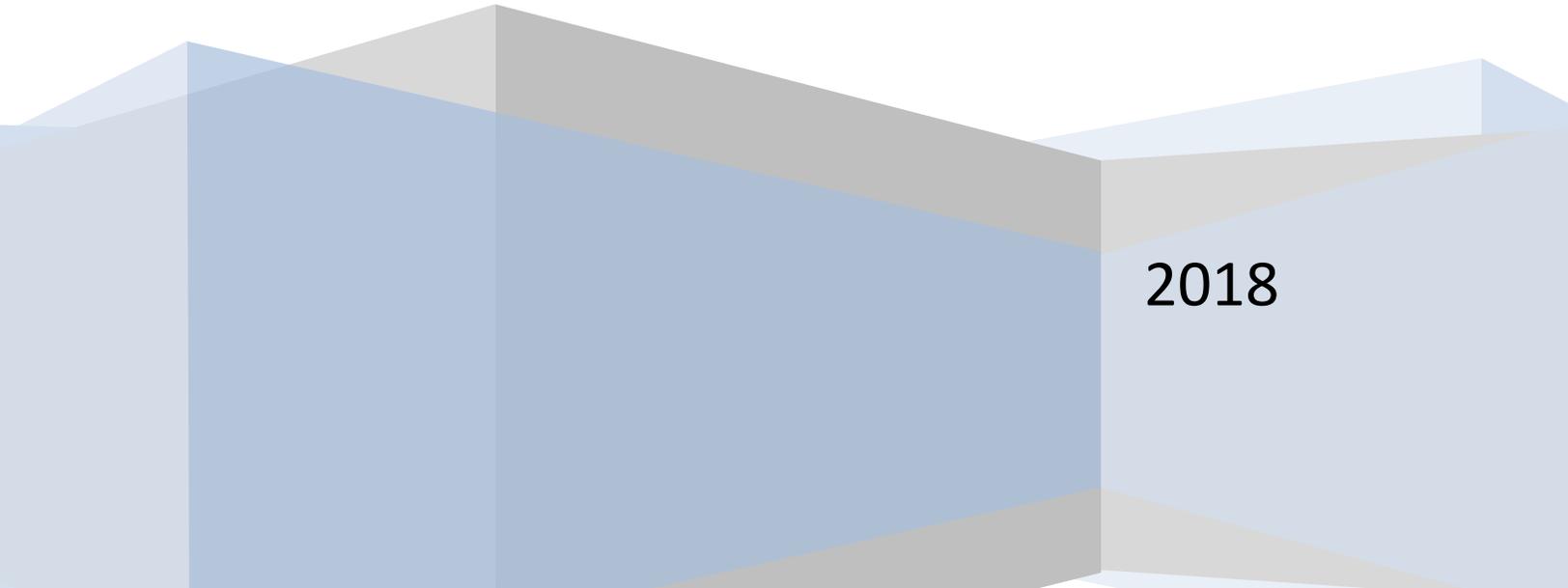


Environment and Climate Change Canada  
Health Canada

# Identification of Risk Assessment Priorities (IRAP)

## Results of the 2017-18 Review



2018

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## Background

Under Canada's Chemicals Management Plan (CMP) Environment and Climate Change Canada (ECCC) and Health Canada (HC), in addition to addressing substances already identified as priorities for assessment, have continued to develop approaches to incorporate new scientific knowledge and to increase collaboration with other regulatory and international agencies. One of the formal approaches developed by ECCC and HC is a cyclical process known as the Identification of Risk Assessment Priorities, or IRAP. As part of this approach, both departments compile new information on substances, evaluate this information, and then subsequently determine if further action on the substance(s) may be warranted. This approach is described in the document titled "[Approach for identification of chemicals and polymers as risk assessment priorities under Part 5 of the \*Canadian Environmental Protection Act, 1999 \(CEPA 1999\)\*](#)" (Environment Canada, Health Canada 2014). This initiative supports ongoing priority setting by identifying additional potential priorities for risk assessment in a transparent manner. In the approach document, the process for identifying additional priorities is described in three steps. These three steps are briefly described below.

- **Acquisition** refers to the active and passive collection of information relevant to the potential health and ecological risks of substances.
- **Evaluation** refers to the triage of substances for which new information has been received. This evaluation requires expert judgment, and consideration of the different types of information that may be available for any given substance.
- **Action** refers to the type of activity that will be undertaken on the substances identified as candidates for further work. These actions could include assessment, risk management, data collection, research and monitoring, generation of new data, etc.

The approach used for the 2017 review is fundamentally similar to the approaches used in previous cycles ([ECCC, HC 2015; 2016](#)). This report describes the manner in which the approach was applied to this review, as well as the results which include for the first time the outcome activity of further scoping/problem formulation.

## Scope of 2017-18 review

The scope of each review cycle identifies the range of substances considered for prioritization and the type of information used to support prioritization decisions (the latter is outlined in more detail under the Acquisition section). It was recognized at the outset of the development of the Approach for Identification of Risk Assessment Priorities that the scope of each review cycle was flexible and could change to incorporate new ideas and methodologies. Changes in scope can occur for various reasons, and can include timing (e.g., the length of time since a substance was last assessed) and types or sources of information not previously considered (e.g., an emerging concern from toxicological endpoints or product uses). Future iterations of the IRAP approach will continue to evolve to incorporate these changes and advancements to ensure the main goals of the approach—which are to incorporate new

scientific knowledge into the program and to increase collaboration with other regulatory and international agencies—are achieved.

The scope of the 2018 review focused on identifying sources of new information that would constitute indicators of hazard and/or exposure for the following types of substances:

- Substances on Canada’s Domestic Substances List (DSL) that have not been assessed within the last 5 years, and are not scheduled to be assessed under the CMP.
- Previously assessed substances that were not found to meet the criteria under 64 of CEPA, depending on the time elapsed since data/information on the substance was last reviewed (e.g., substances concluded as not toxic in phases 1 and 2 of the CMP).
- Substances that had been previously identified under IRAP and assigned an outcome of data gathering or international activity in previous review cycles (Note: information collected on substances that were part of the 2017 Inventory Update survey, published pursuant to S.71 of CEPA, was not available for consideration in the 2017-18 review, but will be considered in future reviews).
- Substances identified as potentially requiring review pursuant to section 75 of CEPA.

Nominations of potential risk assessment candidates by HC and/or ECCC officials were considered for review even if they were outside the 2017-18 review’s scope (e.g., not on the DSL). Additionally, groups which were identified for further scoping may contain substances that (for completeness’ sake) fall outside of the 2017-18 scope.

## Acquisition

The acquisition phase involves consideration of diverse information sources to help identify and inform potential priorities. The number and types of sources consulted continues to evolve over time, as new sources are identified or previously identified sources expand and grow. Some sources may only be relevant for the prioritization of substances based on ecological considerations or human health considerations, while others are relevant for both. As a consequence, not all sources considered within an IRAP review are used to inform both the ecological and human health evaluation of substances, or the same source may be considered or weighted differently for each.

Over one hundred sources are considered in a systematic manner by ECCC and/or HC as part of an IRAP review, in addition to secondary searching done on substances where further information is required to determine the outcome of a substance(s) in an IRAP review. The sources represent a mix of national and international databases, assessments, reports (etc.), and vary from very specific information to very broad sources of information used in risk assessment. A comprehensive list of the sources of information consulted in this review is provided in Appendix A. The following are examples of the types of sources utilized in the 2017-18 review:

- International hazard classifications
- Classifications from the Global Harmonised System (GHS)

- International lists of restricted and/or prohibited substances, or other lists of international priorities
- Data obtained under CEPA
- Canadian National Pollutant Release Inventory (NPRI) information
- Notifications to Health Canada (e.g., use in cosmetics)
- Canadian and international Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS)
- Available Canadian and international biomonitoring, environmental monitoring and surveillance data
- International use and volume data
- Substances identified as potentially requiring review pursuant to requirements of section 75 of CEPA (e.g., substances implicated by pertinent international conventions/agreements, notifications from other jurisdictions)
- Emergent technologies and sources of data

After reviewing the pertinent sources of information, this IRAP review identified approximately 8400 substances that had one or more types of new information that required further evaluation under the approach.

## Evaluation

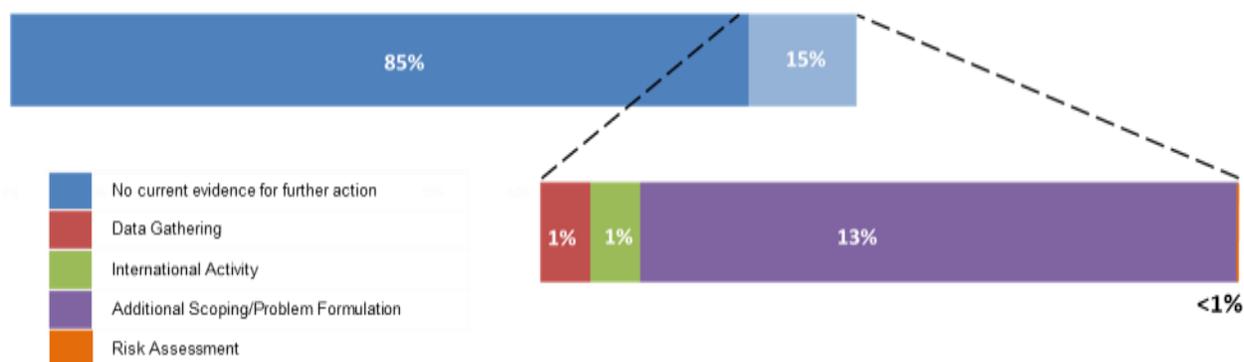
The guiding principles and considerations involved in the evaluation process are described in the [Approach for identification of chemicals and polymers as risk assessment priorities under Part 5 of the Canadian Environmental Protection Act, 1999 \(CEPA 1999\)](#) (Environment Canada, Health Canada 2014).

The process applied under this approach supported a triaging of the approximately 8400 substances identified as candidates to separate those that are unlikely to require further work based on information available at this time, from those that represent potential new priorities for assessment, or if further information is required to make that determination.

## Results and action

This IRAP review cycle identified approximately 15% of the ~8400 substances as having sufficient indicators of hazard and/or exposure to merit further activity, including: i) risk assessment ii) additional data gathering, iii) monitoring of ongoing international activity and iv) requiring further scoping/problem formulation. The outcomes, and the relative proportions of evaluated substances that fall within each, are shown in Figure 1.

**Figure 1: Outcomes of the 2017-18 Review**



Outcomes of the 2017-18 review. Bar Graph: 85% of substances had no current evidence for further consideration. The other 15% were broken down as Data Gathering (1%), International Activity (1%), Additional scoping/Problem Formulation (13%) and Risk Assessment (less than 1%).

As Figure 1 illustrates, for the majority of substances evaluated within the 2017-18 IRAP review (~85% or ~7100 substances), it was determined that there was not a sufficient basis for further consideration at this time. Consistent with how the IRAP approach was implemented in the 2016 review, this group of 7100 substances also includes substances for which a hazard may have been identified, but the uses and exposures were not relevant in the current Canadian context (e.g., pesticide uses are addressed under the *Pest Control Products Act*). Although these substances were found not to have indicators of hazard or exposure of potential concern under the 2017-18 IRAP review, they will continue to be considered in future IRAP review cycles.

The remaining ~1000 substances (~15%) were identified as candidates for further consideration. A breakdown of the specific outcomes for these substances, and a description of what actions these outcomes represent, is provided below.

The 2017-18 review identified a single substance for risk assessment, 1-H-benzotriazole (CAS RN 95-14-7), which was recommended for addition to the current Benzotriazoles and Benzothiazoles risk assessment grouping.

A number of substances and groups of substances were identified that have indications of both hazard and exposure but need more scoping before determining the most appropriate course of action. Accordingly, an additional IRAP outcome was introduced, namely further scoping/problem formulation. This outcome will be applied to substances or groups of substances that require additional scoping/problem formulation as a next step. This will entail an analysis of available data, data needs, areas of focus (e.g., ecological vs. human health, consumer products vs. environmental media), potentially relevant legislation, possible groupings, and other considerations to inform the most

appropriate action for the candidate substance(s). The results of this analysis may be summarized as a problem formulation. A total of 1094 substances (~13%) were recommended for further scoping/problem formulation, as part of seven groupings (see Appendix B for a complete list).

The need for additional data has been identified for 58 substances (~1%) (see Appendix C). These substances were seen as having relevant hazard or exposure indicators, but require further data gathering to determine whether they could be priorities for risk assessment under CEPA. The most common scenario under the data gathering outcome is when there is an indicator of hazard, yet the commercial status in Canada is uncertain. The options available for data gathering include, but are not limited to, addition to upcoming mandatory surveys conducted under Section 71 (e.g., DSL Inventory Updates, targeted surveys) as well as voluntary survey initiatives, research or surveillance and monitoring activities.

Lastly, 77 substances (~1%) were identified as currently being subject to international activities (see Appendix D). This outcome captures substances that have been prioritized internationally by other organizations, for which assessment work and/or data gathering is ongoing or planned. Monitoring the outcomes of these international activities will inform what, if any, actions are required in future review cycles.

## References

[EC, HC] Environment Canada, Health Canada. 2014. [Approach for identification of chemicals and polymers as risk assessment priorities under Part 5 of the \*Canadian Environmental Protection Act, 1999\* \(CEPA 1999\)](#). Ottawa (ON): Environment Canada, Health Canada.

[ECCC, HC] Environment and Climate Change Canada, Health Canada. 2015. [Identification of risk assessment priorities: results of the 2015 review](#). Ottawa (ON): ECCC, HC.

[ECCC, HC] Environment and Climate Change Canada, Health Canada. 2016. [Identification of Risk Assessment Priorities \(IRAP\): results of the 2016 review](#). Gatineau (QC): ECCC, HC.

## Appendix A. Expanded list of IRAP data sources

The following is a comprehensive list of the sources considered within this IRAP review. The sources have been organized by the source type and category and the main information they provided to the IRAP review; however, many represent sources of information for many streams within an IRAP review (e.g., a risk assessment may also contain relevant information on use and volumes, consumer product indicators, monitoring and surveillance and so on). It should be noted that the sources listed below reflect ones that are more readily searched systematically across all substances and that many additional sources may also be searched depending on the substance and the information available at the time of the review. For instance, an indication of use in consumer products may necessitate further searching for specific consumer products and availability to consumer in Canada (e.g., querying of Safety Data Sheet databases).

### **Hazard Indicators**

- ECHA<sup>1</sup> Globally Harmonised System (GHS) of Classification and Labelling Chemicals
  - Carcinogenicity
  - Germ cell mutagenicity
  - Reproductive toxicity
  - Specific target organ toxicity, repeated exposure
  - Effects on/via lactation
  - Hazardous to the aquatic environment, acute hazard
  - Hazardous to the aquatic environment, long term hazard
  - Hazardous to the ozone layer
- ECHA Notifications for Classification and Labelling under REACH<sup>2</sup> (not harmonised); used as indicator of potential hazard for further follow up in review
- Japan GHS
- SafeWork Australia Hazardous Chemical Information System (HCIS) GHS
- ECHA Annex III List (similar endpoints as GHS)
- ECHA Substances of Very High Concern (SVHC)
- ECHA PBT list
  - Very persistent/persistent
  - Very bioaccumulative/bioaccumulative
  - Toxic (ecological)
- California EPA Proposition 65
- International Agency for Research on Cancer (IARC) cancer classifications
- US National Toxicology Program (NTP) report on carcinogens
- US EPA cancer classifications/guidelines (e.g., Integrated Risk Information System- IRIS)
- European Commission Adaptation to Technical Progress (ATP)- historic, and largely ported to ECHA GHS
  - Cancer

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<sup>1</sup> ECHA- European Chemicals Agency

<sup>2</sup> REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals)

- Mutagenicity
  - Reproductive toxicity
  - Developmental toxicity
- International Chemical Secretariat (ChemSec) SIN (Substitute It Now) List- classified as CMR
- Japan Society for Occupational Health (JSOH)
  - Occupational carcinogens
  - Reproductive toxicants
- ECVAM (European Centre for the Validation of Alternative Methods) AMES positive database
- European Commission developmental neurotoxicants
- European Commission list of known or suspected hepatotoxins
- European Commission list of neurotoxins
- European Commission endocrine disrupting chemical category
- European Commission evidence of endocrine disruption in humans database
- Estrogen receptor (ER) actives (EPA Endocrine Disruptor Screening Program-EDSP)
- Positive androgen receptor (AR) actives (EPA Endocrine Disruptor Screening Program-EDSP)
- Positive for steroidogenesis (EPA Endocrine Disruptor Screening Program-EDSP)
- International Chemical Secretariat (ChemSec) SIN (Substitute It Now) List- EDC's
- Organization for Economic Cooperation and Development (OECD) No need to assess HPV list (low hazard)
- US EPA Design for the Environment (DfE) rating status/safer chemical list

## **Exposure Indicators**

### **Use and Volume data**

- Canadian Use and volume data from S.71 Surveys, including;
  - DSL Inventory Update: Phase 1 (2009)
  - DSL Inventory Update: Phase 2 (2012)
  - DSL Inventory Update: Phase 3 (analysis ongoing)(2017)
  - Surveys from CMP1 Challenge program (Various years)
- Chemical data reporting under the US *Toxic Substances Control Act* (TSCA CDR) data (1986-2016)
- Canadian DSL nomination data (1984-86)
- REACH registration tonnage bands (Europe)

### **Consumer Exposure Indicators**

- Cosmetic notifications under s.30 of Cosmetic Regulations under the *Canadian Food and Drug Act*
- Cosmetics reported under Voluntary Cosmetic Reporting Program (VCRP) to US FDA
- EPA functional use database (FUse)
- Notifications under REACH with consumer product use category(s)
- Notifications under REACH with cosmetic/personal care product use
- Danish Environmental Protection Agency: consumer product surveys
- Danish Environmental Protection Agency: environmental project reports
- Netherlands reports (RIVM) (e.g., letter reports)
- European Commission RAPEX (rapid alert system for dangerous non-food products)
- US EPA chemical and product categories (CPCat)

- Household Product Database (US National Library of Medicine)
- Safety data sheets from various retailers and companies: Walmart, Canadian Tire, Home Hardware, Proctor and Gamble, SC Johnson, Chlorox, etc.

### **Biomonitoring**

- Alberta biomonitoring program
- German environmental survey for children
- German Human Biomonitoring Commission (HBM)
- Canadian Health Measures Survey (CHMS): Cycles 1-4
- National Health and Nutrition Examination Survey (NHANES) : 1999-2014 results (January 2017 version)

### **Environmental Monitoring/Surveillance/Guidelines**

- Canadian National Pollutant Release Inventory (NPRI) 2012-16
- US Toxic Release Inventory (TRI)
- Canadian National Air Pollutant (NAP) Surveillance Program
- NORMAN EMPODAT Database (European-based monitoring and biomonitoring database on emerging contaminants in variety of matrices)
- ECCC monitoring and research programs and activities
- European Commission IPChEM (International Platform for Chemical Monitoring)
- Health Canada research and monitoring and surveillance activities
- Canadian Environmental Quality Guidelines (CCME): air, groundwater, sediment, soil, surface water, tissue
- Health Canada Drinking Water Quality Guidelines

## **Assessments and International Activity**

### **Reports and Assessments (e.g., risk assessments)**

- Canadian Priority Substances List (PSL) assessments
- Canadian Chemical Management Plan (CMP) screening assessment reports
- Health Canada Indoor Air Reference Levels (IARL) for chronic exposure to volatile organic compounds summary document
- Health Canada Pest Management Regulatory Agency (PMRA) pesticide re-evaluation assessments
- ATSDR (Agency for Toxic Substances and Disease Registry) toxicological profiles
- Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS) Priority Existing Chemical (PEC) reports
- Australian IMAP (Inventory and Multi-tiered Assessment and Prioritisation)
- World Health Organization (WHO) Concise International Chemical Assessment Documents (CICADs)
- ECHA Community Rolling Action Plan (CoRAP) evaluations

- ECHA Public Activities Coordination Tool (PACT), Risk Management Options Analysis (RMOA) and Informal Hazard Assessment reports
- ECHA REACH dossiers
- ECHA Substances of Very High Concern (SVHC) justification documents
- EPA Integrated Risk Information System (IRIS) assessments
- European Commission Scientific Committee on Consumer Safety (SCCS) opinions
- European Food Safety Authority (EFSA) scientific opinions and evaluations
- European Union Risk Assessment Reports (RARs)
- IARC monographs
- Japan initial risk assessment reports
- Japan NITE database/assessment/reports
- Joint FAO/WHO Expert Committee on Food Additives Toxicological Monographs and Reports
- OECD SIDS/SIARs
- UK Environmental Agency: Environmental Risk Evaluation reports
- UNEP environmental health criteria documents
- US EPA assessments and problem formulations

### **International Activity**

- REACH Annex XIV Authorisation List
- REACH Annex XVII Restriction List
- REACH Registration List
- Rotterdam Convention Prior Informed Consent (PIC)
- Stockholm Convention Persistent Organic Pollutants (POPs)
- ECHA Prior Informed Consent (PIC)
- Vermont chemicals of high concern
- Washington chemicals of high concern
- Maine chemicals of high concern/priority lists
- Minnesota chemicals of concern
- California EPA Proposition 65 list
- US EPA export notification (e.g., formerly TSCA 12b)
- US EPA Significant New Use Rules (SNUR)

## Appendix B. Substances/groups identified for further scoping/problem formulation

### Name and rationale of substances/groups identified for further scoping/problem formulation

Group Name	Number of Substances <sup>a</sup>	Rationale
2-Ethyl Hexanoic Acid (2-EHA) derivatives	86	Health effects of potential concern based on assessments under CEPA of 2-EHA and two 2-EHA derivatives (one substance met s.64c of CEPA), which indicated that these substances have the potential to hydrolyze to 2-EHA. Developmental toxicity classifications for 2-EHA exist from Japan and ECHA. There are indications of use in high volumes for some of these substances in the US and under REACH, with uses similar to those assessed in the CMP assessments.
Alkylphenols	109	The Alkylphenols group builds on the Octylphenols group that was identified as part of the 2015 IRAP review, and involved a review of alkylphenols more broadly, incorporating endocrine-related effects across the larger class, from butyl phenol to dodecylphenol. Many of these subgroups of alkylphenols are currently being reviewed internationally because of endocrine-related effects.
Benzophenones	12	Based on the CMP3 evaluation of benzophenone (CAS RN <sup>b</sup> 119-61-9) (proposed to meet s.64c of CEPA). Many benzophenones have concern for endocrine-related effects, including estrogen receptor active flags from new approach methodology assays. In addition, the focus of international activity is endocrine-related effects/reproductive toxicity. Benzophenones are widely used in cosmetics and sunscreens for their ultraviolet (UV) filtering properties.
Bisphenols	34	This group is based on the internal nomination of additional bisphenol substances to IRAP. The substances are all bisphenols that share structural characteristics with Bisphenol A (BPA) and therefore potential to exert similar adverse effects, along with evidence of potential use in applications in common with BPA. A voluntary industry survey on “certain bisphenols” occurred in late 2017, as well as preliminary screening of hazard and exposure data (in particular for Bisphenol S (BPS) and Bisphenol F (BPF), which were also identified via the 2016 IRAP review).

Group Name	Number of Substances <sup>a</sup>	Rationale
Carbamic acid, butyl-, 3-iodo-2-propynyl ester (CAS RN 55406-53-6)	1	GHS classification for Specific Target Organ Toxicity (repeat exposure) (STOT-RE) with indication of high use in cosmetics and consumer products.
Methane, dichloro- (DCM) (CAS RN 75-09-2)	1	This substance was previously assessed (PSL1) and identified to meet CEPA s.64c based on the outcome of a cancer risk characterization. The substance is currently found in Canada in a number of consumer products (e.g., paint strippers). ECHA is evaluating dichloromethane as reproductive/developmental toxicant and potential endocrine disrupting compound (does not flag consumer use). The US EPA has proposed prohibiting the consumer and commercial paint stripping uses for methylene chloride.
Salicylates	48	Group includes substances that breakdown to salicylic acid, which has been found to have reproductive/developmental effects. Members of the group have been found to have uses in consumer products and cosmetics.
Some Perfluorinated alkyl substances	89	Ecological Priority: Perfluoroalkyl substances (PFAS) have been widely used in industrial and consumer applications since the 1950s, where extremely low surface energy or surface tension and/or durable water- and oil-repellency was needed, e.g., chromium metal plating, fire-fighting foams, or surface treatment of textiles, carpets and papers. Some of the unique physical-chemical properties of these substances (such as water-, oil- and grease-repellence and high thermal stability) that popularized their widespread use are associated with environmental concerns. For over a decade, perfluorooctane sulfonate (PFOS, C8 PFSA) and perfluorooctanoic acid (PFOA, C8 PFCA) have attracted the most attention as contaminants of global concern. PFOA and PFOS are persistent, distributed ubiquitously in the global environment, biota, and in remote areas. These substances are bioaccumulative and can cause various adverse effects in wildlife. PFOS and PFOA have undergone various regulatory actions in many countries, including Canada. In recent years, there has been a trend to substitute PFOS and PFOA with short-chain (C4-C7) perfluoroalkyl carboxylic acids (PFCAs) and short-chain (C4-C7) perfluoroalkyl sulfonic acids (PFSAs). However, there is increasing international concerns that some of these short-chain PFCAs/PFSAs may have impacts similar to PFOS and PFOA. ECCC has initiated data-gathering activities for the short-chain PFCAs, short-chain PFSAs and the long-chain PFSAs (C9 – C20) to identify the critical data gaps and species relevant to future assessment activities, and to encourage the generation of empirical data for

Group Name	Number of Substances <sup>a</sup>	Rationale
		<p>bioaccumulation and toxicity for this class of substances. Empirical data for bioaccumulation is important because traditional assumptions used to estimate bioaccumulation (and typically used in models) cannot be applied, with certainty, to understand the bioaccumulation of PFAS. Additionally, food web bioaccumulation potential in the species of concern, i.e., terrestrial and marine mammals, is lacking. Empirical toxicity data is also generally lacking for most short-chain PFCAs/PFSAs and long-chain PFSAs.</p> <p>Human Health Priority: Perfluorononanoic acid (PFNA) measured in blood serum from 1999 to 2010, showing increasing concentrations over time of in US population for all age groups. Measurements in Canadians are available from Cycle 2 of Canadian Health Measures Survey (CHMS); however, data is not available yet from subsequent cycles of CHMS to determine if a trend exists in Canadian population. There is a proposal under ECHA to have harmonized classification for reproductive toxicity and carcinogenicity, based on read-across from PFOA.</p>
Quaternary Ammonium compounds	720 (on DSL)	<p>This is an expanded group from what was initially identified for assessment under CMP3. QACs are very hazardous substances; most are toxic to aquatic organisms (many are biocidal by nature). However, proper assessment of hazard for the QAC group is challenging due to limited empirical data, and difficulty testing and modelling. Historical Canadian data indicates usage in the range of tens of millions kilograms per year, involving multiple industry sectors and use codes. Therefore, complex exposure scenarios are expected.</p>
2-Propenamide (Acrylamide) (CAS RN 79-06-1)	1	<p>On Schedule 1 of CEPA. Further scoping is required to determine if there are additional sources of exposure to assess/manage. Based on biomonitoring levels reported under Canadian Health Measures Survey (CHMS)</p>
Glycidamide (CAS RN 5694-00-8)	1	<p>Related to Acrylamide, Glycidamide is a metabolite of acrylamide. Further scoping is required to determine if there are additional sources of exposure to assess/manage. Based on biomonitoring levels reported under Canadian Health Measures Survey (CHMS)</p>
Arsenic (CAS RN 7440-38-2)	1	<p>On Schedule 1 of CEPA. Further scoping is required to determine if there are additional sources of exposure to assess/manage. Based on biomonitoring levels reported under Canadian Health Measures Survey (CHMS)</p>
Cadmium (CAS RN 7440-43-9)	1	<p>On Schedule 1 of CEPA. Further scoping is required to determine if there are additional sources of exposure to assess/manage.</p>

Group Name	Number of Substances <sup>a</sup>	Rationale
		Based on biomonitoring levels reported under Canadian Health Measures Survey (CHMS)

<sup>a</sup> The number of substances listed may not represent an exhaustive list. Identities are listed in a Supporting Document.

<sup>b</sup> CAS RN: Chemical Abstracts Service Registry Number.

## Appendix C. Substances identified for data gathering

Chemical Abstracts Service (CAS) Registry Number	Substance Name	Recommended Data Gathering
50-14-6	9,10-Secoergosta-5,7,10(19),22-tetraen-3-ol, (3 $\beta$ ,5Z,7E,22E)-	Exposure
51-28-5	Phenol, 2,4-dinitro-	Exposure
55-55-0	Phenol, 4-(methylamino)-, sulfate (2:1) (salt)	Exposure
57-30-7	2,4,6(1 $\text{O}$ ,3 $\text{O}$ ,5 $\text{O}$ )-Pyrimidinetrione, 5-ethyl-5-phenyl-, monosodium salt	Exposure
58-22-0	Androst-4-en-3-one, 17-hydroxy-, (17 $\beta$ )-	Exposure
83-79-4	[1]Benzopyrano[3,4-b]furo[2,3-h][1]benzopyran-6(6aH)-one, 1,2,12,12a-tetrahydro-8,9-dimethoxy-2-(1-methylethenyl)-, [2R-(2 $\alpha$ ,6a $\alpha$ ,12a $\alpha$ )]-	Exposure
87-61-6	Benzene, 1,2,3-trichloro-	Exposure
90-13-1	Naphthalene, 1-chloro-	Exposure
101-83-7	Cyclohexanamine, N <sup>?</sup> -cyclohexyl-	Exposure
104-94-9	Benzenamine, 4-methoxy-	Exposure
107-21-1	1,2-Ethandiol	Exposure
108-70-3	Benzene, 1,3,5-trichloro-	Exposure
108-88-3	Benzene, methyl-	Exposure
112-55-0	1-Dodecanethiol	Exposure
118-56-9	Benzoic acid, 2-hydroxy-, 3,3,5-trimethylcyclohexyl ester	Exposure
120-82-1	Benzene, 1,2,4-trichloro-	Exposure
125-33-7	4,6(1 $\text{O}$ ,5 $\text{O}$ )-Pyrimidinedione, 5-ethyl-dihydro-5-phenyl-	Exposure
143-24-8	2,5,8,11,14-Pentaoxapentadecane	Exposure
534-07-6	2-Propanone, 1,3-dichloro-	Exposure
534-52-1	Phenol, 2-methyl-4,6-dinitro-	Exposure
538-75-0	Cyclohexanamine, Ú,Úó-methanetetraylbis-	Exposure
558-13-4	Methane, tetrabromo-	Exposure

Chemical Abstracts Service (CAS) Registry Number	Substance Name	Recommended Data Gathering
599-79-1	Benzoic acid, 2-hydroxy-5-[[4-[(2-pyridinylamino)sulfonyl]phenyl]azo]-	Exposure
609-93-8	Phenol, 4-methyl-2,6-dinitro-	Exposure
629-14-1	Ethane, 1,2-diethoxy-	Exposure
688-73-3	Stannane, tributyl-	Exposure
693-98-1	1-Imidazole, 2-methyl-	Exposure
1836-75-5	Benzene, 2,4-dichloro-1-(4-nitrophenoxy)-	Exposure
1983-10-4	Stannane, tributylfluoro-	Exposure
2155-70-6	Stannane, tributyl[(2-methyl-1-oxo-2-propenyl)oxy]-	Exposure
2437-29-8	Methanaminium, N-[4-[[4-(dimethylamino)phenyl]phenylmethylene]-2,5-cyclohexadien-1-ylidene]-N-methyl-, ethanedioate, ethanedioate (2:2:1)	Exposure
2985-57-1	Phenol, p-decyl-	Exposure
4342-30-7	Phenol, 2-[[[(tributylstannyl)oxy]carbonyl]-	Exposure
5466-77-3	2-Propenoic acid, 3-(4-methoxyphenyl)-, 2-ethylhexyl ester	Hazard
6197-30-4	2-Propenoic acid, 2-cyano-3,3-diphenyl-, 2-ethylhexyl ester	Hazard
7440-29-1	Thorium	Exposure
7779-27-3	1,3,5-Triazine, 1,3,5-triethylhexahydro-	Exposure
8001-54-5	Quaternary ammonium compounds, alkylbenzyltrimethyl, chlorides	Hazard
8001-97-6	Pharmaceutical natural products, aloe	Exposure
16079-88-2	2,4-Imidazolidinedione, 1-bromo-3-chloro-5,5-dimethyl-	Exposure
17408-60-5	4-(3-Decyl)phenol	Exposure
20566-35-2	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, 2-(2-hydroxyethoxy)ethyl 2-hydroxypropyl ester	Exposure
20830-75-5	Card-20(22)-enolide, 3-[(O-2,6-dideoxy-β-D-ribo-hexopyranosyl-(1<<FAR)-O-2,6-dideoxy-β-D-ribo-hexopyranosyl-(1<<FAR)-2,6-dideoxy-β-D-ribo-hexopyranosyl)oxy]-12,14-dihydroxy-, (3β,5β,12β)-	Exposure
23726-91-2	2-Buten-1-one, 1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-, (Ö)-	Exposure
25640-78-2	1,16-Biphenyl, (1-methylethyl)-	Exposure
26354-18-7	2-Propenoic acid, 2-methyl-, methyl ester, polymer with tributyl[(2-methyl-1-oxo-2-propenyl)oxy]stannane	Exposure
26636-32-8	Poly(oxy-1,2-ethanediyl), α-(4-octylphenyl)-ω-hydroxy-	Exposure
27157-66-0	Phenol, decyl-	Exposure
32534-81-9	Benzene, 1,16-oxybis-, pentabromo deriv.	Exposure
38051-10-4	Phosphoric acid, 2,2-bis(chloromethyl)-1,3-propanediyl tetrakis(2-chloroethyl) ester	Exposure
38641-94-0	Glycine, N-(phosphonomethyl)-, compd. with 2-propanamine (1:1)	Exposure

Chemical Abstracts Service (CAS) Registry Number	Substance Name	Recommended Data Gathering
63843-89-0	Propanedioic acid, [[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]methyl]butyl-, bis(1,2,2,6,6-pentamethyl-4-piperidiny) ester	Exposure
65997-01-5	Tall oil, sodium salt	Exposure
68187-71-3	Tall oil, calcium salt	Exposure
68647-71-2	Tall oil, potassium salt	Exposure
75113-37-0	1,3,2,4-Dioxastannaboretane, 2,2-dibutyl-4-hydroxy-	Exposure
77098-07-8	1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol	Exposure
84603-60-1	Golden seal, Hydrastis canadensis, ext.	Exposure
101205-02-1	2-Cyclohexen-1-one, 2-[1-(ethoxyimino)butyl]-3-hydroxy-5-(tetrahydro-2 $\bar{O}$ -thiopyran-3-yl)-	Exposure
147783-69-5	Propanedioic acid, [(4-methoxyphenyl)methylene]-, bis(1,2,2,6,6-pentamethyl-4-piperidiny) ester	Exposure

## Appendix D. Substances identified as undergoing international activity

CAS Registry Number	Substance Name
67-66-3	Methane, trichloro-
99-96-7	Benzoic acid, 4-hydroxy-
119-47-1	Phenol, 2,2 $\acute{o}$ -methylenebis[6-(1,1-dimethylethyl)-4-methyl-
355-38-4	Hexanoyl fluoride, undecafluoro-
355-46-4	1-Hexanesulfonic acid, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-
356-27-4	Butanoic acid, heptafluoro-, ethyl ester
375-72-4	1-Butanesulfonyl fluoride, 1,1,2,2,3,3,4,4,4-nonafluoro-
375-73-5	1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-
376-06-7	Tetradecanoic acid, heptacosafuoro-
812-94-2	1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(4-hydroxybutyl)-N-methyl-
1492-87-1	2-Propenoic acid, 4-[methyl[(nonafluorobutyl)sulfonyl]amino]butyl ester
1764-95-0	Ammonium perfluorohexyl ethylphosphates
1893-52-3	2-Propenoic acid, 2-[ethyl[(tridecafluorohexyl)sulfonyl]amino]ethyl ester
1937-37-7	2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4 $\acute{o}$ -[(2,4-diaminophenyl)azo][1,1 $\acute{o}$ -biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)-, disodium salt
2043-57-4	Octane, 1,1,1,2,2,3,3,4,4,5,5,6,6-tridecafluoro-8-iodo-
2218-54-4	Butanoic acid, heptafluoro-, sodium salt
2923-26-4	Hexanoic acid, undecafluoro-, sodium salt

CAS Registry Number	Substance Name
3107-18-4	Cyclohexanesulfonic acid, undecafluoro-, potassium salt
3468-63-1	2-Naphthalenol, 1-[(2,4-dinitrophenyl)azo]-
3794-64-7	Butanoic acid, heptafluoro-, silver(1++) salt
7440-36-0	Antimony
15087-24-8	Bicyclo[2.2.1]heptan-2-one, 1,7,7-trimethyl-3-(phenylmethylene)-
17329-79-2	2-Propenoic acid, 2-[ethyl[(nonafluorobutyl)sulfonyl]amino]ethyl ester
18017-31-7	Hexanoyl fluoride, 2,2,3,3,4,4,5,6,6,6-decafluoro-5-(trifluoromethyl)-
23601-39-0	3,6,9,12,15,18-Hexaoxaicosane
25628-08-4	Ethanaminium, N,N,N-triethyl-, 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanefluorobutanesulfonate (1:1)
26650-09-9	Thiocyanic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester
29420-49-3	1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, potassium salt
34455-00-0	1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N,N-bis(2-hydroxyethyl)-
34455-29-3	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide, inner salt
36913-91-4	1-Butanesulfonic acid, 1,1,2,2,3,3,4,4,4-nonafluoro-, 1,1'-anhydride
38850-52-1	1-Propanaminium, 3-[(carboxymethyl)[(tridecafluorohexyl)sulfonyl]amino]-N,N,N-trimethyl-, hydroxide, inner salt
38850-60-1	1-Propanesulfonic acid, 3-[[3-(dimethylamino)propyl][[(tridecafluorohexyl)sulfonyl]amino]-
40630-65-7	1-Butanesulfonamide, 1,1,2,2,3,3,4,4,4-nonafluoro-N-2-propenyl-
50598-28-2	1-Hexanesulfonamide, N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-
55591-23-6	1-Hexanesulfonyl chloride, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-
57677-95-9	1-Octanol, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-, 1,1'-(hydrogen phosphate)
57678-01-0	1-Octanol, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-, 1-(dihydrogen phosphate)
59587-38-1	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro-, potassium salt (1:1)
61798-69-4	1-Propanaminium, N-(2-carboxyethyl)-N,N-dimethyl-3-[[[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide, inner salt
63512-36-7	5,8,11,14-Tetraoxaoctadecane
66008-71-7	1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[methyl[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide, inner salt
66008-72-8	1-Propanaminium, N-(2-carboxyethyl)-N,N-dimethyl-3-[methyl[(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, hydroxide, inner salt
67584-42-3	Cyclohexanesulfonic acid, decafluoro(pentafluoroethyl)-, potassium salt
67584-48-9	1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-N-2-propenyl-
67584-57-0	2-Propenoic acid, 2-[methyl[(tridecafluorohexyl)sulfonyl]amino]ethyl ester
67584-59-2	2-Propenoic acid, 2-methyl-, 2-[methyl[(nonafluorobutyl)sulfonyl]amino]ethyl ester

CAS Registry Number	Substance Name
67584-61-6	2-Propenoic acid, 2-methyl-, 2-[methyl[(tridecafluorohexyl)sulfonyl]amino]ethyl ester
67584-63-8	Glycine, N-ethyl-N-[(nonafluorobutyl)sulfonyl]-, ethyl ester
67906-39-2	2-Propenoic acid, 2-methyl-, 4-[methyl[(nonafluorobutyl)sulfonyl]amino]butyl ester
67906-70-1	2-Propenoic acid, 2-methyl-, 2-[ethyl[(tridecafluorohexyl)sulfonyl]amino]ethyl ester
67939-33-7	2-Propenoic acid, 2-methyl-, 2-[ethyl[(nonafluorobutyl)sulfonyl]amino]ethyl ester
67939-61-1	2-Propenoic acid, 2-methyl-, 4-[methyl[(tridecafluorohexyl)sulfonyl]amino]butyl ester
67939-89-3	Ethanol, 2-[ethyl[(1,1,2,2,3,3,4,4,4-nonafluorobutyl)sulfonyl]amino]-, dihydrogen phosphate (ester)
67939-91-7	1-Butanesulfonamide, N,N'-[phosphinicobis(oxy-2,1-ethanediyl)]bis[N-ethyl-1,1,2,2,3,3,4,4,4-nonafluoro-
67939-92-8	1-Hexanesulfonamide, N,N'-[phosphinicobis(oxy-2,1-ethanediyl)]bis[N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-
68015-84-9	Hexanoic acid, 2,2,3,3,4,4,5,6,6,6-decafluoro-5-(trifluoromethyl)-, compd. with ethanamine (1:1)
68227-98-5	2-Propenoic acid, 4-[methyl[(tridecafluorohexyl)sulfonyl]amino]butyl ester
68239-74-7	1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-N-(4-hydroxybutyl)-N-methyl-
68299-19-4	Benzenesulfonic acid, [[[(nonafluorobutyl)sulfonyl]amino]methyl]-, monosodium salt
68299-21-8	Benzenesulfonic acid, [[[(tridecafluorohexyl)sulfonyl]amino]methyl]-, monosodium salt
68515-51-5	1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters
68555-68-0	Glycine, N-ethyl-N-[(nonafluorobutyl)sulfonyl]-, sodium salt
68555-70-4	Glycine, N-ethyl-N-[(tridecafluorohexyl)sulfonyl]-, sodium salt
68555-77-1	1-Butanesulfonamide, N-[3-(dimethylamino)propyl]-1,1,2,2,3,3,4,4,4-nonafluoro-
68957-32-4	Glycine, N-ethyl-N-[(tridecafluorohexyl)sulfonyl]-
68957-33-5	Glycine, N-ethyl-N-[(nonafluorobutyl)sulfonyl]-
68957-53-9	Glycine, N-ethyl-N-[(tridecafluorohexyl)sulfonyl]-, ethyl ester
68987-42-8	Benzene, ethylenated, residues
70225-22-8	1-Propanaminium, N,N,N -trimethyl-3-[[[(nonafluorobutyl)sulfonyl]amino]-, sulfate (2:1)
70248-52-1	1-Propanaminium, N,N,N-trimethyl-3-(((1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluorohexyl)sulfonyl)amino)-, sulfate (2:1)
70356-09-1	1,3-Propanedione, 1-[4-(1,1-dimethylethyl)phenyl]-3-(4-methoxyphenyl)-
78560-45-9	Silane, trichloro(3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)-
85665-64-1	1-Hexanesulfonamide, 1,1,2,2,3,3,4,4,5,5,6,6,6-tridecafluoro-N-(2-hydroxyethyl)-N-propyl-
90268-45-4	Butanesulfonyl fluoride, nonafluoro-, branched

CAS Registry Number	Substance Name
96383-55-0	2-Propenoic acid, 2-chloro-, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl ester
220689-12-3	Phosphonium, tetrabutyl-, salt with 1,1,2,2,3,3,4,4,4-nonafluoro-1-butanesulfonic acid (1:1)