approach to pesticide regulatory management. This approach will make the PMRA's regulatory oversight more proactive, so that emerging risks can be quickly addressed.

Comment Summary 16: A commenter requested that fluoropolymers and side-chain fluorinated polymers (SCFP) be treated as 2 distinct sub-groups of PFAS. The commenter mentioned that some stakeholders are confusing fluoropolymers with SCFP. However, fluoropolymers are different in composition, structure, and physical, chemical and biological properties compared to SCFP. Unlike fluoropolymers, SCFP are not critical to innovations that enable sustainability.

Response 16: The Updated Draft State of PFAS Report differentiates fluoropolymers and SCFP. A new section, Section 1.1.1 *Polymeric PFAS*, was added to the Updated Draft State of PFAS Report.

Comment Summary 17: Commenters submitted reports that were prepared in response to the European Chemicals Agency (ECHA) restriction proposals on PFAS (set out in an Annex XV restriction report) for consideration.

Response 17: The submissions have been reviewed and considered. Specific comments raised in these reports and responses to these submissions are addressed elsewhere in the table.

Comment Summary 18: Commenter recommended adding text to the risk management approach to indicate whether objectives for current risk management for certain PFAS (PFOS, PFOA, LC-PFCAs) were achieved and if there were impacts on the exposure of the population in Canada.

Response 18: The Updated Draft State of PFAS Report summarizes human biomonitoring results from the Canadian Health Measures Survey (CHMS). The CHMS shows a statistically significant decreasing trend for PFOA and PFOS since 2007 in people in Canada aged 20-79 as well as for certain LC-PFCAs (that is, perfluorononanoic acid [PFNA], and perfluorodecanoic acid [PFDA]) in people aged 12-79 since 2009.

The Updated Draft State of PFAS Report, also notes that biomonitoring results for PFNA in pregnant women in Nunavik have increased between 2011 to 2012 and 2016 to 2017.

In addition, the Updated Draft State of PFAS Report includes the results of environmental monitoring of specific sites across Canada over time, which has shown a general decrease in PFOA and PFOS levels over the last decade. However, concentrations of other PFAS, such as perfluorobutanoic acid (PFBA) and perfluoropentanoic acid (PFPeA), have generally increased.

Definition and scope

Comment Summary 19: Commenters are in opposition to a class-based approach. Several recommended conducting assessments for subgroups or individual PFAS. They noted that there is limited information on most substances in the class to apply a class-based approach.

These commenters noted that not all PFAS chemicals possess the same hazard profile. The class of PFAS is comprised of thousands of individual substances with diverse molecular structures, which are highly varied in physical and chemical properties, health and environmental profiles, toxicological properties, uses, and benefits.

Response 19: A precautionary, class-based approach to addressing PFAS is needed to protect the environment and people from anticipated adverse effects.

While it is acknowledged that only a small number of PFAS have been the focus of the majority of studies, there is a growing body of evidence suggesting that concerns identified for these well-studied substances are more broadly applicable to other PFAS than previously believed.

While there may be thousands of substances in the class of PFAS with diverse uses, only a small number of them have been well-studied. Amongst those that have been well-studied, there is a degree of consistency in their behaviour in that they either are extremely persistent or degrade into simpler PFAS that are persistent, and they are associated with effects of concern. To be protective of the environment and human health, and to apply precaution when addressing gaps in information, it is reasonable to anticipate that the concerns identified for PFAS that have been well studied may also be inherent in other substances in the class. The use of a class-based approach will also prevent the substitution of one regulated PFAS for an unregulated PFAS that possesses similar hazardous properties, known as regrettable substitution.

Comment Summary 20: Commenters stated that the Draft State of PFAS Report does not follow a scientific and risk-based approach that identifies the critical exposures that are of primary concern based on actual data.

Some commenters were not supportive of the toxic conclusion for the class of PFAS. They commented that the documents failed to demonstrate that concentrations or quantities of PFAS in Canada are associated with health or ecological effects, as per section 64 of CEPA.

They also noted that the work completed by the departments to date has not satisfied the statutory requirements to add a substance or a group of substances to Schedule 1. For instance, a risk assessment has not yet been performed. Until a risk assessment is completed, it is inappropriate to make any conclusions under CEPA section 64. Additionally, the conclusions of the Draft State of PFAS Report do not reflect the full weight of evidence of the available science as information is only available for a small number of PFAS.

Response 20: The Updated Draft State of PFAS Report considers information on potential adverse effects of PFAS to human health and the environment and weighs it against information on exposure to determine the potential for harm. Unlike quantitative assessments that consider risk metrics such as risk quotients or margins of exposure among other lines of evidence, this report uses multiple lines of evidence, based on the latest science available, in a qualitative approach.

Exposure is informed by environmental monitoring and biomonitoring data that indicate widespread detection of certain PFAS in humans, biota, and environmental media, including exposure to multiple PFAS at the same time. Certain PFAS may bioaccumulate and biomagnify in food webs to an extent that can cause adverse effects in biota at low environmental concentrations.

This information is considered in combination with the knowledge that PFAS are associated with broad uses, extreme persistence in the environment and long half-lives in organisms. The information is also considered alongside the evidence that organisms are typically exposed simultaneously to multiple PFAS in the environment, which has the potential to increase detrimental impacts. Recent amendments to CEPA also require consideration of potential cumulative effects on human health and the environment from exposure to multiple substances.

Given the growing body of scientific evidence suggesting that concerns for health and the environment identified from well-studied PFAS are more broadly applicable to other PFAS, and given the expectation that

combined exposures to multiple PFAS will increase the likelihood of detrimental impacts, addressing the large number of PFAS using a class-based approach is appropriate.

Of note, conclusions for the ecological components of screening assessments for PFOS, PFOA, LC-PFCAs, and their salts and precursors were based on a similar qualitative approach.

Comment Summary 21: Commenters expressed support for a class-based approach.

These commenters noted that by addressing PFAS as a class, the Government of Canada is adopting a proactive and precautionary approach. They noted how a class approach is imperative to avoid "regrettable substitution," address the impact of PFAS mixtures on human health and reduce human and environmental exposure to the broader class of PFAS.

Response 21: Noted.

Comment Summary 22: Commenters highlighted the need for a carefully considered definition for the class of PFAS to avoid having them substituted with equally harmful replacements.

Response 22: Although a few chemical definitions have been proposed for PFAS, there is no universally accepted definition across jurisdictions. To address the lack of a widely agreed upon definition of PFAS, the Organisation for Economic Co-operation and Development (OECD) 2021 definition was released under the auspices of the OECD and the United Nations Environment Programme (UNEP). The OECD is an intergovernmental organization having members in North and South America, Europe, Asia, and the Pacific regions. A working group made up of representatives from several international jurisdictions and other experts developed the 2021 PFAS definition.

The OECD 2021 PFAS definition was chosen as the definition in the Updated Draft State of PFAS Report due to its comprehensiveness and because it was developed through a broad community of regulatory authorities. The OECD definition represents the growing and increasingly diverse inventory of PFAS chemicals and includes PFAS that may be developed in the future.

Comment Summary 23: Commenters emphasized that the class of PFAS must specifically include fluoropolymers and that Canada must ensure that fluoropolymers are not given blanket exemptions from regulatory measures to restrict PFAS.

In support of the inclusion of fluoropolymers, some commenters remarked that a statement in the Draft State of PFAS Report ("complexities associated with fluoropolymers that require further consideration before the toxicity of these substances can be accurately assessed") reflects excessive weight placed on reports written by industry staff scientists (that is, Henry et al. 2018).

Commenters also stated that a lifecycle approach is essential when considering fluoropolymers. Specific lifecycle comments include:

- **<u>Manufacturing of fluoropolymers:</u> Some commenters noted that the use of processing aids during the synthesis of fluoropolymers results in the release of non-polymeric PFAS that can be absorbed into the body.**

- **<u>Use of products with fluoropolymers:</u> A commenter noted that the term "fluoropolymer" should include fluoropolymer products which are the actual material produced and sold by a chemical manufacturer and fluoropolymers in finished products (for example, polytetrafluoroethylene (PTFE)-coated cookware).**

Response 23: Fluoropolymers are considered to be part of the class of PFAS, however, given information from a range of sources suggesting their differences from other PFAS, additional work on fluoropolymers is warranted. Fluoropolymers are planned for consideration in a separate assessment and their exclusion from the Updated Draft State of PFAS Report should not be interpreted as meaning that they are of low concern.

It is acknowledged that there may be potential release of non-polymeric PFAS (for example, processing aids) throughout the fluoropolymer lifecycle, as noted in Lohmann et al. (2020).

While substances meeting the definition of fluoropolymers, as defined in the Updated Draft State of PFAS Report, are planned for consideration in a separate assessment, other non-polymeric PFAS, such as processing aids, remain in scope.

Comment Summary 24: Commenters noted that the number of PFAS cited in the report, 4700, is outdated.

Response 24: The Draft State of PFAS Report (published in May 2023) notes that the class of PFAS consists of "over 4700 human-made substances." This number is based on the OECD list of PFAS published in 2018, which was compiled from public sources. Other jurisdictions have also identified a larger number of PFAS; for example, ECHA and the US EPA CompTox Chemicals Dashboard cited more than 10 000 and approximately 15 000 substances, respectively. Text has been added to the Updated Draft State of PFAS Report to note these updated estimates.

Comment Summary 25: Commenters noted that the OECD definition of PFAS is too broad and was not intended for regulatory purposes. Some commenters suggested using other definitions (for example, *Delaware's Drinking Water Protection Act*).

Response 25: The Updated Draft State of PFAS Report uses the definition of PFAS published by the OECD (see Section 1.1 *Chemical Scope*). This is a broad chemical definition developed by a working group that consists of several international regulatory authorities and other experts. The OECD (2021) report addresses the motivation behind the development of this definition, including the recognition of substances that contained fully fluorinated carbon moieties that did not meet earlier definitions.

Comment Summary 26: **Commenters provided recommendations for subdividing the class of PFAS based on chemistry (for example, polymeric vs. non-polymeric, acid vs. non-acid chemistries). Some commenters also provided recommendations for dividing polymeric PFAS into subgroups for regulatory purposes.**

Response 26: Section 1.1 *Chemical Scope* of the Updated Draft State of PFAS Report clearly identifies the definition of PFAS and was revised to define commonly identified polymeric PFAS.

The Government of Canada has committed to use a class-based approach to address the broad class of PFAS. Only a small number of PFAS have been the focus of the majority of studies. To be protective of the environment and human health, and to apply precaution when addressing gaps in information, it is reasonable to anticipate that the concerns identified for PFAS that have been well-studied may also be inherent in other substances in the class. The use of a class-based approach will help prevent the substitution of one regulated PFAS for an unregulated PFAS that possesses equally or more hazardous properties, known as regrettable substitution. A class-based approach also allows to take into consideration co-exposure to multiple PFAS which could result in cumulative effects.

However, if the proposed class conclusion is confirmed in the Final State of PFAS Report, and it is proposed that the class of PFAS is added to Schedule 1 of CEPA, this does not in and of itself restrict or prohibit the substances in the class of PFAS; rather, it enables risk management instruments to be developed such as regulations under the Act. Risk management instruments would be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of environmental and health concerns. Before taking any risk management actions, information would be gathered to fully understand the availability of alternatives and the costs of transitioning to those alternatives.

Comment Summary 27: Commenters stated that hydrofluoroolefins (HFOs) and trifluoroacetic acid (TFA) should not be included under the definition of PFAS. Commenters noted that HFOs do not persist in the environment and that TFA produced via atmospheric degradation of HFOs is well below thresholds for concern for both human and environmental health.

Response 27: The Updated Draft State of PFAS Report acknowledges that HFOs and HCFOs degrade to TFA. Many HFOs and HCFOs, as well as TFA, are PFAS according to the 2021 OECD definition.

A new section, Section 3.3 *Considerations for hydrofluoroolefins (HFOs) and hydrochlorofluoroolefins (HCFOs)*, was added to the Updated Draft State of PFAS Report. Section 3.3 discusses atmospheric degradation of HFOs and HCFOs; occurrence, exposure, and effects of TFA; and potential contribution to cumulative effects. Additionally, Section 7 *Human health hazard* includes information on the health effects of TFA and outlines that exposure to TFA in animal models has been associated with liver effects, increased kidney weight, decreased white blood cells, reduced weight of reproductive organs, litter loss, reduced body weight of offspring, and malformations (ECHA 2023c, 2024).

If the proposed conclusion is confirmed in the final State of PFAS Report, any risk management actions would be developed in alignment with, and complementary to, existing regulations, such as the *Ozone-depleting Substances and Halocarbon Alternatives Regulations* (ODSHAR).

Comment Summary 28: Commenters proposed that fluoropolymers (and in some cases other polymeric PFAS) should not be included under the definition of PFAS used in the Schedule 1 listing and fluoropolymers should not be under the same risk management scope as the class of PFAS.

Some commenters proposed that fluoropolymers are of low concern to health and the environment and are different from the rest of the class of PFAS. Commenters also stated that data from well-studied PFAS should not be extended to fluoropolymers.

Comments related to aspects of the lifecycle of fluoropolymers include:

Manufacturing of fluoropolymers: Some commenters noted that fluoropolymers used by specific industries should not be implicated in the report conclusions as their industry or facilities do not use PFAS processing aids during production and/or are not involved in the production of fluoropolymers. Another commenter recommended removing polymeric PFAS that do not use PFAS processing aids and that have low environmental mobility (for example, high-density PTFE) from the scope of the class of PFAS while keeping in other polymeric PFAS that contain or break down into low molecular weight PFAS.

Use of fluoropolymers: Commenters stated that fluoropolymers meet OECD-defined criteria for polymers of low concern to human health and the environment, and that multiple studies demonstrate that fluoropolymers are insoluble and therefore are not mobile, non-bioavailable and non-bioaccumulative.

End-of-Life: Commenters stated that disposal of fluoropolymers (for example, in landfills, recycling, and through incineration) is proven to be safe and recommended by national and international regulations. It was stated that there would be no PFAS emissions or mobility concerns with the disposal of fluoropolymers in landfills and incineration does not contribute to PFAS emissions. In addition, a commenter noted that recycling to recover and the reuse of fluoropolymer materials avoid environmental exposures during end-of-life.

Response 28: Given information from a range of sources suggesting their differences from other PFAS, additional work on fluoropolymers is warranted. PFAS meeting the definition of fluoropolymers, as defined in the report, are not addressed within the report and are therefore planned for consideration in a separate assessment. Since fluoropolymers are not considered in the report, information regarding the proposed listing on Schedule 1 or the risk management scope does not include fluoropolymers. Other non-polymeric PFAS, such as processing aids, remain in scope of the conclusion in the Updated Draft State of PFAS Report.

Comment Summary 29: A commenter noted that the report should include how the government's definition of long-chain PFAS compares to other jurisdictions.

Response 29: Section 1.1 *Chemical Scope* of the updated draft report has been modified to clarify definitions for long chain (and short-chain) PFAS.

Comment Summary 30: Commenters stated that the inclusion of pest control products in the class of PFAS is not required given the level of existing data on them and because these products are already subject to regulatory oversight by HC's PMRA under the authority of the PCPA. The commenters also support their exemption from Schedule 1 of CEPA.

Another commenter pointed out that the broad definition of PFAS used could lead to risk management measures potentially interfering with the PMRA mandate; however, the commenter was not opposed to a definition of PFAS that included pesticides.

Response 30: The Chemicals Management Plan (CMP) integrates federal programs into a single strategy to ensure that chemicals are managed appropriately in order to prevent harm to people living in Canada and to the environment. In addition to CEPA, there are several other Government of Canada programs and agencies involved in assessing and managing the risks from chemical substances, including the PCPA, which is administered by the PMRA. Proposed risk management options under consideration are meant to be

complementary to existing regulations. As pesticidal uses are regulated under the PCPA, which is managed by the PMRA, potential controls on PFAS used in pest control products would be considered under the PCPA.

Comment Summary 31: A commenter noted that the class of PFAS is so broad that it includes life-saving pharmaceuticals that have already been approved for human use by HC.

Response 31: Through the CMP, the Government of Canada has considered uses of chemical substances that may also be regulated under regulatory frameworks other than CEPA. For example, pharmaceuticals, natural health products, food products, consumer products, and cosmetics may be regulated under the *Food and Drugs Act.* However, substances used in these products are also examined under the CMP as broader considerations may be taken into account, such as exposure via environmental media associated with product lifecycle. Risk management may be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of environmental and health concerns.

Comment Summary 32: Commenters stated that ECCC and HC have already assessed the risk posed by certain fluorinated gases and determined, prior to listing them on the Domestic Substances List (DSL), that they do not pose a threat to the environment or human health. They claimed that substances that have previously been assessed as not toxic prior to entry into the Canadian marketplace should not have been arbitrarily designated as CEPA-toxic because they meet OECD's broad definition for PFAS.

Response 32: CEPA includes several ways to initiate the assessment of a substance. Some of the substances that commenters identified were added to the DSL following submission under the NSNR. Other substances identified by the commenters were manufactured or imported during the transition period (that is, between January 1, 1987, and July 1, 1994) and were added to the DSL following a risk assessment by ECCC and HC. One of the substances identified was in commerce in Canada between 1984 and 1986, so it was included on the original DSL without assessment. The presence of a substance on the DSL does not preclude it from further assessment.

The Updated Draft State of PFAS Report includes PFAS that have been previously assessed individually.

Comment Summary 33: A commenter remarked that in the Draft State of PFAS Report, PFAS are defined as "fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom (without any H/Cl/Br/I atom attached to it), <u>that is with a few noted exceptions</u>, any chemical with at least a perfluorinated methyl group (–CF3) or a perfluorinated methylene group (–CF2–) is a PFAS." These exceptions should be listed.

Response 33: The definition presented in the report is a direct quote from the OECD and, as such, it was not modified. The wording "with a few noted exceptions" is referring to the presence of H/Cl/Br/I atoms; if the methyl or methylene carbon atom contain one of these common substituents, then it is not considered fully fluorinated and is not a PFAS. The language reinforces that a substance needs to have at least one fully fluorinated methylene or methyl carbon to be considered a PFAS.

Comment Summary 34: A commenter noted that the majority of substances that are captured by the OECD 2021 definition for PFAS are not in Canadian commerce and therefore cannot meet the Schedule 1 definition since there is no possibility of exposure.

Response 34: Although the majority of PFAS captured by the OECD 2021 definition are not manufactured in, or imported into, Canada on a commercial scale (that is, on the DSL), this does not preclude their potential exposure to humans and biota in Canada. Some PFAS are capable of undergoing long-range transport in the atmosphere or global ocean currents, as shown by their widespread distribution around the world, including in remote regions. Additionally, PFAS may be present in manufactured items that are imported into Canada and may be a source of PFAS in Canada. As highlighted in Sections 4 and 5 *Environmental occurrence* and *Human biomonitoring*, respectively of the Updated Draft State of PFAS Report, environmental monitoring and Canadian human biomonitoring has shown that PFAS are routinely detected in various environmental samples (including wildlife) collected across Canada and that certain PFAS are present in the blood of almost 100% of the Canadian population. Some PFAS that are present in monitoring data in Canada may be transformation products of PFAS that are in commerce in Canada or elsewhere.

Conclusion

Comment Summary 35: Commenters (more than 200 submissions) expressed support for the toxic conclusion for the class of PFAS.

Response 35: Noted.

Comment Summary 36: A commenter noted that the Supporting document: Ecological state of the science report on SC-PFCAs, SC-PFSAs, and LC-PFSAs is not an ecological risk assessment that supports a toxic determination under CEPA.

Response 36: The supporting document does not make any conclusions under section 64 of CEPA. It is a compilation of information from scientific literature and includes a limited summary of the compiled information in each section. This supporting document is referred to in several sections of the Updated Draft State of PFAS Report to provide additional environmental data on these subgroups of PFAS.

Comment Summary 37: Commenters urged the Government of Canada to make a toxic conclusion on PFAS, and to conclude that they also meet the criteria of paragraph 64(*b*) under CEPA, that is, toxic to the environment on which life depends.

Response 37: Although some PFAS undergo long-range transport and are widely distributed in the environment, there is no evidence that these substances cause the sort of broad-scale alterations to ecosystems or environmental conditions that are indicated in paragraph 64(*b*).

Comment Summary 38: Commenters noted that the Government of Canada should follow the standard CMP process for assessing substances under CEPA by first gathering information, then publishing a state of science report or science approach document for stakeholder input, if needed, to identify any missing information, and then publishing a risk assessment with a proposed conclusion. The Draft State of PFAS Report proposed a conclusion under CEPA before appropriately gathering information, consulting with stakeholders (including on the scope of the definition and appropriate sub-groups) and assessing risk.

Response 38: The Updated Draft State of PFAS Report follows the same general process as with any assessment conducted under the CMP. A search for available information was conducted, the information relevant to the proposed conclusion was synthesized in the report, limitations in the availability of data was indicated, and the draft report included a proposed conclusion under section 64 of CEPA based on consideration of multiple lines of evidence. The information presented in the Draft State of PFAS Report was sufficient to make a proposed conclusion. The Draft State of PFAS Report (published in May 2023) was subject to a 60-day public comment period. Based on comments received and information submitted, along with other available information, PFAS meeting the definition of fluoropolymers are therefore planned for consideration in a separate assessment. As a result of this change, an Updated Draft State of PFAS Report has been published and is also subject to a 60-day public comment period.

In addition, a Notice of Intent published in 2021 invited stakeholders to provide feedback on the intent to address PFAS as a class, including any potential challenges or opportunities. Activities identified under the Notice of Intent included the publication of a State of PFAS Report.

Comment Summary 39: A commenter claimed that the Government of Canada's previous process with toxic conclusions pursuant to section 64 of CEPA and Schedule 1 listings was not being followed. The commenter stated that, where a class is listed, all members of the class must be considered toxic pursuant to section 64. Furthermore, Schedule 1 listings for groups of substances should be narrowed to reflect only those substances within the group that are, in fact, toxic, as demonstrated through a proper risk assessment. Similarly, there are many instances where an assessment by the Government initially determined that there was insufficient information to reach a conclusion on toxicity. In these instances, the substances were not listed on Schedule 1 unless a follow-up risk assessment, which is to examine additional data, permitted a conclusion to be reached under section 64.

Response 39: ECCC and HC applied the requirements of CEPA when it conducted this assessment.

Comment Summary 40: A commenter stated that persistence alone cannot support a toxic conclusion and that persistence is not synonymous with toxicity.

Response 40: The Updated Draft State of PFAS Report draws upon multiple lines of evidence, which are not limited to persistence, to reach its proposed toxic conclusion under section 64 of CEPA. Some of the key lines of evidence include monitoring data, the extreme persistence of PFAS, their potential for bioaccumulation and biomagnification through the food chain, the ability of PFAS to move locally and over long distances, toxicological studies on humans and wildlife as well as human epidemiological information, and in particular, the potential for cumulative exposure and effects as most wildlife and human exposures involve an unknown mixture of PFAS. To be protective of the environment and human health and to apply precaution when addressing gaps in information, it is reasonable to anticipate that the concerns identified in well-studied PFAS may also be inherent in other substances in the class.

Comment Summary 41: Commenters noted that certain PFAS used by specific industries should not be implicated in the report conclusions. Commenters noted that their industry or particular facilities:

- **have control measures or programs in place to contain or limit PFAS emissions to the environment**
- **use processes that do not result in PFAS emissions to the environment**
- **are not involved in the production of these PFAS themselves, but rather the manufacturing of products that contain PFAS**

Another commenter also stated that risk assessments should recognize that some PFAS are used in carefully controlled commercial processes resulting in no human exposure and no release to the environment.

Response 41: While some industries, and certain companies and facilities within specific industries, may have controls in place to limit PFAS exposure and potential emissions to the environment, it cannot be assumed that all industries/companies have the same or equivalent measures in place. Incremental contributions of PFAS emissions from individual facilities add to the total load of PFAS in the environment and may increase the cumulative effects of PFAS. If the proposed conclusion is confirmed in the final State of PFAS Report, there will be additional opportunities for consultation where stakeholders may provide input regarding specific risk management activities. Information gathered through the various stages of consultation (including the information already submitted) will help inform the risk management actions to be developed. The risk management actions developed may be tailored to sectors and uses depending upon the information received, current industry risk management practices and standards, demonstrated absence of suitable alternatives, socio-economic factors, and health and environmental concerns.

Sources and uses

Comment Summary 42: Commenters remarked that landfills, biosolids, composting facilities, waste-to-energy facilities and wastewater treatment facilities are not potential sources of PFAS but rather pathways of environmental releases. Regulations should target the sources of PFAS contamination rather than the receivers. They recommended that the report differentiate between sources and pathways of exposure.

Response 42: ECCC acknowledges that landfills, biosolids, organic processing facilities, waste-to-energy facilities and wastewater treatment facilities are routes of entry to the environment rather than sources of release. The Updated Draft State of PFAS Report has been revised in several sections to clarify this.

The Updated Draft State of PFAS Report notes that upstream management and minimization is the most efficient method to reduce PFAS concentration in many receiving media and the only method to reduce PFAS concentrations in ambient environmental media (see Section 9 *Findings* of the report). However, this also needs to be balanced with the reality that historical consumer practices have and will continue to result in the disposal of waste containing PFAS and discharge of PFAS from waste management facilities.

Comment Summary 43: A commenter had concerns with how biosolids from municipal sludge and industrial waste were being spread on agricultural lands.

Response 43: Municipal biosolids are the stabilized nutrient-rich organic materials that remain after wastewater is treated at municipal wastewater treatment plants. Biosolids are treated to reduce their smell and pathogens. Using biosolids as a fertilizer on agricultural lands has many benefits, such as reduced landfill wastes, enhanced soil health, improved nutrient recycling, reduction of costly fertilizer use, and strengthened farm economies. Using biosolids as fertilizer also leads to carbon sequestration, which helps combat climate change. Biosolids and their application to agricultural fields are carefully regulated by the Canadian Food Inspection Agency (CFIA) (for sale and import) and the provinces and territories (for treatment, land application, and disposal) to ensure safety. Most provinces require nutrient management plans prior to biosolids being applied and restrict how often biosolids are applied to the same agricultural field.

In May 2023, the CFIA announced that it intends to implement an interim standard of less than 50 parts per billion of PFOS for all domestic and imported biosolids intended for use as commercial fertilizers.

Comment Summary 44: Commenters requested that the locations where contaminated sites are monitored and the results from these sites are made publicly available in a database.

Response 44: Information on all known and suspected contaminated sites under the custodianship of federal departments, agencies and consolidated Crown corporations is publicly available online at Federal Contaminated Sites Inventory. As of April 1, 2024, “PFAS” was added as a search category so that interested parties can find sites where PFAS are likely to be a contaminant. Each contaminated site record includes information such as the location of the site, severity of contamination, contaminated medium, nature of the contaminant, progress made to date on identifying and addressing contamination, and how much liquid- and solid-based media have been treated.

Comment Summary 45: Commenters indicated that their industry is impacted by the proposed PFAS restriction. They would like more information on potential exemptions and how their products can be exempted from the proposed restriction.

A few commenters indicated a need for exemptions and derogations for certain types of products or critical applications, including:

- **medical devices**
- **pharmaceuticals**
- **critical textiles**
- **used and new products that contain PFAS that were not intentionally added but are present due to the use of recycled materials, and**
- **water treatment membrane modules (used for water and wastewater treatment and in food, pharmaceutical and semiconductor manufacturing)**

Response 45: Owing to their properties, PFAS have a wide range of uses in products available to consumers, industrial applications, and other specialized applications, including certain firefighting foams, food packaging, drugs, cosmetics, textiles, vehicles, and electronics. Information gathered through the various stages of consultation will help inform any risk management options to be developed. Risk management may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and ecological concerns.

Any regulatory measures that prohibit PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives.

Comment Summary 46: Commenters provided additional information on products that may contribute to exposure to PFAS (for example, artificial turf, ski wax, personal hygiene products, pesticides, and textiles used in children's products such as car seats and strollers).

Response 46: Additional information received on products that may be sources of exposure to PFAS was considered. The products identified in public comments are broadly captured by the general description of the wide range of industrial uses and products described in the Updated Draft State of PFAS Report. The information gathered thus far and at other stages of consultation will be used to help inform any risk management actions to be developed.

Comment Summary 47: Commenters expressed concern with high density polyethylene (HDPE) containers treated with fluorination technology that could leach PFAS into liquid products, such as foods or other products available to consumers.

Response 47: HC is aware of experimental research showing PFAS migration from non-food grade fluorinated HDPE containers; however, it is not aware of any evidence indicating that these containers are being used for food storage in Canada. If the proposed conclusion is confirmed in the final State of PFAS Report, information and recommendations gathered through the various stages of consultation will help inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and ecological concerns.

Note: In reference to "HDPE containers treated with fluorination technology" and the possibility of PFAS leaching into food, the recently published study by Whitehead and Peaslee (2023) has led to some misinterpretation. In a subsequent news item for the University of Notre Dame (March 7, 2023), the authors stated that "it's important to note that these types of containers are not intended for food storage, but there is nothing preventing them from being used for food storage at the moment."

Comment Summary 48: A commenter urged the Government of Canada to expand monitoring for PFAS in foods, assess the impacts of food packaging on human exposure, and take steps to ensure that other federal regulations do not have the unintended impact of increasing PFAS exposure.

Response 48: The Updated Draft State of PFAS Report has been revised to incorporate more recent occurrence data for PFAS in foods from the Canadian Total Diet Study (Section 2.2 *Occurrence in retail foods*). Information on the Canadian Total Diet Study can be found on Canada.ca. The Government of Canada anticipates additional monitoring activities on PFAS in foods through surveillance programs managed by the Government of Canada. In Canada, all food packaging materials, including domestic and imported materials, are regulated under Division 23 of the *Food and Drugs Regulations*. Division 23 prohibits the sale of food in a package that could transfer a chemical to the food that may be harmful to the health of the consumer.

Continued monitoring for PFAS in food will help improve dietary exposure estimates to PFAS in Canada, identify sources and inform future potential measures, if necessary, to protect the health of Canadians. If the proposed conclusion is confirmed in the final State of PFAS Report, any risk management actions would be developed in alignment with, and complementary to, existing regulations. In addition, as stated in the Revised Risk Management Scope, the Government of Canada will consider alignment with measures taken in other jurisdictions when it is possible.

Comment Summary 49: Commenters noted that more focus needs to be put on identifying alternatives for PFAS.

Response 49: The OECD Global Perfluorinated Chemical Group, published several reports about potential alternatives to PFAS in various sectors. Reports are available from Alternatives - OECD Portal on Per and Poly Fluorinated Chemicals.

With respect to firefighting foams that are responsible for much of the known contamination of drinking water, alternative foams, equipment and techniques have been developed and tested by sectorial organizations in other countries.

Any regulatory measures to control certain uses of PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Before taking any risk management actions, information would be gathered to fully understand the availability of alternatives and the costs of transitioning to those alternatives.

Comment Summary 50: Commenters noted that banning PFAS will have a negative impact on Canada's climate plans as certain PFAS (for example, HFOs) are essential for the development of clean energy technologies.

Response 50: Any risk management actions for PFAS would be developed within the context of Canada's climate and clean-energy objectives or obligations.

Risk management instruments developed for PFAS may be tailored to specific sectors and uses depending upon the information received, relevant socio-economic factors, and in consideration of concerns to the environment and human health that have been identified.

Any regulatory measures to control certain uses of PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Additional information gathering to fully understand the availability of alternatives and the costs of transitioning to alternatives would also take place before risk management actions are taken.

Comment Summary 51: Commenters indicated that their products may contain fluoropolymers for critical applications.

Some commenters noted that banning fluoropolymers in clean energy technologies will also have a negative impact on Canada's climate plans.

Alternatively, another commenter noted that only a small percentage of fluoropolymer production is for sustainability innovations and medical devices, and that the other uses should not be exempted. They also note that the European Union's (EU's) proposed prohibition on PFAS has derogations for clean technologies and innovations.

Response 51: Based on public comments received and information submitted, along with other available information, PFAS meeting the definition of fluoropolymers as described in Section 1.1 *Chemical Scope* of the Updated Draft State of PFAS Report are therefore planned for consideration in a separate assessment.

Comment Summary 52: A commenter asked that there be clearer distinctions between legacy and ongoing uses of specific PFAS within the State of PFAS Report.

Response 52: Uses of specific PFAS were not inventoried within the Draft State of PFAS Report (published in May 2023). The report instead refers to various studies, surveys and notifications received that have helped identify numerous uses of legacy and present-day PFAS. The shift from legacy long-chain PFAS to the use of short-chain PFAS due to restrictions on PFOS, PFOA and LC-PFCAs has been more clearly emphasized in the Updated Draft State of PFAS Report.

Comment Summary 53: A commenter asked to be provided with a list of industrial sectors in Canada that are known to use PFAS.

Response 53: Uses of specific PFAS were not inventoried within the Draft State of PFAS Report (published in May 2023). Due to their properties, PFAS have a wide range of uses in products available to consumers, industrial applications, and other specialized applications, including certain firefighting foams, food packaging, non-stick cookware, drugs, cosmetics, textiles, vehicles, and electronics. Information gathered through the various stages of consultation would help inform the risk management options to be developed. Data collection initiatives (including a notice under section 71 of CEPA in the *Canada Gazette*) are planned to collect

additional information on PFAS to better understand uses and sources of release and exposure and may be used to inform risk management decisions and other activities related to PFAS.

Impacts on the environment

Comment Summary 54: Commenters suggested revisions to sections of the Draft State of PFAS Report related to waste/end-of-life, environmental fate and occurrence, and contaminated sites. Suggested revisions included reference changes and additional information to improve clarity and comprehensiveness.

Response 54: The relevant sections of the updated draft report have been revised.

Comment Summary 55: Commenters are concerned about the occurrence of PFAS in the Great Lakes.

Response 55: The Government of Canada works to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes through the Great Lakes Water Quality Agreement. Commitments to science, governance, and action are used to help restore and protect the water quality and ecosystem health of the Great Lakes.

3 subgroups of PFAS (PFOS, PFOA, LC-PFCAs, including their salts and precursors) are chemicals of mutual concern (CMCs) under the Great Lakes Water Quality Agreement with the US. This agreement aims to reduce the anthropogenic release of these chemicals into the Great Lakes. Additional information may be found on the Canada's Great Lakes Strategy for PFOS, PFOA, and LC-PFCAs Risk Management – Binational.net website.

Comment Summary 56: A commenter requested a table summary of measured PFAS concentrations across environmental media in Canada.

Response 56: A paper that summarized the Canadian concentrations of measured PFAS in the environment (Gewurtz et al. 2013) was previously published and is cited in the Updated Draft State of PFAS Report. References for more recently published Canadian data are cited in Section 4 *Environmental occurrence* of the Updated Draft State of PFAS Report. The Government of Canada publishes PFAS monitoring data on the Open Government Portal.

Comment Summary 57: Commenters asserted that testing has found no evidence that biosolid-amended soils are contributing to PFAS that are already present in soil. It should also be noted that the CFIA has a 50 ppb concentration limit for PFOS in biosolid land applications and that 92% of biosolids generated in Canada are well below this limit.

Response 57: ECCC acknowledges that PFAS are present in most soil samples tested, even in those that have not been amended with biosolids (Brusseau et al. 2020).

The concentration of PFAS that is transferred to soil from biosolids is dependent on the PFAS concentration in the biosolids; therefore, higher transport of PFAS from biosolids to soil may be observed if the biosolids contain a higher concentration than what was present in the soil.

Information on CFIA's Interim Standard for PFAS in biosolids has been incorporated into Section 8.1.5 *Waste management* of the Updated Daft State of PFAS Report.

Comment Summary 58: A commenter noted that land application of biosolids to farmland in Ontario has never resulted in illness or environmental damage when regulatory procedures were followed. There are also opportunities to use biosolids in more beneficial applications.

Response 58: Noted. To mitigate the risks of contamination, the CFIA announced in May 2023 that it intends to implement an interim standard. The standard will require biosolids that are intended for use as commercial fertilizers to contain less than 50 parts per billion of PFOS.

Comment Summary 59: A commenter noted that the timeframe over which PFAS substances remain in the environment is described as "very long" or "extremely long" in the Supporting document: Ecological state of the science report on SC-PFCAs, SC-PFSAs, and LC-PFSAs. They recommended providing an estimate/range of the timeframe.

Response 59: The statement is an introductory remark meant to convey the expectation of extreme persistence. As indicated in Section 3.2 *Environmental fate and behaviour* of the Updated Draft State of PFAS Report, a number of studies have shown that C4 to C7 perfluorocarboxylic acids (PFCAs) and C4 to C6

perfluorosulfonic acids (PFSAs) are not expected to degrade meaningfully under environmentally relevant conditions. Further references to "very long" or "extremely long" persistence in the environment are presented in the context of persistent substances in general (that is, as a generic definition) in the Supporting document or as general conclusory statements in Section 6 *Ecotoxicity* and the Summary. The persistence of PFAS is reviewed in more detail in Section 3.2 *Persistence* of the Supporting document and Section 3.2.2 *Persistence* of the Updated Draft State of PFAS Report.

Comment Summary 60: A commenter noted that the Draft State of PFAS Report states that municipal solid waste (MSW) landfills are a known source of groundwater contamination (Section 2.6.1 *Landfills*). This statement misrepresents many of the modern, highly engineered landfills with robust groundwater protection systems and contingencies that are not impacting groundwater.

Response 60: Regulatory requirements for the management of leachate from MSW facilities vary across Canada and may not necessarily provide for consistent levels of groundwater protection within and between provinces and territories. It is understood that modern landfill sites are engineered with groundwater protection systems; however, there is limited information available on their long-term reliability. In addition, many older landfills, both operational and closed, do not have groundwater protection measures in place, yet they continue to produce and release leachate. Given this, the statement that “MSW landfills are a known source of groundwater contamination” is accurate. The text has been revised in Section 2.6.1 *Landfills* of the Updated Draft State of PFAS Report to recognize the installation of groundwater protection measures in newer landfills.

Comment Summary 61: Commenters noted that the Draft State of PFAS Report acknowledged that there is an absence of regulations or standards detailing specific requirements for the acceptance and/or disposal of waste containing PFAS at the provincial or territorial level. Federal and provincial/territorial regulators should facilitate the development and use of science-based policies to manage PFAS impacted media.

Response 61: The Government of Canada will work collaboratively with its provincial, territorial, and municipal partners under the auspices of the Canadian Council of Ministers of the Environment (CCME) to address waste issues of mutual interest and to improve waste reduction policies and practices across Canada.

Comment Summary 62: A commenter suggested that the Draft State of PFAS Report should illustrate whether there is potential for PFAS contamination of organic waste composts from its contact with consumer products containing PFAS, such as may be present in mixed waste processing.

Response 62: PFAS concentrations in the end-products of organic waste processing are largely dependent on sources and types of feedstock. As noted in Section 2.6.4 *Compost* of the updated draft report, compost made from PFAS-containing food packaging, single-use paper products, or food waste is expected to contain PFAS. PFAS persist when composted, may accumulate in the soil or leach into groundwater, and may be taken up by certain crops (see Section 6.1 *Bioaccumulation* of the updated draft report) as well as taken into the natural food chain.

Comment Summary 63: Commenters suggested that contaminated sites that are impacted by PFAS (for example, military bases and airports) should be remediated and that specific action plans must be developed in consultation with those affected. Additionally, the current Federal Contaminated Sites Action Plan (FCSAP) should provide more funding for further assessment.

Response 63: The priority to clean up federal contaminated sites follows an established prioritization process aimed at reducing environmental risks, human health risks, and associated federal financial liabilities. When contaminants migrate off-site, federal departments coordinate with local health services to communicate the risks.

The FCSAP funds the assessment, remediation, and risk management of federal contaminated sites. Funding is provided to departments, agencies and consolidated Crown corporations that have accepted responsibility for the contamination. Please see Funding of federal contaminated sites for more information. There are federal contaminated sites that are contaminated with PFAS, and available FCSAP funding is provided to custodians to conduct assessments, provide remediation, and hold risk management activities at eligible sites based on the potential risks to human health and the environment.

Information on FCSAP sites is available on-line at Federal Contaminated Sites Inventory.

Comment Summary 64: Commenters stated that there is growing evidence that some known PFAS are coming from precursor compounds. Screening at contaminated sites needs to be broad in chemical scope and routinely done.

Response 64: Screening for PFAS and their precursors at contaminated sites is not confined to a specified short-list and is evolving along with the capabilities of laboratory analyses to measure them.

Comment Summary 65: A commenter noted that discussion of municipal use of aqueous film-forming foams (AFFF) in Section 2.3 *Sites contaminated with Aqueous Film-Forming Foams (AFFF)* of the Draft State of PFAS Report is very brief. Using AFFF is common among municipal and regional firefighting agencies in their area.

Response 65: All sources of PFAS should be considered when identifying and delineating a contaminant of concern on a contaminated site.

A fulsome dataset allowing more details to be provided in Section 2.3 *Sites contaminated with Aqueous Film-Forming Foams (AFFF)* of the report is not available; however, revisions to the Updated Draft State of PFAS Report have been made using the information provided.

Comment Summary 66: A commenter requested clarification on whether the percentage of MSW that is disposed of in landfills versus MSW that is incinerated, outlined in Section 2.6.2 *Incineration* of the draft report, include biosolids.

Response 66: Section 2.6.2 *Incineration* was revised in the updated draft report to provide additional clarification.

Comment Summary 67: A commenter requested more context for the following sentence in Section 8.1.5 *Waste management* of the Draft State of PFAS Report: "The collection, recycling, composting, and disposal of residential waste is typically managed by municipal authorities."

Response 67: Section 8.1.5 *Waste management* has been revised to elaborate on this statement.

Comment Summary 68: A commenter noted that Section 4 *Environmental occurrence* of the Draft State of PFAS Report includes a summary of PFAS concentrations in various media and where increases/decreases in PFAS concentrations were observed; however, this section does not mention whether effects were observed at higher PFAS concentrations.

Response 68: The impacts to health and overall ecological and wildlife populations are discussed in Section 6 *Ecotoxicity* of the Updated Draft State of PFAS Report. Apical (for example, growth, reproduction, and development) and mechanistic (for example, immunotoxicity and neurotoxicity) endpoint effects have been found to be either below and above environmentally relevant concentrations. However, it should be noted that there are data gaps in the literature available for certain PFAS and types of effects studied, and few studies account for combined exposure to multiple PFAS.

Comment Summary 69: A commenter noted that Section 4 *Environmental occurrence* of the Draft State of PFAS Report states that fluoropolymers have been detected as environmental contaminants in Canada; however, no references or context were provided to support this.

Response 69: The statement was intended to refer to SCFPs, for which data is available. The wording in the key points boxes has been removed in the Updated Draft State of PFAS Report.

Impacts on human health

Comment Summary 70: Commenters requested that PFAS be identified as a carcinogen.

A commenter recommended clarifying the French language wording for the International Agency for Research on Cancer (IARC) 2B classification in the report.

Response 70: Additional text and references related to cancer endpoints were added to Section 7.2.9 *Carcinogenicity* of the Updated Draft State of PFAS Report. Additional text related to the recent classification of PFOA and PFOS by the IARC was added to the section as well.

The French description of the IARC classification has been updated and revised.

Comment Summary 71: A commenter noted that the report uses the concept of key characteristics of carcinogens (KCCs) in a unique and unintended manner. They remarked that the Draft State of PFAS Report notes that various PFAS "…exhibited at least one characteristic of KCCs," which is a remarkable and unjustified comment.

Response 71: The draft report did not use the KCCs framework itself, but rather reported the results of a study by Temkin et al. (2020) who investigated 26 PFAS with the framework.

The text in Section 7.2.9 *Carcinogenicity* was edited to remove the potential interpretation that all PFAS which exhibited one hallmark were potential carcinogens.

Comment Summary 72: Commenters requested further research and investment on topics including monitoring the effects of PFAS on human health and also effects of:

- **individual PFAS**
- **mixtures**
- **low concentrations**
- **exposure, and**
- **cumulative effects**

More biomonitoring (including targeted biomonitoring) was also suggested.

Response 72: Further research and monitoring will contribute to better characterizing environmental exposure and effects of PFAS. Studies on the human health impacts and monitoring of PFAS have been steadily increasing in the peer-reviewed literature.

The Government of Canada conducts regular monitoring and surveillance of certain PFAS in the environment, wildlife, and people living in Canada. The CMP has supported a number of PFAS-focused environmental health research studies, as well as those funded by the Northern Contaminants Program. Levels of PFAS in the Canadian population will continue to be measured in the ongoing CHMS and other human biomonitoring initiatives. The Government of Canada continues to leverage PFAS monitoring and biomonitoring work which uses more recent analytical methods for a broader set of PFAS in a number of existing biobanks such as the CHMS, Maternal-Infant Research on Environmental Chemicals (MIREC), and CARTaGENE. CARTaGENE consists of a Quebec cohort of women whereas CHMS and MIREC use pan-Canadian cohorts. In addition, the Government of Canada is conducting research to investigate the potential for PFAS exposure in occupational settings relevant to firefighters. As analytical methods for PFAS progress, these methods will be considered for use in forward monitoring and biomonitoring plans based on available resources.

With respect to the research on the effects of PFAS on human health, toxicology research is being conducted to better understand the potential human health effects of exposure to certain PFAS, including their potential contribution to metabolic diseases, such as obesity and type II diabetes, and their impacts on the immune system and neurological diseases. The Government of Canada also continues to examine the potential health effects of PFAS in populations that may be more susceptible or highly exposed (including pregnant people and children) through means that include using data from the ongoing MIREC cohort study.

Information on the planned and future research associated with PFAS monitoring and human health is summarized in Section 8.1.2.2 *Human health* of the updated draft report.

Comment Summary 73: A commenter suggested to tabulate occurrences of PFAS in food packaging, food, drinking water so that readers can easily correlate the study results to the study conditions.

This commenter also noted that although some results of the EFSA (2020) assessment are mentioned, the conclusions (namely that a part of the European population would exceed thresholds considered safe for PFAS) are not discussed.

Response 73: Given a qualitative approach was used in this assessment, a table showing occurrences of monitored PFAS in media was not considered necessary. Key results of the EFSA (2020) assessment are mentioned in the Updated Draft State of PFAS Report. Specifically, European Food Safety Authority (EFSA) occurrence data are cited in Section 2.2 *Occurrence in retail food* of the report, however, this section ("*uses and sources of exposure*") does not include any description of risk conclusions from other jurisdictions. In the Updated Draft State of PFAS Report, exposure is informed by environmental monitoring data as well as human biomonitoring data and uses multiple lines of evidence in a qualitative approach. These indicate widespread detection of measured PFAS in humans, biota and environmental media.

Comment Summary 74: A commenter suggested comparing the previous cycles of CHMS with reference values to highlight trends showing decreases in measured concentrations in the general population.

Response 74: A statement has been added to highlight decreasing trends for certain PFAS in the general population.

Comment Summary 75: A commenter notes the utility of non-targeted screening methods to identify and prioritize PFAS from biomonitoring, as well as less invasive methods of sample collection. It is also noted that urine might be useful for other substances such as telomeres. This might be a suitable matrix for additional PFAS, other than ones most commonly observed in biomonitoring studies.

Response 75: Section 5.2 *Factors to consider when using human biomonitoring data to assess PFAS exposures* and Section 5.5 *Summary of international human biomonitoring data on PFAS* of the updated draft report were revised accordingly.

Comment Summary 76: A commenter had concerns with a statement in the Draft State of PFAS Report suggesting that fluoropolymers may, in some circumstances, be bioavailable since fluoropolymers in nanoform can penetrate cell membranes. The commenter noted that this statement is broadly applicable to all substances in nanoform and is not specific to fluoropolymers. It is more appropriate to address the nanoform of fluoropolymers in the context of a risk assessment directed at nanoparticles rather than in the context of an assessment of PFAS.

Response 76: Nanoscale forms have not been explicitly considered in the risk assessments of existing substances conducted under Canada's CMP. The Government of Canada assesses the ecological and health risks of nanomaterials currently in commerce in Canada separately; Canada's policy on nanomaterials is outlined on the Nanomaterials webpage. Nanoscale forms of PFAS are not considered in the Updated Draft State of PFAS Report; Section 7 *Human health hazard* of the Updated Draft State of PFAS Report has been modified to be clearer in that regard.

In addition, note that based on public comments received and information submitted, along with other available information, PFAS meeting the definition of fluoropolymers as described in the Updated Draft State of PFAS Report are therefore planned for consideration in a separate assessment.

Comment Summary 77: Commenters noted that certain HFOs and HFCs have been heavily studied, rigorously regulated, and identified as not of toxicological concern in various repeat dose studies.

Response 77: It is acknowledged that certain HFOs may be regulated under various legislation (for example, US EPA and California Air Resource Board) and that available information may indicate low hazard for some HFOs.

However, as part of the consideration of PFAS as a class, the lifecycle of HFOs has been taken into consideration. It is noted that these substances contribute to the overall presence of low molecular PFAS in the environment which may result in human exposure (for example, TFA in surface water). Health effects information for TFA has been integrated into Section 7 *Human health hazard* which outlines that exposure to TFA in animal models has been associated with liver effects, increased kidney weight, decreased white blood

cells, reduced weight of reproductive organs, litter loss, reduced body weight of offspring, and malformations (ECHA 2023c, 2024).

If the proposed conclusion is confirmed in the final State of PFAS Report, any risk management actions would be developed in alignment with, and complementary to, existing regulations, such as the ODSHAR.

Comment Summary 78: Commenters noted that more information and training are needed to inform people living in Canada and health professionals about the risks of PFAS and what people can do to minimize exposure to these substances. A commenter also recommended a government-run sustained public education campaign for military service members. Suggestions indicated that guidance on PFAS (for example, for clinical testing and levels in people) would be helpful.

Response 78: The Government of Canada is working to inform people in Canada of the concerns associated with PFAS.

Information on PFAS in products may be found on ingredient lists on some labels or information may be available from the product manufacturer. While there are currently no requirements to specifically identify PFAS in most products, the Government of Canada has outlined proposed risk management options under consideration. If the proposed conclusion is confirmed in the final State of PFAS Report, a risk management approach would be developed, and would take into account information from public comments and other sources.

HC also works with provinces, territories, and other federal departments, to provide accurate and relevant information to municipalities and homeowners concerned about the health effects of PFAS in drinking water.

Requests for public campaigns have been noted and may be considered. Information on how Canadians can reduce their exposure to PFAS is available on the Government of Canada's PFAS website.

In the United States, the Agency for Toxic Substances and Disease Registry has published PFAS Information for Clinicians.

Comment Summary 79: Commenters requested that the Government of Canada establish a comprehensive system to provide assistance to individuals affected by health issues related to PFAS exposures. Given the broad burden of human exposure to PFAS, cost analysis of interventions to reduce exposure may also be helpful once the risk to human health is better understood.

Response 79: Establishing a causal relationship between the specific health issues experienced by an individual person and exposure to multiple PFAS is challenging. As indicated in the Revised Risk Management Scope, the proposed human health objective for the class of PFAS is to reduce exposure of the general population, including disproportionately impacted populations to protect human health. The government has also developed an objective for PFAS in drinking water with the intent to reduce human exposure from PFAS in drinking water while a more comprehensive drinking water guideline is developed.

Comment Summary 80: Commenters identified scientific data on TFA; TFA has been determined in animal studies to not result in adverse effects. Commenters cited publications that assess human health risks associated with environmental exposures to TFA.

Commenters noted that TFA as a degradation product from the use of HFOs is well studied and does not warrant including the HFC/HFO substances under the criteria of section 64 of CEPA.

Response 80: Information on health effects of TFA has been incorporated into Section 7 *Human health hazard* of the Updated Draft State of PFAS Report. This section indicates that exposure to TFA in animal models has been associated with liver effects, increased kidney weight, decreased white blood cells, reduced weight of reproductive organs, litter loss, reduced body weight of offspring, and malformations (ECHA 2023c, 2024). The intent of this section is not to provide a comprehensive report of all the health effects data on PFAS or to conduct individual hazard assessments for each PFAS. Rather, the purpose of this section is to provide an overview of recurrent health effects observed to be caused by multiple PFAS to get a better understanding of key endpoints, organs, and systems affected by PFAS. The overview demonstrates that well-studied PFAS are associated with health effects as observed in animal and epidemiological studies.

Given the lack of consensus regarding the most sensitive health effects, limited data on the toxicity of PFAS in mixtures and the likelihood of exposure to multiple PFAS at one time, it is not considered appropriate to

examine individual PFAS, such as TFA, without considering its potential contribution to cumulative exposure and effects.

Comment Summary 81: Commenters assumed the effects of the C1-C3 PFSAs (for example, as summarized in Table 4 and elsewhere in Section 7 *Human health hazard* of the Draft State of PFAS Report) were based on TFA.

Response 81: The data for C1-C3 PFSAs (summarized in Table 4 and elsewhere in Section 7 *Human health hazard* of the Draft State of PFAS Report [published in May 2023]) were based on toxicological data for trifluoromethane sulfonic acid (TFMS); this has been clarified in the updated draft report. In addition, information on health effects of TFA has been incorporated into Section 7.

Comment Summary 82: Commenters noted that "null" results were excluded from the human health summary. Focusing only on data that shows positive associations may be equated with introducing a reporting bias.

In contrast, another commenter expressed that, although the probability of effects in humans is inferred from animal studies, the draft report avoids the multitude of definitive studies of serious negative impacts of PFAS on humans.

A commenter questioned the usefulness of the section on the overview of the lowest observed adverse effect levels (LOAELs) given that the document is not intended to derive a health guide value and also noted that inclusion of no observed adverse effect level (NOAEL) ranges (for example, Table 5) would be interesting.

A commenter suggested describing the weight of evidence for various effects, and to clarify whether associations are causal.

Response 82: The purpose of Section 7 *Human health hazard* of the Updated Draft State of PFAS Report is to provide an overview of recurrent health effects observed to be caused by multiple PFAS to get a better understanding of key endpoints, organs, and systems affected by PFAS. The overview demonstrates that well-studied PFAS are associated with health effects as observed in animal and epidemiological studies. Although the data indicate that statistically significant effects or associations were identified for endpoints, it is recognized that other studies may have found no such effect or association.

The aim is not to conduct individual hazard assessments for each PFAS nor to critically evaluate the weight of evidence available for each endpoint. Consequently, evaluation and presentation of every available scientific study is not included in the updated draft report.

With respect to LOAELs, to date there is no consensus on most sensitive endpoints in animal studies for any one PFAS. This may be, in part, due to the large variability in study design which has resulted in a wide range of LOAEL values as indicated in Table 5. As indicated in the updated draft report, the study NOAELs could not be identified in a number of cases and, for this reason, they are not included in Table 5.

The updated draft report has also been revised to clarify that links between health effects and exposure to PFAS are "associations" and not described as being causal.

Comment Summary 83: A commenter noted an interest in seeing a discussion the clinical impact of the findings of animal and epidemiological studies. Many of the effects remain subclinical or have no clinical impact. An example was provided of using the term immunosuppression when referring to a relative decrease in antibodies.

Response 83: The clinical impacts of the effects noted in Section 7 *Human health hazard* are not discussed in the Updated Draft State of PFAS Report. The purpose of Section 7 of the Updated Draft State of PFAS Report is to provide an overview of recurrent health effects observed to be caused by multiple PFAS to obtain a better understanding of key endpoints, organs, and systems affected by PFAS.

With respect to use of the term immunosuppression and a potential lack of clinical effects, this term was used in the supporting studies and reviews that are cited in this section of the updated draft report.

Comment Summary 84: A commenter remarked that acknowledging co-exposure as being of concern is relevant as it supports the approach of regulating PFAS as a class because the impacts of human and environmental exposure cannot be completely informed by evaluating individual compounds.

Response 84: Noted.

Comment Summary 85: Commenters noted that First Nations and Inuit communities may experience higher levels of exposure to PFAS as the waste management sites near the communities may be poorly maintained.

A commenter suggested the addition of a summary of results for First Nations, Inuit communities and other Indigenous or northern communities at the end of the biomonitoring section.

Response 85: It is acknowledged that certain populations or groups of people within Canada may be at increased risk of experiencing adverse health effects from exposure to substances, which is caused by greater susceptibility or higher levels of exposure (for example, location and proximity to environmental hazards).

In the Updated Draft State of PFAS Report, study results indicate higher levels of certain PFAS in blood of specific communities of Indigenous populations compared with similar populations sampled in the CHMS. Specific sources of exposure for certain subpopulations were not identified in the Updated Draft State of PFAS Report, however, the updated draft report notes that people living in the vicinity of sites contaminated with PFAS may be disproportionately exposed to higher levels of PFAS. If the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of these substances to the general population, including disproportionately impacted populations, to protect human health.

Key points from the human biomonitoring section are summarized at the start of Section 5 *Human biomonitoring*, including information related to certain First Nations and Inuit communities; no further summary information was added to the updated draft report.

Comment Summary 86: Commenters expressed that the development of the federal management strategy on PFAS as a class should prioritize the impacts of PFAS on vulnerable groups and communities and ensure that information is actively disseminated to the impacted communities.

Specific action plans must be developed in consultation with groups and communities that were affected to remediate the environments harmed by PFAS and to reduce the exposure to PFAS in communities at high risk. High-risk environments include military bases, airports, firefighting areas, and landfills.

A commenter noted that the needs of vulnerable populations may not have been adequately addressed in the Draft State of PFAS Report.

Response 86: In the Updated Draft State of PFAS Report, certain subpopulations that may experience greater susceptibility or greater exposure have been identified, including specific Indigenous populations that may experience higher levels of exposure to certain PFAS compared with similar populations sampled in the CHMS.

PFAS-impacted contaminated sites are also identified as representing hot spot areas. In addition, biomonitoring data on children and pregnant people are considered. If the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS to the Canadian environment to reduce exposure of these substances to the general population, including disproportionately impacted populations, to protect human health. The development of risk management tools would involve cooperation with other departments and programs.

There would also be additional opportunities for consultation on future risk management actions.

Comment Summary 87: A commenter noted that the draft report fails to recognize that virtually all North Americans have PFAS in their bodies.

Response 87: The key points in Section 5 *Human biomonitoring* state that Canadian biomonitoring data demonstrate that certain PFAS are present in almost 100% of the Canadian population.

Comment Summary 88: Commenters noted that exposure to chemicals in components and equipment (for example, appliances) may be associated with limited exposure. As a result, these products need special consideration prior to starting a regulatory process.

Response 88: Exposure to PFAS can result directly from the use of a product or indirectly as a result of an environmental release of PFAS, including after disposal of a product. As noted in the Updated Draft State of PFAS Report, people living in Canada may be exposed to PFAS from various sources such as in food and food packaging, cosmetics, products available to consumers (including textiles such as carpets, furniture, and clothing), ambient and indoor air, dust, and drinking water.

If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation would help inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health concerns.

Comment Summary 89: A commenter noted that the Government of Canada needs to work with Indigenous communities towards a PFAS monitoring program specific to their traditional foods.

Response 89: Through the Northern Contaminants Program, the Government of Canada supports PFAS monitoring, including in traditional foods. The government will continue to support health, environmental and community-based monitoring studies that address the research needs of northern communities.

Comment Summary 90: Commenters requested implementing health-based regulatory limits for PFAS in food.

Response 90: Based on the currently available scientific information, PFAS in foods are likely to occur as a result of bioaccumulation in the environment or migration from certain materials coming into contact with food. Currently, HC considers the retail food supply in Canada to be safe, and consumers should continue to eat a varied, well-balanced diet as recommended in Canada's Food Guide.

As described in the Revised Risk Management Scope, one of the proposed objectives is to reduce the environmental releases of PFAS. Reducing the environmental release of PFAS is anticipated to result in lower dietary exposures to PFAS over time. Furthermore, continued monitoring for PFAS in food will help improve dietary exposure estimates to PFAS in Canada, identify sources, and inform measures, if necessary, to protect the health of Canadians.

Comment Summary 91: Commenters requested the Government of Canada to update the guidelines that support public health action, such as guidance for fish consumption and for soil.

Response 91: Fish is considered an excellent source of high-quality protein and a primary source for long-chain omega-3 fatty acids and other nutrients. While the Government of Canada is aware of reports that some freshwater fish may contain concentrations >10 ng/g of PFAS, concentrations in retail fish in Canada have shown to be significantly lower (<1 ng/g). Local fish consumption advisories should always be followed when sportfishing or harvesting fish. If available, such advisories may be provided by provincial, territorial or municipal governments or other local health authorities.

In the absence of Canadian Soil Quality Guidelines for other PFAS at this time, HC has developed soil screening values (SSVs) on the basis of human direct contact with soil for 10 select PFAS (HC 2022). The SSVs for PFAS are used to assess soil at federal contaminated sites. Given the uncertainties associated with the assessment of PFAS contamination, a precautionary approach is warranted. Further work is ongoing to investigate the feasibility of assessing PFAS at contaminated sites as a class or group.

Comment Summary 92: A commenter stated that there is no explanation on the importance of the different routes of exposure (for example, dermal, oral, inhalation) in the human health hazard section.

Response 92: Section 7.1 *Toxicokinetics* of the updated draft report indicates that available data on specific PFAS indicate that these substances are readily absorbed following oral ingestion and, although data on the exposure to PFAS via inhalation and dermal routes are extremely limited, available studies indicate that absorption occurs by these routes as well. However, the relative importance of the different routes of exposure is unknown.

Occupational exposure

Comment Summary 93: Commenters provided recommendations related to supporting groups affected by PFAS exposure, including firefighters (for example, implementing regulatory measures to address PFAS exposures to firefighters from personal protective equipment [PPE] and firefighting foams).

Response 93: The Government of Canada is taking action to protect firefighters from harmful chemicals and released a Firefighter Action Plan in 2021. This plan includes conducting research and monitoring to better understand chemical exposure levels, identify practices that reduce harm (for example, PPE improvements), and share information and raise awareness.

HC scientists are working with Canadian universities and firefighters to research occupational exposures faced by firefighters. Projects related to the Firefighter Action Plan, involve research to better understand the exposure potential of PFAS from firefighters' PPE and other sources (that is, dust). These projects will collectively inform the federal government's current and future work to assess and manage the risk of harmful chemicals, including PFAS. More information on this work can be found on the Helping to protect firefighters from harmful chemicals webpage.

On June 22, 2023, Bill C-224, the *National Framework on Cancers Linked to Firefighting Act*, received Royal Assent. It called on the Minister of Health to consult broadly and develop a national framework to prevent and raise awareness on cancers linked to firefighting.

HC has launched a comprehensive engagement strategy, including consultation sessions, key informant interviews and scientific workshops, to inform the development of the National Framework. 2 scientific workshops related to firefighters have taken place in December 2022 and October 2023.

If the proposed conclusion is confirmed in the final State of PFAS Report, the proposed options identified in the Revised Risk Management Scope would be expected to help protect firefighters, among other occupational groups, from exposure to PFAS.

Comment Summary 94: Commenters requested that HC expedite assessing and following-up on risk management measures to minimize the exposure of workers to PFAS.

A commenter requested that the Government of Canada establish a federal workers' occupational cancer research center with pan-Canadian occupational data and establish a federal workers' compensation system.

Response 94: The Government of Canada recognizes federal, provincial and territorial occupational health and safety organizations are responsible for coordinating legislation for the safe use of chemicals in the workplace. The government is working to support this role by integrating the information, tools, and technical expertise of the CMP and HC's Workplace Hazardous Products Program. If a substance is harmful to the general population, it could also be of concern for individuals in situations where a higher volume of the substance is used or where the substance is used for a longer duration (for example, in the workplace).

The Updated Draft State of PFAS Report includes specific information on occupational groups, specifically firefighters. As indicated in the Revised Risk Management Scope, the proposed human health objective for the class of PFAS is to reduce exposure of the general population, including disproportionately impacted populations to protect human health, including through collaboration with various departments and programs. Proposed risk management options are identified in the Revised Risk Management Scope and would take into consideration groups of individuals within the Canadian population who, due to greater exposure, may be more vulnerable to experiencing adverse health effects.

The inclusion of information on firefighters in the updated draft report is considered to be complementary to, and supportive of, activities underway as part of the Firefighter Action Plan.
In addition, the *National Framework on Cancers Linked to Firefighting Act* calls on the Minister of Health to consult broadly and to develop a national framework to prevent and raise awareness on cancers linked to firefighting. The development of this framework will be the next step for the Government of Canada to help protect firefighters from the occupational exposures they experience in their line of duty.

Comment Summary 95: A commenter asked that the federal government ensure all federal firefighters receive annual blood testing for the presence of PFAS; and recommended that HC should develop guidance for clinical testing of PFAS.

Response 95: Initiatives such as the Firefighter Action Plan and the *National Framework on Cancers Linked to Firefighting Act* are among the actions taken by the Minister of Health to work toward protecting firefighters from harmful chemicals.

The initial steps for the development of the National Framework on Cancers Linked to Firefighting involves consulting with stakeholders in the firefighting community, provincial, territorial and municipal governments, health care professionals and scientists. A range of activities may be explored under these initiatives.

Comment Summary 96: A commenter noted that there was no acknowledgement of occupational exposure (for example, professional participation in skiing and snowboarding) other than that of firefighters. Another commenter noted that users handling and applying biosolids may also result in exposure to PFAS.

Another commenter provided a reference to a review article on occupational exposure and serum levels of PFAS in people.

Response 96: Additional information received on sources of exposure to PFAS was considered. A statement has been added to the occupational human biomonitoring section (Section 5.6 *Occupational HBM data – Firefighters*) of the updated draft report to acknowledge that certain occupations have been identified as having potential exposure to PFAS. In addition, the uses of PFAS that may result in exposure which have been identified in public comments are broadly captured by the general description of the wide range of industrial uses and products in the Updated Draft State of PFAS Report. If the proposed conclusion is confirmed in the final State of PFAS Report, the information gathered so far and at other stages of consultation would be used to help inform risk management actions.

Comment Summary 97: A commenter recommended to add confidence intervals in the graph comparing concentration values in firefighters with the general population. In this case, the results for PFOA, PFDA, perfluorohexanesulfonic acid (PFHxS) and PFOS would show higher averages, but not for PFNA.

Response 97: Confidence intervals on the geometric mean values were not available from all firefighter biomonitoring studies and therefore could not be included in the graphs.

Additional firefighter biomonitoring studies have been added to the Updated Draft State of PFAS Report resulting in revisions to Figure 7 and the list of PFAS considered to have higher values in firefighters.

Drinking water

Comment Summary 98: Commenters expressed that Canada lacks transparency in monitoring for PFAS in drinking water.

Response 98: Monitoring of PFAS in drinking water is primarily undertaken by provinces, territories, and municipalities. At present, PFAS are not regularly monitored at drinking water treatment plants in Canada. Consequently, there is limited data available for municipally supplied drinking water.

Comment Summary 99: Commenters asked that the federal government convene multiple government-level working groups to ensure that precautionary drinking water standards are put into place at the provincial and territorial level.

The federal government must enhance funding to ensure that municipalities and municipal wastewater treatment plants are not burdened with financial costs associated with adoption of technologies for PFAS removal.

Canada should provide support for baseline monitoring needed for implementation planning and prioritization.

Response 99: HC plays a leadership role in science and research on drinking water and derived an objective for PFAS in drinking water in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water. The objective aims to reduce Canadians' exposure to PFAS and thus to lower the risk to health. While HC developed the objective in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water, setting regulatory standards for drinking water, and putting such standards into place, are primarily the responsibility of provinces and territories.

HC recognizes the challenges of implementing the drinking water objective for PFAS and will continue to support provinces and territories through health guidance and providing advice on testing protocols and water treatment strategies moving forward.

Comment Summary 100: A commenter noted that establishing effective sampling and testing methods is key to implementing any formal objectives or targets for PFAS. Current testing methods (for example, EPA Method 537.1) do not provide a good solution to test for PFAS and related substances in drinking water and may also present risks in other areas. For example, when applied to drinking water, this testing method creates a higher risk of objective exceedances when an actual exceedance has not occurred. Issues such as these need to be considered before any media standard can be applied.

In addition, commenters noted that there is limited laboratory capacity to test for PFAS in Canada, which needs to be addressed before reasonable levels of testing can occur. A commenter noted that having adequate commercial laboratory capacity within Canada should be a precursor to implementing any standard. It is recommended that HC develop alternate, cost-effective analytical methods to support an approach that is "as low as reasonably achievable" before any formal objectives are set. It was also recommended that best practices be developed for treatment of PFAS in small residential water treatment systems.

Response 100: There are 2 validated and standardized methods from the US EPA that are available for the quantitation of a total of 29 PFAS in drinking water (EPA Methods 533 and 537.1). In addition, new methods that will measure a greater number of compounds are being developed in many countries. There are already 7 laboratories in Canada that measure PFAS in drinking water according to specific standards. HC is in contact with these laboratories and the Canadian Association of Laboratory Accreditation. The drinking water objective for PFAS will encourage more laboratories to develop their capacity for measuring PFAS.

In terms of residential water treatment, treatment devices can be certified to National Sanitation Foundation (NSF) Standard 53 (granular activated carbon) and NSF Standard 58 (reverse osmosis) (NSF International, 2022a, b) for the reduction of "total PFAS" in drinking water to a total concentration of 20 ng/L for the following 7 PFAS: perfluoroheptanoic acid (PFHpA), PFOA, PFNA, PFDA, perfluorobutanesulfonic acid (PFBS), PFHxS and PFOS. The revised criteria were published in NSF Standard 53 and NSF Standard 58 in early 2023. The use of treatment devices certified to the revised criteria will help homeowners further reduce their exposure to PFAS in drinking water.

Comment Summary 101: A commenter noted that standard sampling and measurement methods in water, wastewater and biosolids are needed.

Response 101: While validated and standardized analytical methods are currently available for a combined total of 29 PFAS in drinking water, new methods that will measure a greater number of compounds are under development by regulatory authorities and academics in many countries. In addition, Government of Canada research laboratories have been focused on improving analytical detection methods for PFAS in different exposure media, including drinking water.

Comment Summary 102: A commenter expressed that reliable, sustainable, and cost-effective water treatment processes must be identified.

Response 102: This information has been considered. HC has collaborated with provinces, territories, and other federal departments to develop an objective for PFAS in drinking water. As part of this process, treatment options for PFAS in drinking water have been identified.

Comment Summary 103: Commenters requested putting into place health-based regulatory limits for PFAS in drinking water. Further efforts are needed to establish regulatory limits for PFAS in drinking water which would, in turn, trigger clean-up activities and controls targeted at PFAS-emitting facilities. Data on PFAS in the drinking water from all Canadian distribution systems is a major data gap.

Response 103: Health Canada's drinking water objective is based on analytical detection and treatment achievability. This is a practical approach to reduce exposure while the full guidelines are being re-evaluated. When revising the guidelines, HC will review the health hazard information and will consider the possibility of having health-based values for certain individual PFAS in addition to an overall maximum acceptable concentration for a group of PFAS.

The monitoring of PFAS in drinking water is primarily the responsibility of provinces, territories, and municipalities. At present, PFAS are not regularly monitored at water treatment plants in Canada. Consequently, there is limited data available for municipally supplied drinking water, but the body of evidence is growing. HC's new drinking water objective has prompted interest in many areas to pursue the monitoring of PFAS in drinking water and water sources. It is expected that this will lead to more data on the levels of PFAS in Canadian water.

Comment Summary 104: A commenter noted that more information is needed on whether the levels of certain PFAS found in Canadian surface waters exceed guidelines such as those for protecting aquatic life or drinking water quality. The commenter also provided additional information on ongoing water monitoring activities in Manitoba.

Response 104: PFAS are not regularly monitored at water treatment plants in Canada and there is limited data available on the levels of PFAS in source and treated waters. However, HC has developed a new drinking water objective, that recommends a single value for a group of PFAS in drinking water. This has prompted interest in many areas to pursue the monitoring of PFAS in drinking water and water sources. It is expected that this will lead to more data on the levels of PFAS in Canadian water.

A Federal Environmental Quality Guideline (FEQG) for surface water is available for PFOS. The PFOS FEQG factsheet summarizes monitoring data for PFOS, including for surface water. Please note that the surface water guidelines for the protection of aquatic life prepared at the federal or national level or by the CCME are not currently available for other PFAS.

Additional text was added to Section 4.2.2 *Aquatic ecosystems and wildlife* to include information on surface water concentrations of PFOS and a comparison against the FEQG for surface water. The CCME is currently developing surface water guidelines for PFOA.PFOS concentrations from surface water across Canada collected by Environment and Climate Change Canada (ECCC) in 2016 to 2017 were below the FEQG for PFOS in surface water. PFOS concentrations in fish tissues also did not exceed the FEQG for fish health; however, in some locations the levels in fish exceeded the FEQG for the protection of wildlife predators (that is, mammals and birds).

The additional information on water monitoring activities in Manitoba has been noted.

Comment Summary 105: A commenter requested that drinking water regulations be aligned with drinking water treatment device standards from other jurisdictions.

Response 105: HC works closely with international partners such as US EPA. HC's objective for PFAS in drinking water is based on the feasibility for treatment plants and treatment devices to remove PFAS from drinking water. The purpose of the objective is to reduce exposure to PFAS while the full guidelines are being re-evaluated. HC recommends that drinking water treatment devices meet the appropriate NSF / American National Standards Institute (ANSI) standard. HC has been a long-time participant in the development of these standards, along with the US EPA and other NSF committee members, including those from industry, to ensure the protection of public health. In early 2023, the criteria for claims about reducing PFAS through drinking water treatment devices were revised under the applicable NSF/ANSI standards, taking into consideration values derived by the US EPA, HC and other recognized agencies.

Comment Summary 106: Commenters recommended that Canada conduct a thorough cost-benefit analysis for a national drinking water standard. The commenters recommended using information from a report submitted to the White House's Office of Management and Budget (OMB) that modelled the potential costs attributable to various drinking water treatment levels.

Response 106: HC plays a leadership role in science and research on drinking water and derived the objective for PFAS in drinking water in collaboration with the Federal-Provincial-Territorial Committee on Drinking Water. However, setting regulatory standards, conducting any related cost-benefit analyses for drinking water, and putting such standards into place are primarily the responsibilities of provinces and territories.

The drinking water objective for a group of PFAS aims to reduce potential exposure of Canadians to multiple PFAS in drinking water, thereby reducing the health risks caused by PFAS. HC recognizes the challenges of implementing the drinking water objective for PFAS and will continue to support the provinces and territories through health guidance and giving advice on testing protocols and water treatment strategies moving forward.

Comment Summary 107: Commenters noted that monitoring for PFAS in drinking water sources and wastewater requires greater attention and financial resources. The Government of Canada should work with academics and municipal water system owners and/or operating authorities, either directly or through the provincial government, to develop a long-range environmental monitoring program.

Response 107: HC has developed a new objective, that recommends a single value for a group of PFAS in drinking water. This has prompted interest in many areas to pursue the monitoring of PFAS in drinking water and water sources. It is expected that this will lead to more data on levels of PFAS in Canadian water. HC continues to work in collaboration with the provinces and territories and supports its partners by providing guidance on testing protocols and water treatment strategies.

In partnership with certain municipalities throughout Canada, ECCC's national wastewater monitoring program gathers data on levels of PFAS entering municipal wastewater treatment plants (WWTPs), evaluates the fate of PFAS through the liquid and solids trains of typical types of treatment processes used in Canada (primary, secondary, advanced, and lagoon treatment), and determines levels of PFAS being discharged in residuals from WWTP effluents and solids.

Comment Summary 108: A commenter noted that the threshold for a safe level of total PFAS in drinking water is too high (30 ng/L). It will not take long for this value to be considered outdated.

Response 108: The value for the objective for PFAS in drinking water is based on analytical detection and treatment achievability. The purpose of the objective is to reduce exposure (along with potential health risks) while the full guidelines are being re-evaluated. HC acknowledges that as more toxicity data are published, an increasing number of health effects are being associated with exposure to PFAS, and at lower levels. Consequently, in the objective, HC has included a recommendation to keep concentrations in drinking water as low as reasonably achievable (ALARA). HC will continue to monitor the science and will incorporate the results of new toxicology studies in the full reassessment of PFAS in drinking water.

Comment Summary 109: A commenter noted that data aggregated from various sources show that the total combined median concentration for measured PFAS was approximately 23 ng/L in Canadian surface waters. The commenter noted that this value was substantially lower than the drinking water limits in the European Union (EU) and the World Health Organization (WHO) of 100 ng/L (sum of 20 PFAS) and 500 ng/L (sum of all PFAS), respectively.

Response 109: A total combined median value of 23 ng/L for measured PFAS in Canadian surface waters is close to the proposed objective value of 30 ng/L that has been developed by HC for a group of PFAS in drinking water. It is noted that the measured concentration is based on a small number of PFAS. As analytical capacity grows and the suite of PFAS that can be quantified increases, it is anticipated that the measured values of PFAS concentrations in surface waters will increase. In the meantime, as PFAS are persistent and as it is anticipated that surface waters will continue to be affected by ongoing releases of PFAS, it is possible that the actual concentrations of PFAS will also increase.

These considerations, combined with the occurrence of multiple PFAS in surface water, reinforces the proposed conclusion to take broad action on PFAS in Canada.

Comment Summary 110: A commenter suggested replacing “spring water” [translated] with the term “source water” [translated], as the former has a specific definition within Bottle Water Regulations in Quebec. A commenter recommended specifying the number of compounds analyzed in the 2007 to 2008 Quebec drinking water data and related edits.

Response 110: The number of compounds analyzed and related editorial changes have been made to the updated draft report.

Potential action

Comment Summary 111: Commenters asserted that a more comprehensive ban on PFAS needs to take place, especially with respect to cleaning up existing contamination and preventing future exposures.

Response 111: The Revised Risk Management Scope document outlines the proposed risk management options under consideration for the class of PFAS at a broad level.

As stated in the Revised Risk Management Scope, the Government of Canada's objective in managing the risks of PFAS is to, over time, achieve the lowest levels of environmental and human exposure that are technically and economically feasible, taking into consideration socio-economic factors.

The Federal Contaminated Sites Inventory shows more than 24 000 suspected, active, and closed federal contaminated sites (as of August 2023), of which there are over 100 sites with confirmed or suspected PFAS contamination. Federal contaminated sites are located on land owned or leased by the federal government or on land where the federal government has accepted responsibility for the contamination. The most common sources of PFAS at federal contaminated sites are associated with the use of AFFF and include activities such as firefighting training and the maintenance of firefighting equipment. The Government of Canada continues to take action through the FCSAP to reduce environmental and human health risks from known federal contaminated sites.

Comment Summary 112: A commenter recommended that Canada conduct a thorough cost-benefit analysis at the risk management stage.

Response 112: Future steps in the risk management phase would include the consideration of socio-economic and technical data. For any regulation developed, a Regulatory Impact Analysis Statement, including a qualitative or quantitative analysis of costs and benefits, would be provided.

Comment Summary 113: A commenter recommended that the Canadian government must take a holistic approach in assessing the economic impacts of PFAS and evaluating the PFAS industry's profit against the overall costs to society.

Response 113: For future steps in the risk management phase, actions developed may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and ecological concerns. For any regulation developed, a Regulatory Impact Analysis Statement, including a qualitative or quantitative analysis of costs and benefits, would be provided.

Comment Summary 114: Commenters requested that manufacturers disclose the presence of PFAS in their products. They suggested identifying the presence of PFAS on labels.
Commenters also requested that companies be required to disclose whether:

- **PFAS are used in the production of a product, and**
- **PFAS-containing products are used in production facilities, as this can unintentionally lead to PFAS being present in consumer products**

Response 114: This information will be considered in the future steps of any risk management development, which could include labelling requirements.

Comment Summary 115: **A commenter suggested that labelling is not an effective form of communication with consumers or end-users for components and parts of complex goods, as these products are most often located in machine rooms or remote locations, which are generally hidden from view.**

Response 115: This information will be considered in the future steps of any risk management development. Information gathered through the various stages of consultation will help inform any risk management actions to be developed. The actions developed may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of environmental and health concerns.

Comment Summary 116: **A commenter recommended defining "intentionally added PFAS" as PFAS that manufacturers intentionally add to a product and that has a functional or technical effect in the product. It was also recommended that there be a testing threshold of 100 ppm total fluorine (TF).**

Response 116: This information will be considered in the future steps of any risk management development.

Comment Summary 117: **A commenter asked why it has taken Canada so long to act on PFAS.**

Response 117: For over 15 years, the Government of Canada has taken action to control the use of certain PFAS that were found to be harmful to the environment.

In addition to restrictions on PFOS, PFOA, LC-PFCAs (and their salts and precursors), the Ozone-depleting Substances and Halocarbon Alternatives Regulations, and the Prohibition of Certain Toxic Substances Regulations, the Government has invested in research on the health and environmental effects of PFAS, as well as environmental monitoring and biomonitoring to better understand the levels of exposure to PFAS in Canadians and their environment. The Government has also taken action to protect Canadians from exposure to PFAS in the environment, for example by establishing reference values for PFAS in drinking water, soil and groundwater, which are used by drinking water authorities and in the management of contaminated sites.

As PFAS can travel over long distances and around the world, the Government of Canada actively promotes global restrictions on PFAS through international agreements such as the Stockholm Convention on Persistent Organic Pollutants and the Great Lakes Water Quality Agreement.

In 2021, the Government published a Notice of Intent to move forward to review and consider emerging science suggesting that many PFAS may be associated with environmental and human health effects. The Updated Draft State of PFAS Report is the result of that review.

The Government will continue to monitor the new and emerging science from a variety of sources, including the scientific literature as well as work done by international partners.

Comment Summary 118: **A commenter recommended that the Government of Canada should prohibit the class of PFAS and fully prohibit PFOS, PFOA and LC-PFCA under the Prohibition of Certain Toxic Substances Regulations, including repealing all time-limited exemptions related to these 3 substances.**

Response 118: The recommendations have been noted and will be considered in the future steps of any risk management development. There would also be additional opportunities for consultation later in the risk management phase. The government published a draft of the regulations on May 14, 2022 (proposed *Prohibition of Certain Toxic Substances Regulations, 2022*) to further restrict exempted uses of PFOS, PFOA, LC-PFCAs, and products containing them.

Comment Summary 119: **Commenters recommended taking immediate risk management measures, including a comprehensive prohibition of the substances, investing in technology to address PFAS in soil and drinking water, and imposing fines on industries to address contamination in municipalities and Indigenous communities in Canada.**

Response 119: As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of these substances to the general population, including disproportionately impacted populations, to protect human health. The actions developed may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of environmental and health concerns.

Comment Summary 120: **Commenters noted that the Government of Canada should require reporting releases and transfers of PFAS as a class under the National Pollutant Release Inventory (NPRI). A commenter also suggested that PFAS that are used intentionally should be reported under the NPRI, including their volumes and releases in various waste streams, and that the availability of alternatives should be provided.**

Response 120: ECCC is considering adding requirements for reporting releases and transfers of PFAS to the NPRI beginning in the 2025 reporting year. The consideration of this issue will occur in line with ECCC's Process for proposing and considering changes to NPRI. The NPRI Multi-Stakeholder Work Group is the

primary consultative body for the NPRI. A notice will be published on the Proposed Changes to NPRI webpage to consult on proposed NPRI reporting requirement.

Comment Summary 121: **A commenter noted that PFAS reporting should be a voluntary NPRI parameter and that the information should be collected for data-gathering purposes only. Additionally, there should be a uniform analysis method for all Canadian provinces and territories. Risk communication and citizen awareness would be needed to properly interpret the information made available to the public.**

Response 121: If PFAS were to be added to the NPRI, reporting releases and transfers would be mandatory if thresholds are met. Reporting facilities would be able to select from several methods of estimation to report to the NPRI, recognizing that there are potential challenges with source testing. More information on methods of estimating releases and transfers is available in the Guide for Reporting to the NPRI [PDF]. The NPRI publishes contextual information with collected data in the form of highlights reports and fact sheets and will consider publishing such information with any PFAS data that may be collected in the future.

Comment Summary 122: **A commenter noted that there may not be enough time to consider adding PFAS to the NPRI before the publication of the 2025 to 2027 notice and that it may be premature to add PFAS to the NPRI based on the proposed conclusions of the Draft State of PFAS Report. The commenter also noted that there are many considerations to take into account when deciding if and how PFAS should be added to the NPRI including:**

- **results from notices under section 71 of CEPA**
- **whether certain PFAS are on the DSL**
- **the risks of PFAS and how these risks are linked to the NPRI objective of improving public understanding of pollutant releases**
- **risk management activities that are in place or will be put into place, and**
- **how reporting requirements will be affected by increasing the time and resources needed for facilities to make a report**

Response 122: Following the standard approach under the NPRI, a multi-stakeholder work group has been formed whose purpose is to consider if and how PFAS should be added to the NPRI with reporting requirements starting in 2025 or a later year. Each of the considerations noted by the commenter will be considered by the work group as part of the process. To be considered for addition to the NPRI, substances do not have to be listed on Schedule 1 of CEPA, and consideration of candidate substances can take place at any point during the NPRI process.

Comment Summary 123: **Commenters asserted that the Government of Canada must ban all PFAS substances immediately and needs to impose stricter regulations on companies. There should be no phase-out period for PFAS.**

Response 123: PFAS possess practical traits that are useful in a broad spectrum of applications. Thus, there is a wide variety of sources of releases and exposure to take into consideration in managing the risks.

As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of the general population, including disproportionately impacted populations, to these substances to protect environmental and human health. Risk management actions may be tailored to sectors and uses in order to allow specific uses that are currently without technically or economically feasible alternatives.

Comment Summary 124: Commenters asserted that it is crucial that the Government of Canada comprehensively examine the safety and impact of both PFAS and other harmful chemicals that are used in products available to consumers, industrial processes, and other applications.

Response 124: Fact Sheets are available online with information on the Government of Canada's CMP and how the Government of Canada assesses exposure of Canadians and the environment to substances in products. As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of the general population, including disproportionately impacted populations, to these substances to protect environmental and human health. Risk management actions may be tailored to sectors and uses in order to prevent their releases to the environment and to minimize human

exposure during their whole lifecycle, that is, during their manufacture and import, use, and disposal (including recycling and destruction).

Comment Summary 125: A commenter noted that respective industries should be responsible for the cleanup costs of any PFAS contamination in the Canadian environment and held accountable for the exposure of Canadians to PFAS and the intentional withholding of information on PFAS use in Canada. The commenter added that Governments should also be fully accountable and transparent in communicating to the public their knowledge of PFAS manufacture, use and import by industries.

Another commenter recommended that the Government of Canada should take legal action against the manufacturers of PFAS.

Response 125: In the Revised Risk Management Scope, the Government of Canada has proposed actions to reduce releases of PFAS with the aim of reducing exposure of the Canadian environment and Canadians, including those groups of individuals within the Canadian population who, due to greater exposure, may be disproportionately impacted, to these substances. Risk management actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of the environmental and health concerns.

In addition, data collection initiatives (including the mandatory CEPA section 71 notice in the *Canada Gazette*) are planned to collect additional information on PFAS, which may be used to inform risk management decision making and other activities related to PFAS. PFAS are being considered for addition to the publicly available NPRI. The Government of Canada aims to provide a high degree of public participation, openness and transparency in decision making, yet it also has an obligation to protect confidential business information. Government officials work to promote public participation and transparency while protecting confidential information. Additional information obtained by the Government of Canada may be shared in future risk management documents, if appropriate.

Comment Summary 126: Commenters noted that the Government of Canada should take into consideration the time it will take manufacturers to comply with the new regulations. They note that checking supply chains takes significant time, but changing supply chain processes or providers will take even more time. A commenter also noted that there are hundreds of suppliers in complex global supply chains, who hold chemical composition information for parts and components. It is also important to understand that it is not unusual for component suppliers to change throughout the life of a product. Another commenter noted that it is likely impossible to have suppliers of manufactured items disclose the use of PFAS in these products.

Another commenter also suggested that the Government of Canada should be aware that finding alternatives that meet technical and regulatory requirements will take additional time, including testing, certification and regulatory approvals, all of which could be lengthy periods and could have impacts of supply demand to Canadians.

Another commenter noted similar challenges would also apply to the aerospace and defense sectors, as their supply chains are global and complex.

Another commenter indicated that regulatory approaches that fail to consider the challenge of aftermarket parts and components will lead to critical shortages of parts.

Response 126: Before risk management actions are taken, there would be opportunities for stakeholders to provide information about their challenges through consultation and information gathering aiming to fully understand the availability of alternatives and the costs of transitioning to alternatives.

Comment Summary 127: Commenters stated that the Government of Canada should exclude HFOs, HCFOs and/or HFCs, and their uses from the Schedule 1 listing.

Response 127: The Government of Canada takes note of the challenges posed by the limited alternatives to HFCs, following the coming into force of the controls under the ODSHAR.

Although many HFOs, HFCs and HCFOs are part of the class of PFAS in the Updated Draft State of PFAS Report, risk management measures may be tailored to specific sectors and uses depending upon the information received through various stages of consultations, relevant socio-economic factors, and in consideration of concerns to the environment and human health that have been identified.

Any risk management measures to address HFOs or HCFOs would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Information gathering to fully understand the availability of alternatives and the costs of transitioning to alternatives would also take place before risk management actions are taken.

Should risk management actions on HFOs and HCFOs be considered, they would be developed in alignment with, and complementary to, existing regulations with controls on PFAS, such as the ODSHAR.

Comment Summary 128: A commenter recommended not to duplicate existing listings in any Schedule 1 listing(s) that result from addressing PFAS as a class.

Response 128: The proposed recommendation is to add the class of PFAS, excluding fluoropolymers as defined in the Updated Draft State of PFAS Report, to Schedule 1. Note that existing listings of certain PFAS on Schedule 1 does not prevent the addition of the broader class to the Schedule. The addition does not in and of itself restrict or prohibit the substances; rather, it enables risk management instruments to be developed, such as regulations under CEPA.

Any risk management actions considered will be developed in alignment with, and complementary to, existing regulations.

Comment Summary 129: Commenters recommended excluding certain PFAS, such as HFOs, from a Schedule 1 listing of CEPA. Others recommended not to add PFAS to Schedule 1 of CEPA until assessments are conducted for subgroups or individual PFAS.

Other commenters recommended adding the entire class of PFAS to Schedule 1 of CEPA.

Response 129: With the Updated Draft State of PFAS Report proposing that the class of PFAS (excluding fluoropolymers as defined in the report) is toxic to health and the environment under CEPA, a Revised Risk Management Scope has been published that outlines the proposed risk management options. Both documents have a 60-day public comment period. The proposed recommendation is to add the class of PFAS (excluding fluoropolymers as defined in the report) to Schedule 1. Note that adding a substance to Schedule 1 of CEPA does not in and of itself restrict or prohibit the substance; rather, it enables risk management instruments to be developed such as regulations under the Act.

Risk management instruments may be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of environmental and health concerns. Any regulatory measure that would address PFAS, including HFOs, would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Before taking any risk management actions, information would be gathered to fully understand the availability of alternatives and the costs of transitioning to those alternatives.

If the proposed conclusion is confirmed in the final State of PFAS Report, there will be additional opportunities for consultation on future risk management actions.

Comment Summary 130: Commenters requested that PFAS processing aids necessary to manufacture fluoropolymers be excluded from the risk management scope for the class of PFAS.

A commenter noted that while SC-PFCA are used in the production of some fluoropolymers, they appear to be a very small segment of the market. Considering the stability and durability of coatings containing fluoropolymers, their releases in the environment would also be negligible.

Response 130: The release of non-polymeric PFAS, such as processing aids, to the environment from the manufacturing of some fluoropolymers has been reported (see Section 1.1.1 *Polymeric PFAS* of the updated draft report). Non-polymeric PFAS that are used as processing aids are considered to be in scope of the Updated Draft State of PFAS Report, given their potential to contribute to the cumulative risk of the class.

Risk management instruments may be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of environmental and health concerns.

Comment Summary 131: Commenters requested to expedite the timelines to include the class of PFAS in Schedule 1 of CEPA.

Response 131: The Government of Canada understands that people in Canada are concerned with the potential impacts of PFAS on the environment and their health. Work on these substances will be prioritized while operating within the existing regulatory framework and taking into consideration comments received during public comment periods. Based on the science presented in the Updated Draft State of PFAS Report, the ministers are proposing to add the class of PFAS (excluding fluoropolymers as defined in the report) to Schedule 1.

Comment Summary 132: Commenters recommended clarifying the use of the risk management instruments and the scope of the risk assessment and risk management. The scope should not include substances that are addressed by other regulations; it should include an exhaustive list of substance identifiers (that is, Chemical Abstracts Service Registry Numbers [CAS RNs]) and be limited to substances on the DSL.

A commenter added that manufacturers do not have the background to interpret complex chemical definitions or identify chemical structure diagrams, making it difficult for them to identify PFAS from only a chemical structural definition. A list of CAS RNs would help to streamline and simplify reporting.

Response 132: The Updated Draft State of PFAS Report defines PFAS using the OECD (2021) definition of PFAS, which uses chemical structure rather than individual identifiers such as CAS RNs. Risk management actions considered would be developed in alignment with, and complementary to, existing regulations. The proposed approach is therefore to address parent compounds and potential transformation products.

The following external resources are non-exhaustive lists of PFAS:

- OECD Comprehensive Global Database of PFAS
- EPA Master List of PFAS Substances

It should be noted that while fluoropolymers are part of the class, PFAS meeting the definition of fluoropolymers as described in the Updated Draft State of PFAS Report are planned for consideration in a separate assessment.

Comment Summary 133: A commenter urged ECCC to not drastically reduce the number of exempt Volatile Organic Compounds in products solely on the basis that they are captured under the PFAS definition.

Response 133: If the proposed conclusion is confirmed in the final State of PFAS Report, this information would be considered in the future steps of risk management development. Risk management actions considered would be developed in alignment with, and complementary to, existing regulations such as the *Volatile Organic Compound Concentration Limits for Certain Products Regulations*, the ODSHAR and the *Prohibition of Certain Toxic Substances Regulations, 2012*.

Comment Summary 134: Commenters requested that PFAS as a class should be proposed for virtual elimination.

Response 134: Please note that the 2023 amendments to CEPA repealed provisions pertaining to virtual elimination. As stated in the Revised Risk Management Scope, the Government of Canada's objective in managing the risks of PFAS is to, over time, achieve the lowest levels of environmental and human exposure that are technically and economically feasible, taking into consideration socio-economic factors. The document outlines proposed risk management options being considered to meet this objective.

Comment Summary 135: A commenter noted that lower thresholds to determine persistence and bioaccumulation should be established under CEPA.

Response 135: Well-studied PFAS meet the persistence criteria as set out in the *Persistence and Bioaccumulation Regulations* of CEPA. Based on available information and structural similarities, it is expected that other substances within the class of PFAS are also highly persistent or transform to persistent PFAS. It is therefore proposed that the class of PFAS meets the persistence criteria as set out in the *Persistence and Bioaccumulation Regulations* of CEPA.

However, evaluating the bioaccumulation potential of substances relative to criteria in the *Persistence and Bioaccumulation Regulations* of CEPA is complicated because the numeric criteria for bioaccumulation,

outlined in the *Persistence and Bioaccumulation Regulations*, are based on bioaccumulation data for freshwater aquatic species, which do not account for biomagnification potential. There is a high concern identified for the biomagnification and trophic magnification potential of well-studied PFAS in air-breathing organisms. Therefore, application of the criteria would not reflect the concern for dietary-based biomagnification, which is the primary route of foodweb exposure identified for well-studied PFAS. It is therefore proposed that the bioaccumulation potential of PFAS cannot reasonably be determined according to the regulatory criteria set out in the Persistence and Bioaccumulation Regulations of CEPA.

Comment Summary 136: Commenters noted that if ECCC is establishing PFAS limits for biosolids, it will be necessary to conduct rigorous scientific testing of agriculture soils, ground water, watersheds, and farm products grown from land-applied biosolids. As part of the circular economy, receivers are shifting from simply processing waste to recycling and finding beneficial uses (such as using biosolids for land application).

Response 136: In May 2023, the CFIA proposed to adopt an interim standard that will require biosolids that are intended for use as commercial fertilizers to contain less than 50 µg/kg of PFOS before they can be imported or sold in Canada. The proposed interim standard will effectively prevent the small proportion of biosolids products that are heavily impacted by industrial inputs (both domestic and imported) from being imported or sold as fertilizers in Canada. This interim approach is intended to provide a risk control measure for biosolids that is protective of the environment and the safety of food and feed crops grown in Canada. The CFIA interim standard is also part of the Government of Canada's coordinated suite of risk mitigation measures, which are intended to minimize human and environmental exposure to PFAS throughout a product's life cycle from manufacture to disposal. The CFIA has been working with the provinces and will continue to engage with the provinces, municipalities and biosolids industry to implement the interim standard.

Comment Summary 137: Commenters recommended that the Government of Canada invest more in the research and monitoring of PFAS. Some suggestions include:

- **improved analytical testing and sampling methods**
- **more research on the toxicological effects of PFAS and various PFAS at different concentrations, including mixtures**
- **monitoring to understand PFAS trends, to capture a wider range of PFAS and examine releases within Canada, and**
- **developing and conducting targeted monitoring, including targeted biomonitoring, to inform the public of the potential for PFAS contamination**

Response 137: The Government of Canada conducts a variety of monitoring programs and research studies to understand trends in PFAS occurrence in Canadian ecosystems and wildlife.

As the analytical methods for PFAS have improved over the years, a wider range of PFAS, including newer generation compounds, are included in monitoring programs. The data generated from these monitoring programs are routinely published on the Government of Canada's Open Data Portal. Research on the toxicology of PFAS is also ongoing.

More information on planned and future research, monitoring, and surveillance projects are highlighted in Section 8.1.2 *Planned and future research, monitoring, and surveillance* of the Updated Draft State of PFAS Report.

Comment Summary 138: A commenter is concerned with variability of measurement methodologies used to evaluate the performance of non-PFAS firefighting foams in the aviation sector. Commenter also suggests implementing a National Strategy for the Safe and Environmentally Sound Disposal of firefighting foam containing PFAS.

Response 138: As indicated in the Revised Risk Management Scope, further consultation and data gathering would take place in the future for the development of controls on firefighting foams containing PFAS. The commenter's suggestions would be taken into consideration in that process.

Comment Summary 139: A commenter pointed out there is no commonly accepted method or threshold for measuring PFAS across jurisdictions.

Response 139: As stated in the Revised Risk Management Scope, the Government of Canada will consider alignment with measures taken in other jurisdictions when it is possible. Significant research is happening globally for analytical methods, remediation technologies and potential alternatives.

Comment Summary 140: Commenters recommended that as part of developing PFAS regulations, the Government of Canada needs to invest in reliable, sustainable and cost-effective PFAS treatment processes. This includes investing in the technology necessary to address PFAS in Canadian soil and drinking water.

Response 140: The Government of Canada recognizes that there are several methods and technologies that can help reduce and mitigate PFAS contamination and that further investment and research are required to scale treatment. As stated in Section 2.6.5 *Potential PFAS removal and treatment technologies* of the Updated Draft State of PFAS Report, the field of PFAS treatment and remediation is rapidly evolving and advancing, with new information becoming available as experience is gained through conducting activities at contaminated sites. However, as stated in Section 9 *Findings* of the Updated Draft State of PFAS Report, upstream management and minimization remains the most efficient method to reduce PFAS concentrations in many receiving media, and the only method to reduce PFAS concentrations in ambient environmental media.

Comment Summary 141: Commenters supported efforts to identify PFAS uses that should be targeted for restriction. They also recommended that more work needs to be done to identify key product categories leading to direct and indirect PFAS human and ecosystem exposure.

Response 141: Data collection initiatives (including a notice under section 71 of CEPA in the *Canada Gazette*) are planned to collect additional information on PFAS to better understand uses and sources of release and exposure, and may be used to inform risk management decisions and other activities related to PFAS.

Risk management instruments may be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of the environmental and health concerns. Any regulatory measure that would address PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Information gathering to fully understand the availability of alternatives and the costs of transitioning to alternatives would also take place before risk management actions are taken.

Additional opportunities for stakeholder and interested parties engagement would be provided during the subsequent development of risk management actions.

Comment Summary 142: A commenter recommended that risk management actions should focus on source control measures first and foremost, as they are typically more effective.

Response 142: As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of the general population, including disproportionately impacted populations, to these substances to protect environmental and human health. Risk management actions developed may be tailored to sectors and uses depending upon the information received, the demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 143: A commenter recommended focusing on fuel fire prevention along with AFFF alternatives due to its potential for being an essential PFAS application in some contexts.

Response 143: This information would be considered in the future steps of risk management development. Information gathered through the various stages of consultation would help inform the risk management actions to be developed. Actions developed may be tailored to sectors and uses depending upon the information received, the demonstrated absence of suitable alternatives, socio-economic factors, and consideration of the health and environmental concerns.

Comment Summary 144: A commenter noted that certain alternatives to PFOS-based AFFF are manufactured with short-chain PFAS for which there are no guidelines or screening values.

Response 144: This would be considered for future steps in the risk management phase during instrument development, where there would be additional opportunities for consultation.

Comment Summary 145: A commenter recommended that risk management measures should avoid imposing a greater burden on domestic manufacturers and should not attempt to impose standards on products that are produced in other jurisdictions.

Response 145: Both domestic and imported products can be important sources of exposure and releases of PFAS, and both will be considered in any risk management actions. International alignment and the burden imposed by risk management will be taken into account in the development of risk management instruments.

Risk management instruments may be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of environmental and health concerns. Any regulatory measures to address PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Before taking any risk management actions, information would be gathered to fully understand the availability of alternatives and the costs of transitioning to those alternatives.

There would also be additional opportunities for public and stakeholder engagement during the subsequent development of any risk management actions.

Comment Summary 146: A commenter suggested identifying lessons learned from the experience of jurisdictions that have implemented restrictions on PFAS as a class to date, which can be used to assess any potential impacts on veterinary medicines and to avoid negative and unintended consequences on animal health and welfare in Canada.

Another commenter recommended that environmental risk management actions should be balanced to avoid impacting critical access to medical devices in Canada. They recommended that PFAS with minimal environmental and human health impacts should be exempted in risk management.

Response 146: This information will be considered for future steps in any risk management development. The Revised Risk Management Scope outlines that aligning with other jurisdictions will be considered, where appropriate. Risk management actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 147: A commenter recommended implementing risk management measures first for non-essential PFAS-containing products, such as banning personal care products, textiles, and food packaging containing PFAS.

Response 147: The class of PFAS, excluding fluoropolymers as defined in the Updated Draft State of PFAS Report, is proposed to meet the criteria under paragraph 64(a) and (c) of CEPA, as these substances are entering or may enter the environment in a quantity or concentration or under conditions that have or may have immediate or long-term harmful effects on the environment or its biological diversity, and that constitute or may constitute a danger in Canada to human life or health. The proposed risk management options under consideration for the class of PFAS, excluding fluoropolymers as defined in the Updated Draft State of PFAS Report, through a phased approach, are the following:

- As a first step, due to their high potential for environmental and human exposure, a regulatory instrument under CEPA to restrict PFAS not currently regulated in firefighting foams; and
- Additional regulatory instrument(s) under CEPA to prohibit other uses or sectors in relation to PFAS. Prioritization for prohibition may be based on factors such as socio-economic considerations, the availability of feasible alternatives, and the potential for human and environmental exposure.

Before taking any risk management actions, information would be gathered to fully understand the availability of alternatives and the costs of transitioning to those alternatives. There would also be additional opportunities for public and stakeholder engagement during the subsequent development of any risk management actions.

Comment Summary 148: Commenters called for Federal leadership to manage PFAS and to coordinate with the provinces, territories and municipalities to avoid a fragmented approach to PFAS management, including on waste management issues. A commenter suggested data on PFAS in environmental matrices should be shared with other government partners.

Response 148: Partnerships would be considered during the development of future risk management while noting the respective mandate of each jurisdiction. Federal partners, such as the CFIA, regulate waste-derived materials including municipal biosolids intended for import or sale as commercial fertilizers and soil conditioners/amendments.

The Government of Canada can work collaboratively with its provincial, territorial, and municipal partners under the auspices of the CCME, to address waste issues of mutual interest, and to improve waste reduction policies and practices across Canada.

Comment Summary 149: A commenter recommended that cross-border and interprovincial movement of waste must include PFAS as a class for notification and ensure the requirement for the environmentally sound management of waste containing PFAS. Relevant federal, provincial/territorial and municipal regulations must be strengthened to improve disclosure and tracking of the movement and treatment of waste containing PFAS (for example, Canada's *Cross-border Movement of Hazardous Waste and Hazardous Recyclable Material Regulations*, Ontario). Ultimately, Canada needs to restrict and avoid exports and imports of waste containing PFAS.

Response 149: The Revised Risk Management Scope outlines the proposed risk management options under consideration for the class of PFAS. A review of the definitions of hazardous waste and hazardous recyclable materials under the *Cross-border Movement of Hazardous Waste and Hazardous Recyclable Material Regulations* will be undertaken in future. This will include an examination of substances controlled under these Regulations.

Comment Summary 150: A commenter recommended that the Canadian government should adopt a moratorium on incineration until safe protocols for incineration are developed and included in regulations under CEPA.

Response 150: The Basel Convention has adopted General technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants, such as PFAS, which provide guidance on their environmentally sound management, including thermal treatment.

In Canada, approximately 4% of MSW is incinerated, while the remaining 96% is disposed of in landfills. Data suggests that temperatures of 1000°C and above are expected to sufficiently destroy many fluorinated compounds; however, further data are needed.

Comment Summary 151: A commenter asked why the Government of Canada is considering regulating firefighting foams only, while gathering information to identify and prioritize options for minimizing exposure to PFAS from other sources and products. Why is the Government not banning the entire class of PFAS at once?

Another commenter requested the immediate ban of PFAS products and their import into Canada with the exception of products related to safety in the form of firefighting, aircraft maintenance, etc. The commenter noted that we need to give these industries more time to find an alternative.

Response 151: The Revised Risk Management Scope outlines the proposed risk management options under consideration for the class of PFAS at a broad level. As stated in the Revised Risk Management Scope, the government's proposed objective in managing the risks of PFAS is to, over time, achieve the lowest levels of environmental and human exposure that are technically and economically feasible, taking into consideration socio-economic factors. Risk management actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 152: A commenter recommended that the Canadian government should consider an earlier deadline for banning consumer goods used by pregnant women and children under 12.

Response 152: Proposed risk management for PFAS would take into consideration those groups of individuals within the Canadian population who, due to greater exposure, may be disproportionately impacted. The Government of Canada would consider the information gathered through the various stages of consultation in determining the most effective and feasible timelines for taking action on PFAS as proposed in the Revised Risk Management Scope.

Comment Summary 153: A commenter proposed that the Government of Canada establish a regulatory regime to govern the release, export, import, manufacture, processing, sale, and use of material containing PFAS. Hence the importance of the PFAS risk management framework and having an action plan for the short, medium, and long term.

Response 153: The Revised Risk Management Scope document outlines the proposed risk management options under consideration for the class of PFAS at a broad level.

As stated in the Revised Risk Management Scope, the government's proposed objective in managing the risks of PFAS is to, over time, achieve the lowest levels of environmental and human exposure that are technically and economically feasible, taking into consideration socio-economic factors.

Comment Summary 154: Commenters recommended that companies who have benefitted from sale or import of PFAS or PFAS-bearing products should be strongly encouraged to support financial and intellectual (in the form of research) responsibility toward efforts related to PFAS analytical method development, treatment process development and testing, environmental remediation solutions, and more.

Response 154: Suggestions would be taken into consideration in the risk management process.

Comment Summary 155: Commenters wished to know what interim measures may be proposed to address the PFAS issue while the Government of Canada develops and implements risk-management instruments.

Response 155: The Revised Risk Management Scope outlines the proposed options considered by the Government of Canada, which identify voluntary risk management actions considered as a complement to long-term regulatory initiatives. This work would be informed by stakeholder engagement and would reflect and align with the suite of broader risk management options under consideration.

Comment Summary 156: A commenter recommended an immediate recall of PFAS in existing products.

Response 156: A recall of products containing PFAS is not being proposed. PFAS are a large class of substances with a wide array of different uses. As a result, the proposed risk management options under consideration are outlined in the Revised Risk Management Scope.

Comment Summary 157: Commenters recommended that complex goods containing de minimis levels, less than 0.1% by weight, should be exempt from risk management measures. A commenter also recommended that the Government of Canada should primarily focus on limiting intentional additions of certain PFAS subclasses in products.

Response 157: Risk management may be tailored to sectors and uses depending upon the information received, socio-economic factors, and consideration of the environmental and health concern. Any regulatory measures that prohibit PFAS would take into consideration the availability of suitable alternatives, including the costs and benefits of switching to those alternatives. Information gathering to fully understand the availability of alternatives and the costs of transitioning to alternatives will also take place before certain risk management actions are taken. Consideration would also be given to whether certain concentration thresholds, and/or exemptions for incidental presence may be needed in any risk management instruments for PFAS.

Comment Summary 158: A commenter requested flexibility in notification and reporting requirements, if considered, for risk management actions for products that contain intentionally added PFAS, such as to:

- **allow for coordinated supply chain reporting mechanisms if required for complex goods**
- **use internationally used product classification codes**

Response 158: The Revised Risk Management Scope outlines the proposed options considered by the Government of Canada. However, there would be additional opportunities for consultation in the future during the subsequent development of risk management activities.

In addition, data collection initiatives (including the mandatory CEPA section 71 notice in the *Canada Gazette*) are planned to collect additional information on PFAS, which may be used to inform risk management decision making and other activities related to PFAS. The section 71 notice will be accompanied by explanatory materials to facilitate reporting.

Comment Summary 159: Commenters requested that the Government of Canada develop best practices for managing legacy PFAS to prevent risks to human health and the environment, such as developing a national strategy for disposal of firefighting foam.

Response 159: Firefighting foams are a very dispersive use of PFAS and should be properly removed and disposed of to minimize risks to human health and the environment. The Revised Risk Management Scope outlines the proposed options considered by the Government of Canada, including a regulatory instrument to control firefighting foams containing PFAS not currently regulated under the *Prohibition of Certain Toxic Substances Regulations, 2012*.There would be additional opportunities for consultation in the future during the subsequent development of risk management activities.

Comment Summary 160: A commenter suggested that the Government of Canada should establish a PFAS action fund, potentially within the FCSAP, to assess and mitigate PFAS risks at airports to a meaningful degree.

Response 160: The Revised Risk Management Scope outlines the proposed risk management options under consideration for the class of PFAS. This suggestion would be considered in future steps of risk management development.

The FCSAP provides funding for the assessment, remediation, and risk management of federal contaminated sites. Available FCSAP funding is provided to federal departments, agencies, and consolidated Crown corporations to conduct assessment, remediation, and risk management activities at eligible sites based on potential risks to human health and the environment.

Comment Summary 161: A commenter recommended that a national PFAS source inventory be built, and a lifecycle roadmap created to delineate all known and potential pathways that PFAS can roam and transfer through, including use, processing, and disposal of PFAS-containing products. It would be expected that this national database be accessible to all levels of government and industry in Canada.

Response 161: Suggestions will be taken into consideration for any future risk management activities, should they be required.

Comment Summary 162: Commenters urged the Government of Canada to collect information under section 71 of CEPA as it could inform the PFAS work. Such efforts should be based on a specific subset of substances listed by CAS RN.

Response 162: Data collection initiatives (including the mandatory CEPA section 71 notice in the *Canada Gazette*) are planned to collect additional information on PFAS, which may be used to inform risk management decision making and other activities related to PFAS. The scope of the section 71 notice is proposed to be limited to the substances identified by CAS RN in the notice.

Comment Summary 163: Commenters recommended making information gathered under section 71 of CEPA publicly available to determine major types, quantities and concentrations of PFAS in products manufactured, imported into and sold in Canada.

Response 163: To increase transparency and facilitate access to information on substances in Canada, compilations of non-confidential information collected under section 71 CEPA are made available on the Government of Canada Open Data Portal.

Comment Summary 164: A commenter stated that a section 71 notice may not necessarily get the information from overseas suppliers. Therefore, they recommend a well-coordinated list of PFAS chemicals and internationally scientifically accepted threshold limits to comprise the section 71 notice. Please help Canadian companies by lining up the section 71 notice that reflects real time internationally viable data collection.

A commenter suggested that if the Government of Canada intends to proceed with data collection initiatives (most notably, the CEPA section 71 notice), retailers should be provided with a draft document/form to share with suppliers.

Response 164: The CEPA Industry Coordinating Group Subcommittee on Information Gathering and other stakeholder groups were engaged on the scope of the notice under section 71 of CEPA. The information

gathering initiative will be limited to the substances identified in the notice. Threshold limits (concentration and quantity) will also be identified in the notice.

Section 71 notices are accompanied by explanatory materials to facilitate reporting. Please see the Information Gathering Initiatives webpage for more information.

Comment Summary 165: A commenter suggested that a whitelist of permitted chemicals should be made available, rather than a blacklist of prohibited chemicals.

Response 165: Pursuant to CEPA, substances are assessed and the ones found toxic are listed on Schedule 1 to the Act. In addition, under this Act, the Government of Canada recognizes the importance of encouraging the progressive substitution of substances, processes, and technologies, with alternatives that are safer for the environment or human health, when they are economically and technically viable.

Comment Summary 166: A commenter encouraged the Government of Canada to invest time and funding to assist investment and infrastructure to support the scale-up and deployment of PFAS alternatives as well as investment in basic scientific research.

Response 166: The Revised Risk Management Scope outlines the proposed options being considered by the Government of Canada for the class of PFAS. If the proposed conclusion is confirmed in the final State of PFAS Report, there will be additional opportunities for consultation where stakeholders may provide input about specific risk management activities.

Comment Summary 167: A commenter recommended requiring alternative assessments under CEPA to address substitutions and chemical regulation.

Another commenter requested ongoing evaluations of alternative chemicals and their feasibility/suitability as environmentally-sound replacements, within the context of the approach and timeline for managing PFAS as a class.

Response 167: When developing risk management approaches, alternative substances are considered whenever possible and when adequate and relevant information is available on the economic, social and environmental implications for Canada. The Government of Canada is also exploring ways to advance responsible replacement of chemicals of concern, including ways to apply informed substitution to support chemical management. Risk managing the class of PFAS addresses the potential cumulative effects of co-exposure to multiple PFAS and is a way to reduce regrettable substitution – that is, substituting regulated PFAS with unregulated PFAS that potentially possess equally hazardous properties.

Comment Summary 168: A commenter recommended the Government of Canada focus regulatory efforts on PFAS chemical release prevention, waste disposal, material handling, recycling and environmental remediation.

Response 168: The Updated Draft State of PFAS Report outlines the involvement of provinces in contaminated site remediation and the difficulties with remediation of PFAS contamination.

Waste management can involve federal partners such as the CFIA, which regulates waste-derived materials including municipal biosolids intended for import or sale as commercial fertilizers and soil conditioners/amendments.

The Revised Risk Management Scope outlines the proposed options being considered by the Government of Canada for managing risks due to PFAS. However, there would be additional opportunities for consultation in the future about potential measures for specific uses and sectors.

Comment Summary 169: A commenter recommended multiple factors to consider prior to regulating food packaging. The recommendations are related to the need for industry guidance and validating test methods, background data and PFAS-contaminated recyclable materials.

Response 169: If the proposed conclusion is confirmed in the final State of PFAS Report, information and recommendations gathered through the various stages of consultation will help inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health

and ecological concerns.

Continued monitoring for PFAS in food will help improve estimates of dietary exposure to PFAS in Canada, identify sources, and inform on future potential measures, if necessary, to protect the health of Canadians.

Comment Summary 170: A commenter recommended that "high risk" packaging be prioritized in risk management and indicated that it would be difficult to identify PFAS in some packaging where they are unintentionally present or at very low levels. The commenter suggested that this priority would provide a rapid reduction in overall PFAS concentrations going into the environment and would be more effective than putting a blanket ban in place.

Response 170: As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of these substances to the general population, including disproportionately impacted populations, to protect environmental and human health. Information and recommendations gathered through the various stages of consultation will help inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and ecological concerns.

Comment Summary 171: A commenter noted that a section 71 notice that would target all substances that meet the proposed definition for PFAS will cause a significant burden to industry. Only a small number of PFAS are on the DSL and the risk associated to other PFAS are already managed under the New Substances program. Instead, the Government of Canada should mainly aim to understand the large extent to which PFAS uses could be exempted and the non-availability of functional alternatives. In addition, the section 71 notice should be related to 'intentional uses' and/or readily known uses in products, without any need for testing to avoid the possibility of non-compliance.

Response 171: The planned CEPA section 71 notice intends to collect information on those PFAS likely to be present in Canadian commerce, not currently regulated, and not recently subject to information gathering activities. The information collected may be used to inform risk management decision making and other activities related to PFAS. The section 71 notice will be accompanied by explanatory materials to facilitate reporting.

Comment Summary 172: A commenter recommended that emphasis should be placed on removing PFAS chemicals as they reach wastewater treatment systems and solid waste facilities, such as composting facilities, scrapyards and recycling facilities which may also be a source of release to the environment.

Response 172: The proposed environmental objective listed in the Revised Risk Management Scope is to reduce releases of these substances to the Canadian environment so as to avoid adverse effects. The proposed risk management options to achieve the objectives are also listed in the Revised Risk Management Scope. In addition, additional information obtained from public comments and other sources would be considered in the instrument selection and development process.

Comment Summary 173: A commenter requested a transition from using fluorinated to non-fluorinated polymerization agents. This change in the manufacturing process aims to eliminate hazardous substances such as PFOA and PFOS from the finished product.

Response 173: This information would be considered in the future steps of risk management development.

Comment Summary 174: A commenter requested that instead of banning the class of PFAS, the Government of Canada invest in and introduce technology to deal with PFAS releases similar to Carbon Capture technology on challenges associated with fugitive emissions.

Response 174: Experience with PFAS-contaminated sites has shown that remediation and management of these sites are very challenging and complex, and the removal of PFAS from the broader environment is not possible. As stated in Section 9 *Findings* of the Updated Draft State of PFAS Report, upstream management and minimization remains the most efficient method to reduce PFAS concentrations in many receiving media, and the only method to reduce PFAS concentrations in ambient environmental media.

As indicated in the Revised Risk Management Scope, the proposed environmental and human health objectives for the class of PFAS, excluding fluoropolymers as defined in the Updated Draft State of PFAS Report, are, respectively, to reduce releases of these substances to the Canadian environment so as to avoid adverse effects; and to reduce exposure of the general population, including disproportionately impacted populations, to these substances to protect human health. The proposed risk management options to achieve the objectives are also listed in the Revised Risk Management Scope.

Comment Summary 175: A commenter requested that the environmental objectives of the Risk Management Scope should also be expanded to specify the need to reduce the use and release of PFAS substances to levels that are not harmful to biodiversity. This aligns with Canada's commitments under the Kunming-Montreal Global Biodiversity Framework.

They recommend that the Risk Management Scope environment objectives should be revised to: "Reduce releases of these substances to the Canadian environment so as to not cause adverse effects, including immediate and long-term harmful effects on biological diversity."

Response 175: The Updated Draft State of PFAS Report proposes to conclude that the class of PFAS, excluding fluoropolymers as defined in the Updated Draft State of PFAS Report, meets the criteria under paragraphs 64(a) and 64(c) of CEPA as these substances are entering or may enter the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effects on the environment or its biological diversity, and that constitute or may constitute a danger in Canada to human life or health. It is thus understood that the environmental objective also includes biological diversity.

Comment Summary 176: A commenter noted that the health objective in the Risk Management Scope fails to recognize the need to protect vulnerable populations. They recommended revising the Risk Management Scope health objective to the following: "Reduce exposure of the general and vulnerable populations to these substances to levels that are protective of human health."

Response 176: As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of these substances to the general population, including disproportionately impacted populations, to protect human health. Proposed risk management will take into consideration groups of individuals within the Canadian population who, due to greater exposure, may be disproportionately impacted.

Comment Summary 177: Commenters stated that information gathering must precede risk assessment and not be used as a proposed risk management option.

Response 177: The Updated Draft State of PFAS Report includes information collected through literature searches, including key information submitted by stakeholders in response to the notice of intent (published in 2021) and the public comment period following publication of the Draft State of PFAS Report (May, 2023). The Updated Draft State of PFAS Report also identifies information on mobility and extreme persistence of PFAS in the environment, potential for effects on the environment and human health, and the expectation that combined exposures to multiple PFAS increase the likelihood of detrimental impacts which supports the proposed toxic conclusion.

Broad concerns for the substances in the class have been identified based on: past risk assessments under CEPA, ongoing collection and review of scientific data and literature on PFAS, and activities in other jurisdictions and international fora such as the *Stockholm Convention on Persistent Organic Pollutants*.

The proposed CEPA section 71 notice intends to collect information on those PFAS likely to be present in Canadian commerce and not currently regulated. The information collected may be used to inform risk management decision making and other activities related to PFAS.

Comment Summary 178: A commenter requested that Canada implement a robust regulatory framework for continuous evaluation and review of hazardous chemical products.

Response 178: Canada's approach to chemicals management includes information gathering, risk assessment, risk management, compliance promotion and enforcement, performance measurement and evaluation, and reporting. For more information please consult Canada's approach on chemicals.

Comment Summary 179: A commenter asked what steps they can take to assist in addressing the presence of PFAS in our food, water, blood, products, etc.

Response 179: Individual Canadians may take part in the future consultations about the next steps of risk management. For more information on actions individuals can take please consult Per- and polyfluoroalkyl substances (PFAS).

Comment Summary 180: A commenter requested that the Government of Canada establish a centre to undertake research and work directly with companies to substitute toxic chemicals and harmful pollutants in products.

Response 180: This would be considered during future steps of risk management.

When developing risk management documents, substitutes and alternatives are considered whenever possible and when adequate and relevant information is available on the economic, social and environmental implications for Canada. The Government of Canada is also exploring ways to advance responsible replacement of chemicals of concern, including ways to apply informed substitution to support chemicals management.

Comment Summary 181: Commenters indicated that a phase-out of the class of PFAS would present challenges for several uses in the aerospace and petroleum industries.
They provided comments that were submitted to ECHA for their proposed restriction on PFAS.

Response 181: Commenters' concerns and the information submitted to ECHA would inform the development of risk management measures.

Comment Summary 182: A commenter stated that the proposed regulatory revisions should initially aim to act upstream, rather than downstream, of contamination. Several jurisdictions already apply regulations that prohibit the import, manufacture, and use of PFOS, without exemption, particularly for AFFF. Revision of regulations to eliminate the addition of all sources of PFAS to the environment, including exemptions granted (for example AFFF), is essential to reduce the problem.

Response 182: Several PFAS (PFOS, PFOA, LC-PFCAs, their salts and precursors) have been previously assessed, added to Schedule 1 of CEPA and are regulated in Canada by the *Prohibition of Certain Toxic Substances Regulations, 2012*.

The Regulations prohibit the manufacture, use, sale, offer for sale and import of these 3 PFAS subgroups, and products containing them, with some exemptions. Please note the Government published draft Regulations on May 14, 2022 that would further restrict exempted uses of PFOS, PFOA and LC-PFCAs, and products containing these substances, such as AFFF, by removing or providing time-limits for most remaining exemptions.

As outlined in the Revised Risk Management Scope, if the proposed conclusion is confirmed in the final State of PFAS Report, the federal government will aim to reduce releases of PFAS as a class to the Canadian environment to reduce exposure of the general population, including disproportionately impacted populations, to these substances to protect environmental and human health. Risk management actions developed may be tailored to sectors and uses depending upon the information received, the demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 183: A commenter recommended maintaining the current regulatory approach for veterinary medicines at HC's Veterinary Drugs Directorate and CFIA, as well as conducting an assessment on potential impacts of regulatory approaches for PFAS on veterinary medicine and animal health.

Response 183: The Veterinary Drugs Directorate and the CFIA have been kept informed of developments leading to the publication of the Updated Draft State of PFAS Report and would be directly consulted regarding any risk management activities that may affect their programs.

Consultation

Comment Summary 184: Commenters requested to be engaged in future consultations and discussions regarding PFAS, including risk management actions.

Response 184: If the proposed conclusion is confirmed in the final State of PFAS Report, there will be additional opportunities for consultation on future risk management actions. The Government of Canada will notify implicated stakeholders of future consultation opportunities.

To receive the latest news on actions to assess and manage chemical substances under the CMP, please consult the Latest News about the CMP website.

Comment Summary 185: A commenter suggested consulting impacted communities, such as communities in PFAS hotspots, to draft measures specific to their area.

Response 185: If the proposed conclusion is confirmed in the final State of PFAS Report, there will be additional opportunities for consultation on proposed risk management actions. The Government of Canada will notify implicated stakeholders of future consultation opportunities. In addition, the Government of Canada, while addressing Canadian federal contaminated sites impacted by PFAS, will collaborate with other jurisdictions such as provincial/territorial governments and/or municipal/local health authorities to ensure risks associated with PFAS exposure both on-site and off-site are addressed and mitigated appropriately (for example, treating drinking water or finding alternatives). Note that PFAS contamination on non-federal lands is under the jurisdiction of the province/territory.

Comment Summary 186: A commenter requested to see a summary of the public comments.

Response 186: The public consultation period is an important step in the assessment process as it is an opportunity for interested parties to provide feedback. Comments received on the Draft State of PFAS Report and Risk Management Scope (published in May 2023) were reviewed, organized, and consolidated, and are summarized in this document.

Comment Summary 187: A commenter indicated that there is no clear, coordinated approach on how Canada is advancing its efforts on PFAS and that the report is silent on the role of provinces and territories in managing PFAS relative to, or in coordination with, Canada.

Response 187: ECCC collaborates with the provinces and territories to develop environmental quality guidelines through the CCME. Currently, ECCC is leading CCME projects on the development of environmental quality guidelines for PFOA in water, soil, and groundwater. Guidelines developed by the CCME are reviewed and approved by all federal, provincial, and territorial jurisdictions. In addition, several provinces and territories may also develop or adopt other guidelines/standards for PFAS that respond to needs within their jurisdictions to address sites on their lands and sites on private properties, including industrial facilities.

HC works in collaboration with provinces, territories and other federal departments to address PFAS in drinking water. Recently, HC and the Federal-Provincial-Territorial Committee on Drinking Water worked together to develop the objective for PFAS in drinking water. HC provides scientific and technical expertise to the Committee and coordinates its activities. Like drinking water guidelines, the objective for PFAS in drinking water is not a regulation and is not binding. Provinces and territories have the autonomy to decide how to best apply the objective in their jurisdiction.

The FCSAP Secretariat coordinates activities pertaining to PFAS contaminated sites that are located on land owned or leased by the federal government or on land where the federal government has accepted responsibility for the contamination.

If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation will continue to inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health concerns.

Comment Summary 188: A commenter recommended forming an expert working group comprised of academics, industry representatives, US industry counterparts, and other agencies and organizations to develop a PFAS approach and address current data gaps as required. This expert group could conduct more coordinated reviews and develop risk management actions.

Response 188: If the proposed conclusion is confirmed in the final State of PFAS Report, this suggestion will be considered in the risk management process.

International alignment

Comment Summary 189: Commenters asserted that Canada's approach to PFAS should not be a blanket approach, but rather it should align with actions taken in other jurisdictions and follow the examples of various countries that provide approaches and regulations suited to each reasonable subclass of material.

Response 189: The Government of Canada is considering actions taken in other jurisdictions, including measures taken in the EU and the US. Alignment with other jurisdictions will be considered where appropriate and provided that the measures are consistent with the Canadian context.

Comment Summary 190: Commenters noted that PFAS is a global issue, but each jurisdiction appears to be developing its unique approach and not aligning efforts. Commenters recommended that Canada should collaborate with its counterpart agencies to compare scope definitions and requested that the definition of PFAS align with key trade partners, particularly the US and Europe. Commenters also suggested that the Government of Canada align its actions with actions taken in other jurisdictions, including work by the US EPA and through the Great Lakes Water Quality Agreement. They recommended that the Government of Canada consider measures taken in the US on PFAS to ensure consistency with our trade partner.

Several commenters noted that risk management must avoid regulatory policies that are barriers to free trade, and advocated for a harmonized North American PFAS approach. Failure to align with the US EPA could lead to supply chain disruptions and impact the availability of products in Canada.

Another commenter recommended alignment with California AB 1817 with regards to risk management.

Another commenter recommended the formation of a PFAS expert working group comprising of government agencies, academics, industry and other organizations.

Response 190: The Government of Canada is taking into consideration actions taken in other jurisdictions (for example, the US and Europe), including measures proposed by the US EPA, and is closely following international developments to help inform the approach it will take in addressing the class of PFAS.

The Updated Draft State of PFAS Report uses the definition developed by the OECD (Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance, OECD 2021). This is a broad chemical definition developed by a working group consisting of several international regulatory authorities and other experts.

Under the Great Lakes Water Quality Agreement, Canada and the US have agreed to protect human health and the environment through cooperative and coordinated measures to reduce the anthropogenic release of CMCs into the waters of the Great Lakes. The Government of Canada published Canada's Great Lakes Strategy for PFOS, PFOA, and LC-PFCAs in 2022 (ECCC 2022). The document outlines risk mitigation and management actions to further protect the Great Lakes from these substances. To support the goal of reducing releases of harmful chemicals, the Government provides funding to projects seeking to increase participation in the application of measures that go beyond regulatory compliance to reduce releases of CMCs (including PFOS, PFOA, and LC-PFCAs) by developing, implementing, assessing, and promoting the use of innovative approaches.

Canada is a party to the Stockholm Convention on Persistent Organic Pollutants (POPs), an important international agreement that requires that measures be taken to prohibit or restrict a number of PFAS, including PFOA, PFOS, and PFHxS. Recently, Canada nominated LC-PFCAs for addition to the Stockholm Convention, which is currently under review. If the review is successful, LC-PFCAs could be considered for listing under the Stockholm Convention as early as 2025.

In addition, the Revised Risk Management Scope outlines that alignment with measures in other jurisdictions will be considered, where appropriate.

Comment Summary 191: A commenter requested that the Government of Canada not align risk management strategy with the EU.

Response 191: The Government of Canada is taking into consideration actions taken in other jurisdictions, including measures proposed by the EU, and is closely following international developments to help inform the approach it will take in addressing the class of PFAS, should it be required. The Revised Risk Management Scope outlines that alignment with other jurisdictions will be considered, where appropriate, to avoid trade barriers for Canadian companies and disruption to the supply chain.

Comment Summary 192: A commenter recommended that targeted approaches similar to the US's AFFF model legislation, the "Responsible Firefighting Foam Management Act", should be explored in risk management.

Response 192: The Government of Canada is taking into consideration actions taken in other jurisdictions, including measures proposed by the US EPA, and is closely following international developments to help inform the approach it will take in addressing the class of PFAS. In addition, the Revised Risk Management Scope outlines that alignment with other jurisdictions will be considered, where appropriate, to avoid trade barriers for Canadian companies and disruption to the supply chain.

Note that for AFFF, alignment will be considered where appropriate and provided that the measures are consistent with the Canadian context.

Comment Summary 193: Commenters requested that Canada align its actions with those of the EU (ECHA 2022, ECHA 2023) which includes a clear timetable for restrictions according to use, as modified by Canadian-specific data, which could prioritize uses that are of greatest concern.

Response 193: The Government of Canada is taking into consideration actions taken in other jurisdictions, including measures taken in the EU and the US Alignment will be considered where appropriate and provided that the measures are consistent with the Canadian context.

Comment Summary 194: A commenter noted that Canada needs to enforce a class of PFAS ban not only with traditional retailers and manufacturers but also third-party marketplace websites.

Response 194: Noted. The Revised Risk Management Scope published at the same time as the Updated Draft State of PFAS Report outlines the proposed risk management options being considered for PFAS. Actions in specific sectors, such as retail, would be developed in consultation with stakeholders.

Comment Summary 195: A commenter wondered when the Government of Canada will take more definitive steps to eliminate the entire class of PFAS compounds as a precautionary measure.

Response 195: The Revised Risk Management Scope published at the same time as the Updated Draft State of PFAS Report outlines the proposed options aimed at achieving the lowest levels of environmental and human exposure that are technically and economically feasible, taking into consideration socio-economic factors.

Comment Summary 196: A commenter noted that Canada should commit to strengthen international agreements to include PFAS as a class particularly in the Stockholm Convention on POPs, Basel Convention and Great Lakes Water Quality Agreement.

Response 196: The Government of Canada actively supports global restrictions on chemical of concerns, including PFAS, through various international agreements.

For the *Stockholm Convention on POPs,* candidate substances must undergo a rigorous multi-stage review to determine if they meet specific criteria to be considered a POP. After a candidate substance goes through all the phases of this review process, the POPs Review Committee (POPRC) then provides a recommendation to the Conference of the Parties to list the nominated substance (or group of substances). This process has already been used to list several groups of PFAS in the Stockholm Convention: PFOS, its salts and Perfluorooctane sulfonyl fluoride (PFOSF); PFHxS, its salts and PFHxS-related compounds; and PFOA, its salts and PFOA-related compounds. In 2021, Canada led the nomination of LC-PFCAs, their salts and LC-PFCA-related compounds to the Stockholm Convention. The listing of these substances will be considered at the next Conference of the Parties in 2025.

Once a substance is listed in the Stockholm Convention, the Stockholm Convention collaborates with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal [PDF] to ensure that the Conference of the Parties manages waste in an environmentally sound manner, including

products and articles that have become waste containing, consisting of, or contaminated with, the listed substance. As the Basel Convention is not responsible for listing POPs, making decisions related to including PFAS as a class is not the direct responsibility of this Convention.

Under the Great Lakes Water Quality Agreement, Canada and the US have designated PFOS, PFOA and LC-PFCAs as CMCs. In 2022, Canada's Great Lakes Strategy for PFOS, PFOA and LC-PFCAs was released. The strategy identifies 16 actions in 5 categories. These actions will help to minimize ecological and human health effects caused by PFAS in the Great Lakes Basin.

If future discussions related to addressing PFAS as a broader class arise in the context of international agreements to which Canada is a party, Canada would work to ensure that our domestic and international positions are consistent, where appropriate.

Comment Summary 197: A commenter noted that short-chain PFAS are not listed in the *Stockholm Convention on POPs*, and it is not clear if the Government of Canada intends to nominate short-chain PFAS to the Stockholm Convention.

Response 197: The Government of Canada actively supports global restrictions on chemicals of concern, including PFAS, through various international agreements, in keeping with their procedures for considering or listing substances. In 2021, Canada led the nomination of LC-PFCAs, their salts and LC-PFCA-related compounds to the Stockholm Convention, and in fall 2023, the POPs Review Committee under the Convention recommended that these substances be considered for listing at the next Conference of the Parties in 2025.

Should future discussions related to addressing additional groups of PFAS arise in the context of international agreements to which Canada is a party, Canada would work to ensure that our domestic and international positions are consistent, where suitable.

New information and data

Comment Summary 198: A commenter provided information on the environmental fate of PFAS and the potential for its removal from the environment using microbial biodegradation.

Response 198: The information submitted regarding environmental fate is consistent with that in the Draft State of PFAS Report (published in May 2023). Additional references that were cited by the commenter were considered and changes were made accordingly in the updated draft report.

Comment Summary 199: Commenters provided additional environmental and health-related information associated with PFAS.

Response 199: The information submitted was examined. Additional references that were cited by the commenter were taken into account and changes were made accordingly to the updated draft report.

Comment Summary 200: Commenters provided additional information on provincial guidelines to inform relevant sections of the Draft State of PFAS Report and Risk Management Scope.

Response 200: Section 8.1.3 *Guidelines for protection of human health and the environment* of the updated draft report was revised accordingly, and the information has been considered in the Revised Risk Management Scope.

Comment Summary 201: A commenter provided additional information on sources, biomonitoring, environmental fate, transformation, occurrence, contaminated sites, biosolids and agricultural ecosystems.

The commenter also provided additional information from a study of PFAS concentrations measured in waterways, drinking water and treated water in Quebec. The commenter also noted that specific values and detection limits in water appeared to be low for the time period cited.

Response 201: Additional references that were cited by the commenter were considered in the updated draft report and changes were made accordingly.

The accuracy of specific values cited in the Draft State of PFAS Report (published in May 2023) was confirmed.

The methods developed to measure PFAS in the specific study noted by the commenter were considered to be some of the most sensitive at the time.

Comment Summary 202: A commenter requested the addition of a statement to the Draft State of PFAS Report that, as of July 20, 2023, in Quebec, section 29.2 of the *Farm Operations Regulation* prohibits the agricultural application of imported biosolids and biosolids products.

Response 202: This information has been added to Section 8.1.5 *Waste management* of the updated draft report.

Comment Summary 203: A commenter requested further explanation on the dose-additivity risk assessment methods and clarification on how different PFAS mixtures may have opposing effects.

Response 203: Section 6.2.4 *Mixtures and cumulative effects in the environment* of the Updated Draft State of PFAS Report was revised accordingly.

Comment Summary 204: Commenters urged Canada to consider uses of PFAS in the aerospace and defense sectors including alternatives, spare parts, ammunition and the development of future technology programs.

Response 204: If the proposed conclusion is confirmed in the final State of PFAS Report, this information will be considered in the future steps of risk management development.

Comment Summary 205: Commenters identified potential alternatives for PFAS, including PFAS-free fire suppression concentrate (F3), and alternatives either in development or already on the market that could be used for hydrogen fuel cells.

Response 205: The Revised Risk Management Scope has taken into consideration the information received to the extent possible. If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation will continue to inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 206: Commenters identified uses of PFAS where there is no known alternative or the alternative is not technically, economically, or otherwise feasible. Uses mentioned included the following:

- **medical devices (including metered dose inhalers or MDIs) and processing aids for essential uses (in vitro diagnostic products), as well as medicinal products and medicinal product packaging**
- **high-voltage switchgear**
- **hydrogen energy-related products, especially fuel cells**
- **seals, hoses, custom wires and cables, hydraulic systems, refrigerants, and alternative power technologies (batteries and hydrogen fuel cells)**
- **engines, vehicles, and equipment**
- **new coating technologies, including uses in front and back-sheet materials for solar panels, uses that are critical for ultraviolet (UV) light and corrosion resistance, and uses to protect critical private and public infrastructure such as bridges and various metal constructions.**
- **veterinary products and veterinary product packaging**
- **certain fertilizer manufacturing processes**
- **printed circuit boards, lithium-ion batteries, and other internal parts of home appliances**
- **products and their respective new and replacement parts in the aerospace and defense sectors**

Response 206: The Revised Risk Management Scope has taken into consideration the information received to the extent possible. If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation will continue to inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 207: Commenters provided information on the potential impacts of a ban on PFAS. Products and sectors anticipated to be impacted include:

- **firefighting foams, and their replacement, disposal and clean-up**
- **medical devices**
- **transportation, agriculture, construction and industry**
- **international trade**
- **pharmaceutical products**

Response 207: The Revised Risk Management Scope has taken into consideration the information received to the extent possible. If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation will continue to inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 208: Commenters provided technical information on the function and uses of certain PFAS in products, some of which were identified as confidential business information.

Response 208: The Revised Risk Management Scope has taken into consideration the information received to the extent possible. If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation will continue to inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health and environmental concerns.

Comment Summary 209: Commenters provided information on products containing PFAS (often including their concentration and CAS RNs).

Response 209: The Updated Draft State of PFAS Report and Revised Risk Management Scope have taken into consideration the information received to the extent possible. If the proposed conclusion is confirmed in the final State of PFAS Report, information gathered through the various stages of consultation will continue to inform the risk management actions to be developed. These actions may be tailored to sectors and uses depending upon the information received, demonstrated absence of suitable alternatives, socio-economic factors, and consideration of health concerns.

Comment Summary 210: A commenter provided a website link with PFAS standards and guidance values for water and soil across international jurisdictions.

Response 210: This information was reviewed and had already been considered in the Draft State of PFAS Report (published in May 2023).

Comment Summary 211: Commenters provided additional information and references on HFOs and TFA, including toxicological data and information on persistence, degradation, and bioaccumulation.

Response 211: The information submitted was considered. Additional references that were cited by commenters were taken into account and Section 3.3 *Considerations for hydrofluoroolefins (HFOs) and hydrochlorofluoroolefins (HCFOs)* was added to the Updated Draft State of PFAS Report.

Comment Summary 212: A commenter noted that there are missing elements for agricultural ecosystems such as information on the characterization of agricultural sites, the impacts of PFAS on the agricultural environment and the possible water treatments for contaminated water for different uses.

Response 212: The Updated Draft State of PFAS Report does not have a specific section on agricultural lands, however, this information is captured within different sections of the report. For example, the uptake of PFAS into crops/livestock through irrigation and soil contamination is relevant to soil, biosolids and irrigation water (although fodder is not explicitly addressed). The characterization and management of PFAS contaminated agricultural sites would follow the same methodologies used to characterize and manage other PFAS contaminated sites with different land uses (for example residential, parklands, commercial, industrial, etc). In addition, the CCME PFOS Soil Quality Guideline includes information related to agricultural land uses which is referenced in the Updated Draft State of PFAS Report. Land application of biosolids and use of PFAS-impacted irrigation water on plants is also referenced in the updated draft report.

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