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Science approach document on the prioritization of chemicals in plastics

Environment and Climate Change Canada

Health Canada

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Synopsis

Plastics are made of chemicals, including polymers (which are themselves chains of chemicals known as monomers), additives (for example, plasticizers, flame retardants, stabilizers, pigments), processing aids (for example, catalysts, heat stabilizers, lubricants, solvents and viscosity modifiers), and non-intentionally added substances (NIAS). Health Canada (HC) and Environment and Climate Change Canada (ECCC) have developed an approach for the prioritization of chemicals in plastics in Canada. The approach reviews chemicals with known or potential use in plastics in Canada to identify those that may warrant further attention based on indicators of hazard and potential for human and environmental exposure in relation to their use in plastics. The approach is built on the previously published approach for the identification of chemicals and polymers as risk assessment priorities (IRAP) under Part 5 of the *Canadian Environmental Protection Act, 1999* (CEPA). The results of this exercise were then considered along with the prioritization results for other substances to support work planning and the selection of assessment priorities for CEPA's Plan of Priorities. The initial results from the use of this approach informed the selection of priorities for the 2025 Plan of Priorities. As more data becomes available, the approach may be refined and used in the future to identify priorities in relation to plastics for addition to the Plan.

For this prioritization approach, HC and ECCC developed a list of 6,604 chemicals used or potentially used in plastics in Canada based on a compilation of chemicals in plastics reported internationally. To determine if future work on certain substances in relation to plastics is warranted, the IRAP framework (which includes screening steps for hazard and potential exposure) was applied to the substances, with additional considerations for plastics, such as the type of plastic involved, the function of the substance in the plastic, and the likelihood of its release from the plastic, to identify the substances that could be of potential concern to human health or the environment. The regulatory status of a substance in Canada was also taken into consideration for making recommendations about priorities for action. The approach identified 11 substances as priorities for assessment under CEPA, which are included on the 2025 Plan of Priorities. An additional 25 substances were identified for data gathering to inform future prioritization, and 55 substances were identified for further review of past CEPA assessments and any existing risk management measures to determine if additional action with respect to their use in plastics is warranted. The remaining 6,513 substances were not identified as priorities for further action at this time in relation to plastics. Results will be updated as part of the cyclical prioritization process as more information about chemicals in plastics becomes available. This may include identification of new hazard or exposure information, risk analyses, international activities, or risk management activities. The detailed results of the application of this approach for each of the 6,604 substances are available as a supporting document.

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1 Introduction

Plastics are a valuable material and resource because of their functionality, durability and low cost. We use plastics in almost all aspects of our lives. In a circular economy that is protective of human health and the environment, the life cycle of certain materials and products is extended for as long as possible following a “make-use-return” model by which materials and products are reused, repaired, re-manufactured or recycled. Understanding the chemicals that are used to make or alter the functionality of plastics, such as stabilisers or plasticizers, will help ensure that the plastics we are choosing to use and/or keep in the economy do not pose a risk to human health or the environment throughout their lifecycle.

Health Canada (HC) and Environment and Climate Change Canada (ECCC) have developed an approach for the prioritization of chemicals in plastics in Canada. The approach first involved identifying chemicals used in plastics in Canada based on a review of information on chemicals in plastics identified internationally, including, but not limited to the collation of information on their function(s) as an additive; the plastic matrices they are used in; the types of plastic products they are used in (for example, food contact materials); and the hazards associated with these substances. In doing so, the approach improves understanding of their potential exposures to humans and the environment and prioritizes those that may warrant further attention based on indicators of potential for human and environmental exposure, as well as hazard, in relation to their use in plastics.

The approach developed for the prioritization of chemicals in plastics in Canada is built on the Approach for identification of chemicals and polymers as risk assessment priorities (IRAP) under Part 5 of the *Canadian Environmental Protection Act*, 1999 (CEPA) (EC, HC 2014). Once a list of chemicals used or potentially used in plastics in Canada was developed, it was set as the scope of application of the approach. The IRAP framework was then used, consisting of 3 phases: data collection, evaluation, and recommended action, with additional considerations specific to the substances’ use in plastics. Recommended actions can include prioritization for assessment under CEPA, information gathering, and further review of hazard and exposure information in relation to plastics to inform future prioritization.

The results of the application of this approach were considered along with prioritization results for other substances to support work planning and the identification and selection of priorities for assessment under CEPA for the Plan of Priorities. Results will be updated as part of the cyclical prioritization process as more information about chemicals in plastics becomes available. This may include identification of new hazard or exposure information, which may impact future prioritization exercises, risk analyses, international activities, or risk management activities.

2 Scope

Plastics are made of chemicals, including polymers (which are themselves chains of chemicals known as monomers), additives (for example, plasticizers, flame retardants, stabilizers, pigments), processing aids (for example, catalysts, heat stabilizers,

lubricants, solvents and viscosity modifiers), and non-intentionally added substances (NIAS) (Wiesinger et al. 2021). NIAS may be present as side products formed during manufacture, breakdown products, and contaminants, including contaminants resulting from recycling (Geueke 2018; Horodytska et al. 2020). For this prioritization exercise, the initial scope consisted of all the above types of chemicals in plastics; however, the focus was placed on those with known or potential use in plastics in Canada.

A critical component in the development of the scope of this approach was to identify a comprehensive list of chemicals used or potentially used in plastics in Canada. The creation of the list of chemicals in plastic was initiated with a literature search to identify and collate information on chemicals used or found in plastic products. Focus was placed on the literature and sources that represented comprehensive reviews and compilations of information that encompassed multiple sources. This included use of comprehensive lists of substances in plastics identified by international initiatives, such as those reviewed in the United Nations Environment Programme (UNEP) Chemicals in Plastics technical report (UNEP 2023).

Wiesinger et al. (2021) gathered a list of more than 10,000 substances involved in plastic production through an extensive process of identification of relevant sources. Similarly, Aurisano et al. (2021b) presented a list of more than 6,000 chemicals found in plastics, using the European Chemical Agency's (ECHA) mapping of plastic additives as a starting point. Both teams produced valuable datasets from an extensive list of primary sources and both datasets were reviewed by the UNEP (2023) technical report on chemicals in plastics and included as annexes to the report. In addition, Groh et al. (2019) reviewed and developed a database of chemicals associated with plastic packaging (CPPdb). This database contains over 4,300 substances, over 900 of which are flagged as likely associated with plastics and ~3,400 as possibly associated. More recently, Wagner et al. (2024) published a State of the Science on Plastic Chemicals and an associated PlastChem database of over 16,000 substances potentially used in, or present in, plastic materials and products.

Together, these 4 datasets were chosen as the starting point to develop a list of over 16,441 unique chemicals with known or potential use in plastics. Those in scope as applicable to Canada were identified based on their commercial status in Canada via their presence on domestic inventories. The list of 16,441 chemicals was compared with Canada's Domestic Substances List (DSL) to identify which substances have been in commerce in Canada. Substances not on the DSL are considered new substances in Canada which have their own assessment and management mechanisms, and so were not considered further at this stage. As the government intends to add the eligible substances on the Revised-In Commerce List (R-ICL) to the DSL in the near future,some of these substances were also analyzed using the approach outlined below, but are not included in this report. None of the R-ICL substances were identified as priorities for assessment in relation to their potential use in plastics at this time. Based on this analysis, 6,604 DSL substances were identified based on their known or potential use in plastics in Canada.

3 Data collection

Substances that were identified as within scope were further analyzed to identify data sources and acquire further information, including information relevant to their use and function in plastics both in Canada and internationally. Many published articles were gathered, including extensive international datasets of chemical substances found in plastics. Emphasis was placed on the literature and sources that represented more comprehensive reviews and compilations of information on chemicals in plastics.

Hazard indicators for the candidate substances were identified from the results of the Health Canada Automated Workflow for Prioritization (HAWPr) (HC 2024) and the Ecological Risk Classification of organic substances version 2 (ERC2) (ECCC 2022). For exposure indicators, the information sources regularly used for identifying priorities for assessment under CEPA were supplemented with additional sources of information specific to chemicals used in plastics. Data from comprehensive reviews, such as UNEP (2023) or the confirmed use of a substance in plastics by industry from ECHA's Plastics initiative, were weighted higher than a reporting of "possibly" used in plastics from CPPdb (Groh et al. 2019).

In addition to the information outlined in the datasets discussed in the scope, information on the chemical's function and the potential plastic polymer matrix or polymer type in which the chemical was used was compiled based on available evidence from a number of sources (for example, ECHA 2019a, 2019b, 2020; Aurisano et al. 2021b; Wiesinger et al. 2021) and the results of the Netherlands Plastic Toy Screening study (VWA 2005). Available information on the range of concentrations for various types of additives in plastics and expected release potential was compiled from key sources (for example, Simoneau et al. 2015; ECHA 2019a, 2020). Specific sources of information relevant to the presence of chemicals in plastic toys (for example, VWA 2005; Aurisano et al. 2021a) and chemicals listed as potential food contact materials, including indirect food additives, where plastics may be implicated (for example, Food Packaging Forum 2020; US FDA 2023; Wagner et al. 2024) were also included.

4 Evaluation

For the evaluation phase, an iterative process was applied using the data and indicators assembled in the data collection phase for the 6,604 substances identified as within scope of this prioritization approach. The initial objective was to identify those substances possessing certain hazardous properties of high concern to human health or the environment. Individual approaches were developed to address both human health and ecological hazard concerns. Then, from within the subset of substances identified as having hazardous properties of high concern, approaches were used to identify those with the potential to contribute to exposure of people in Canada or the environment, taking into consideration factors such as the function of the chemical in the plastic, the plastic type and their likely use in plastics available in Canada.

4.1 Hazard screening

4.1.1 Human health approach

The hazard screening adopted methods developed for HAWPr to identify substances with hazard indicators. The HAWPr tool considered information from a large number of data sources and is discussed in more detail within the HAWPr science approach document (HC 2024). HAWPr's hazard module currently addresses critical risk assessment toxicity endpoints including carcinogenicity, genotoxicity, developmental and reproductive toxicity, repeated dose toxicity, as well as certain endocrine pathways. The first step for each endpoint is to identify if the substance has been classified by a competent authority based on its intrinsic hazard properties. Competent authorities are identified as other domestic or international regulatory agencies that have classified a substance after a robust scientific review, incorporating endpoint specific considerations. The second and third step of the process involves querying various databases for *in vivo* and *in vitro* hazard data. The HAWPr hazard module results in an overall hazard indicator level for each substance (for example, high, moderate, low or unknown). Substances for which HAWPr assigned an overall hazard indicator level of "High" were considered as having sufficient evidence of potential hazard for this prioritization approach.

Just over 23% (1,528) of the 6,604 substances were found to have potential high human health hazard indicators from the screening process. These 1,528 substances then proceeded to further exposure screening steps to be considered alongside those found to have ecological hazard indicators from the ecological approach.

4.1.2 Ecological approach

Identification of ecologically hazardous substances was conducted using the ERC2 (ECCC 2022), with additional information from Weisinger et al. (2021). ERC2 is an integrated approach to testing and assessment which synthesizes *in silico*, *in chemico,* and *in vitro* information to provide predictions of risk, as well as confidence and severity information. Hazard profiles are potency-based and consider the following: receptor-mediated interactions, chemical reactivity/genotoxicity, mode of toxic action, and food web toxicity.

The information from ERC2 was then analyzed to identify substances with ecological indicators of high risk, high hazard, endocrine disruption chemical (EDC), or very hazardous substances capable of long-range transport (VH-LRT). More information on ERC2 is available in the Science Approach Document (ECCC 2022).

Substances identified by Wiesinger et al. (2021) as having chronic aquatic toxicity or as being an EDC were also considered. If a substance had more than 2 of the indicators identified, it passed the ecological hazard screen threshold and proceeded to the exposure screening steps. Out of the 6,604 substances, 950 substances proceeded to the next step.

4.1.3 Overall results of hazard screening

The results of the hazard screening from both the ecological and human health indicators were then combined to identify the total number of substances with hazard indicators. In total, 2,129 substances had hazard indicators as a result of ecological or human health hazard screening, including 349 substances that were identified through both the ecological and human health hazard screening.

4.2 Exposure screening

Next, the exposure screening took a stepwise approach that progressed from the use of broad indicators to more specific exposure indicators. The multi-step approach was adopted to ensure conservatism with the intent of ultimately focusing on the identification of the highest priorities for action based on potential risk from use in plastics in Canada.

4.2.1 Primary exposure screening

To identify the potential exposure to substances used in plastics in Canada, the 2,129 chemicals in plastics identified with hazard indicators were subjected to a primary exposure screening. This primary exposure screening was developed to identify those substances reported to be in use in high volumes globally, substances registered under ECHA's Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) program with article category AC13 for plastics articles (ECHA 2023), as well as the presence of a number of broad exposure indicators (see list of Tier 1 and Tier 2 indicators in Annex 1) developed for this screening step. In total, 1,495 of the 2,129 substances passed the primary exposure screening and proceeded to the secondary exposure screening.

4.2.2 Secondary exposure screening

These 1,495 substances were then subjected to a secondary exposure screening to account for different types of exposure indicators deemed most relevant for human health and for environmental screening. The considerations for secondary screening based on human health and environmental exposure indicators in this step are outlined below.

<u>Secondary screening indicators for human exposure</u>

For human exposure, the first step of the secondary screening considered a number of additional indicators to evaluate the potential for human exposure based on the expectation of the plastic articles/products being used by consumers, with particular focus on those uses that represent potential exposures to subpopulations who may be more susceptible or more highly exposed, such as children. The indicators used to screen for this are listed in Annex 2. These indicators are consistent with the top 10 priority use sectors discussed in UNEP (2023), particularly the top 2 priority use sectors, namely toys and other children's products and packaging, including food contact materials.

Secondary screening indicators for environmental exposure

The first step of secondary environmental exposure screening focused on identifying substances in plastics that could be found and released outdoors (for example, usage, weathering, or disposal). For example, this included substances contained in articles with large surface areas, widespread outdoor usage, high release from industrial, agricultural, or building and construction sites, or from electrical equipment. The indicators used to screen for this are listed in Annex 3. After applying these human health and environmental exposure criteria to the 1,495 substances, 657 substances passed and proceeded to the next step to further refine exposures.

4.2.3 Tertiary exposure screening based on chemical function and polymer matrix

The 657 substances that met the secondary screening criteria were then subjected to a tertiary screening to inform potential exposure based on information that was available on the function of the chemical used as an additive in the plastic, as well as the type of polymer matrix the chemical is associated with. This step used information drawn primarily from the work done under the ECHA plastics initiative (2019a) and the OECD (2009, 2019), as well as a number of sources examining the release of substances from various plastic food contact materials, in particular the report from Simoneau et al. (2015).

The approach for screening based on the chemical additive function was similar for both human and environmental exposures, with interest focused on substances identified as antistatic agents/slip agents, flame retardants or plasticizers, due to the high usage of these types of additives in plastics to achieve their desired function. This step provided a mechanism to identify and prioritize substances with a high potential for exposure, based on function, with expected use in higher concentrations as an additive in plastics (for example, plasticizers, which may be used as an additive in plastics up to 50%), versus ones expected to be required in lower concentrations to fulfill their function as additives in plastics (for example, coupling agents/crosslinkers or catalysts) (OECD 2009). Additionally, the environmental exposure screening based on additive types included consideration of function of a chemical as a light stabilizer, as this class of substances has been associated with concerns to aquatic life (Allinson et al. 2018).

The final component of both the human and environmental exposure screening involved consideration of the material or polymer matrix, and the release potential (or diffusivity) of the chemical additive, based on information that had been collated on this from several key sources. For the purposes of this exercise, only substances associated with expected high release potential matrices were considered further.

Of the 657 substances that underwent the tertiary screening, the 263 that met the criteria based on type of chemical additive, were then subjected to the polymer matrix screening. The 159 substances that met all exposure screening criteria were then considered as potential priorities for further action. See Annex 2 and Annex 3 for full lists of tertiary screening indicators.

5 Further Analysis

5.1 Follow up on substances that did not meet tertiary exposure criteria based on chemical function and polymer matrix

Substances with chemical functions and polymer matrices that are not expected to be associated with a high exposure scenario (498 in total) were considered to not be a priority for action at this time in this prioritization approach. These substances were nevertheless reviewed for regulatory and assessment status in Canada. As shown in Figure 1, 25 of these substances were proposed as priorities for assessment on CEPA's Plan of Priorities based on considerations not specific to their use in plastics. Their potential exposure from use in plastics will be considered as part of any future assessment work that may be undertaken for these substances. These 25 substances are identified in the supporting document. For the remaining 473 substances, further work to gather information related to their use in plastics could help address gaps in their exposure profiles and inform future prioritization initiatives.

5.2 Further review of substances that met all hazard and exposure screening criteria

A further review was conducted of the 159 substances that met all hazard and exposure screening criteria to determine their regulatory and assessment status in Canada for consideration in making recommendations for action. This included identifying substances that, for example, have been previously assessed under CEPA, are listed as toxic substances on Schedule 1 to CEPA, and/or are subject to a significant new activity (SNAc) notice. For substances that have been previously assessed, their assessments were examined to determine the extent of consideration of their uses in plastics, and if, for example, these uses were considered in these assessments. This additional information was used in making the recommendations in section 6.

6 Recommended actions

Figure 1 illustrates the overall prioritization approach and results at each step, beginning from scope determination, through the various evaluation steps, to the recommended actions.

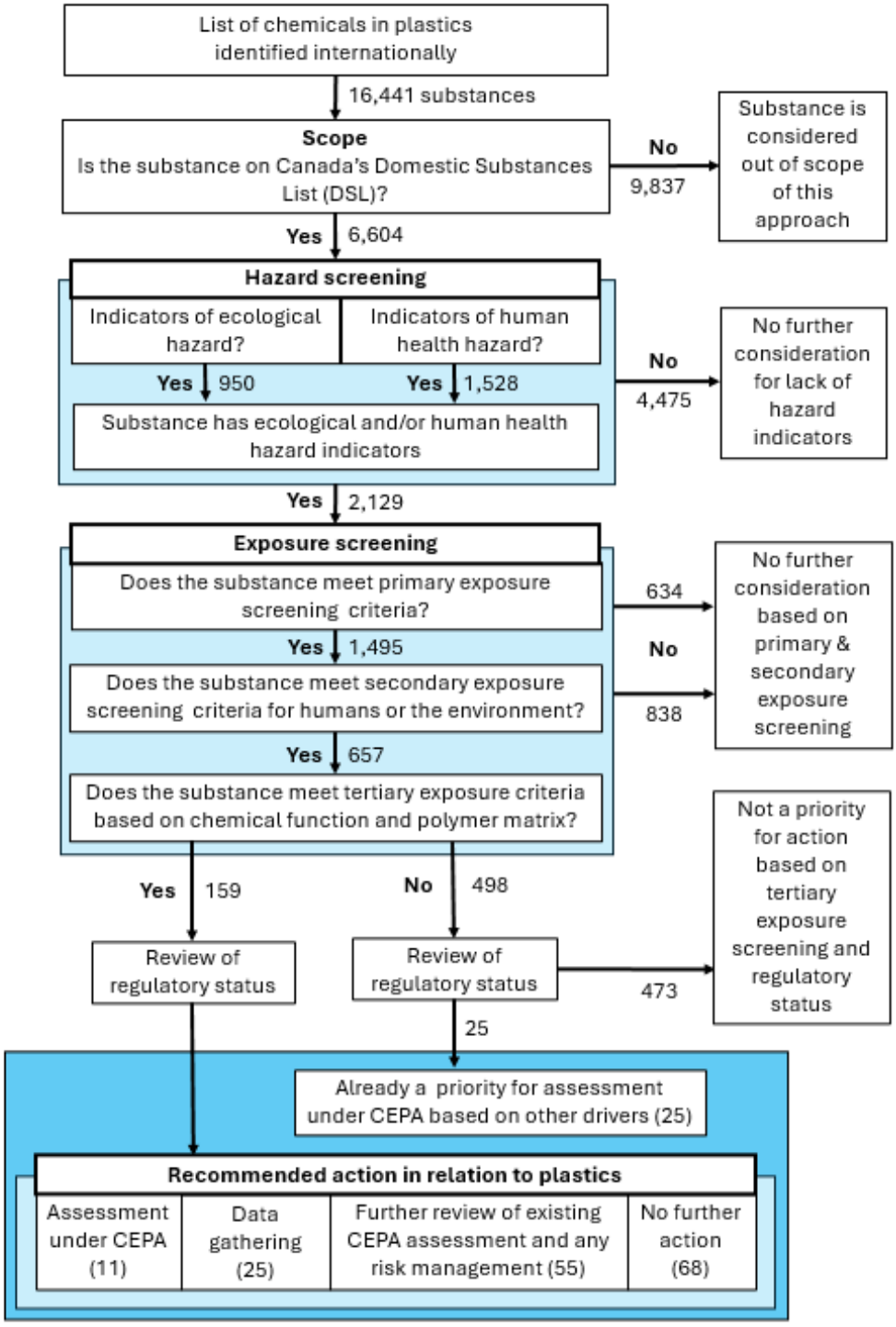

Figure 1. Overview of the stepwise approach and results for the prioritization of chemicals in plastics

[ALT Text: This figure illustrates the flow through the prioritization approach of 16,441 substances identified in plastics internationally. The first step was to determine if substances are within the scope of the approach, based on their presence on the Domestic Substances List. This step resulted in 6,604 substances remaining within the scope, and 9,837 substances considered outside the scope of this approach. The next step was the application of the hazard screening component of the approach. There were 950 substances that met the ecological hazard screening criteria, and 1,528 substances that met the human health hazard screening criteria. This resulted in a total of 2,129 substances that proceeded to the next step, and 4,475 substances that were not considered further based on a lack of hazard indicators. Of the 2,129 substances that proceeded to the primary exposure screening, 1,495 substances met this screening criteria. Of these 1,495, 657 substances then passed the secondary exposure screening criteria. The substances which did not pass the primary or secondary exposure screening were not considered further in this approach. The 657 remaining substances then were subjected to through the tertiary exposure screening. The 159 substances that passed this step then proceeded to a review of regulatory status, whereafter, decisions on appropriate recommended actions in relation to plastics were made: 11 substances were identified for assessment under CEPA, 25 for data gathering, 55 for further review of the CEPA assessment and any risk management, and no further action was the outcome for the remaining 68. The 498 substances that did not pass the tertiary exposure screening were then reviewed to determine their regulatory status in Canada. As a result, 25 of the 498 substances were determined to already be a priority for assessment under CEPA based on other drivers, and the remaining 473 were considered to not be a priority for action.]

The evaluation phase resulted in the identification of 159 substances as potential priorities for further action based on the methodology used in this approach to screen for both hazard and exposure indicators. Their regulatory and assessment status in Canada was then also taken into consideration for prioritizing substances and making recommendations. Recommended actions for subsets of the substances are summarized in Table 1.

Table 1. Summary of recommended actions for substances meeting hazard and tertiary exposure screening criteria, taking into account their regulatory and assessment status in Canada

Recommended action	**Regulatory and assessment status**	**Number of substances**
Assessment under CEPA to determine if the substance may be causing harm to human health or the environment and requires risk management	Included among substances proposed as priorities for assessment on CEPA's Plan of Priorities (see Table 2)	11

Data gathering (hazard or exposure) to inform future prioritization or assessment	Not previously addressed under CEPA (see Table 3)	25
Further review of existing CEPA assessment and any existing risk management to inform future prioritization in relation to use in plastics	Previously addressed under CEPA; use in plastics was not considered or identified (see Annex 4, Table A4-1)	55 (22 on, or proposed to be added to, Schedule 1 to CEPA)
Not a priority for further action at this time	Previously addressed under CEPA; use in plastics was considered or identified (see Annex 4, Table A4-2)	68 (15 on, or proposed to be added to, Schedule 1 to CEPA)

Table 2 lists the 11 substances that are recommended for assessment under CEPA because they meet all the screening criteria in this prioritization approach and they are not considered to be previously addressed under CEPA. These substances are included in the list of priorities proposed for assessment in CEPA's Plan of Priorities. The rationales for the addition of these substances as assessment priorities to the Plan may outline reasons for concern beyond those related to plastics. When these substances are assessed for their potential harm to human health or the environment, the assessment will consider any risks associated with the use of these substances in plastics.

Table 2. Chemicals in plastics identified as priorities for assessment that are included on CEPA's Plan of Priorities

CAS Registry Number (CAS RN)	Chemical name	Plan of Priorities listing
74-31-7	1,4-Benzenediamine, N,N'-diphenyl-	1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenyl- (6PPD), its transformation products, and related p-phenylenediamines (PPDs)
80-05-7	Phenol, 4,4'-(1-methylethylidene)bis-	Bisphenol A Structural Analogues and Functional Alternatives (BPA SAFA)
100-42-5	Benzene, ethenyl-	Styrene
106-42-3	Benzene, 1,4-dimethyl-	Xylenes
1330-20-7	Benzene, dimethyl-	Xylenes
115-27-5	4,7-Methanoisobenzofuran-1,3-dione, 4,5,6,7,8,8-hexachloro-3a,4,7,7a-tetrahydro-	Organic Flame retardants
1241-94-7	Phosphoric acid, 2-ethylhexyl diphenyl ester	Organic Flame retardants
1889-67-4	Benzene, 1,1'-(1,1,2,2-tetramethyl-1,2-ethanediyl)bis-	Organic Flame retardants
131-53-3	Methanone, (2-hydroxy-4-methoxyphenyl)(2-hydroxyphenyl)-	Hydroxybenzophenones
131-56-6	Methanone, (2,4-dihydroxyphenyl)phenyl-	Hydroxybenzophenones
131-57-7	Methanone, (2-hydroxy-4-methoxyphenyl)phenyl-	Hydroxybenzophenones

Additional hazard or exposure data gathering is recommended as an appropriate next step for the 25 substances listed in Table 3.

Table 3. Further information relevant to the breadth and type of use of these substances in plastics in Canada is needed because many of the exposure indicators used in this approach relied on surrogate information from international jurisdictions to estimate the presence and commercial status of these plastics in Canada. Hazard data gathering is

recommended for those substances for which additional verification of the hazard indicator is needed, to be conducted through additional literature review or data generation. Once acquired the new information will be considered in future prioritization initiatives.

Table 3. Chemicals in plastics recommended for hazard or exposure data gathering

CAS RN	Chemical name	Type of data
70-55-3	Benzenesulfonamide, 4-methyl-	Exposure
75-91-2	Hydroperoxide, 1,1-dimethylethyl	Exposure
76-22-2	Bicyclo[2.2.1]heptan-2-one, 1,7,7-trimethyl-	Exposure
77-89-4	1,2,3-Propanetricarboxylic acid, 2-(acetyloxy)-, triethyl ester	Exposure
94-28-0	Hexanoic acid, 2-ethyl-, 1,2-ethanediylbis(oxy-2,1-ethanediyl) ester	Exposure
96-33-3	2-Propenoic acid, methyl ester	Exposure
105-99-7	Hexanedioic acid, dibutyl ester	Exposure
107-21-1	1,2-Ethanediol	Exposure
110-05-4	Peroxide, bis(1,1-dimethylethyl)	Exposure
110-33-8	Hexanedioic acid, dihexyl ester	Hazard
110-63-4	1,4-Butanediol	Exposure
120-46-7	1,3-Propanedione, 1,3-diphenyl-	Exposure
927-07-1	Propaneperoxoic acid, 2,2-dimethyl-, 1,1-dimethylethyl ester	Exposure
991-84-4	Phenol, 4-[[4,6-bis(octylthio)-1,3,5-triazin-2-yl]amino]-2,6-bis(1,1-dimethylethyl)-	Hazard
2440-22-4	Phenol, 2-(2H-benzotriazol-2-yl)-4-methyl-	Exposure
6683-19-8	Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, 2,2-bis[[3-[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]-1-oxopropoxy]methyl]-1,3-propanediyl ester	Hazard
12124-97-9	Ammonium bromide ((NH4)Br)	Exposure
26741-53-7	2,4,8,10-Tetraoxa-3,9-diphosphaspiro[5.5]undecane, 3,9-bis[2,4-bis(1,1-dimethylethyl)phenoxy]-	Exposure
26748-41-4	Neodecaneperoxoic acid, 1,1-dimethylethyl ester	Exposure
31570-00-0	Phenol, 2,4-bis(1,1-dimethylethyl)-, phosphite (3:1)	Hazard

CAS RN	Chemical name	Type of data
32687-78-8	Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, 2-[3-[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]-1-oxopropyl]hydrazide	Hazard
52829-07-9	Decanedioic acid, bis(2,2,6,6-tetramethyl-4-piperidinyl) ester	Exposure
63843-89-0	Propanedioic acid, [[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]methyl]butyl-, bis(1,2,2,6,6-pentamethyl-4-piperidinyl) ester	Exposure
67845-93-6	Benzoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, hexadecyl ester	Hazard
71786-60-2	Ethanol, 2,2'-iminobis-, N-C12-18-alkyl derivs.	Exposure

In total, 123 of the 159 candidates have been previously addressed under CEPA. Assessments of these 123 substances concluded that 37 of them met the criteria under section 64 of CEPA and these 37 substances were, or are proposed to be, added to Schedule 1. The other 86 substances did not meet the section 64 criteria as no risk was identified at the time of the assessment. The existing assessments for these 123 substances were reviewed to determine the level of consideration of uses in plastics, and the results are found in Annex 4 and in the supporting document. For the 55 previously addressed substances where it was determined that uses in plastics have not been considered (see Annex 4, Table A4-1), it is recommended that further scoping be conducted to determine the need for additional assessment of their use in plastics or review of existing risk management measures. For the 68 substances that had previous assessments that considered or identified uses in plastics, it was determined that no further action is required at this time (See Annex 4, Table A4-2).

7 Challenges and uncertainties

This approach for prioritization of chemicals in plastics was built on existing prioritization and assessment schemes used under the CMP, with the goal of identifying risk-based priorities for action. To this end, both hazard and exposure indicators were considered as part of the prioritization approach, as were the challenges and uncertainties that exist for both hazard and exposure.

There are challenges and uncertainties associated with a lack of available substance-specific empirical hazard data for many substances, including polymers or mixtures identified as chemicals in plastics. Further discussion on the challenges and uncertainties associated with the data used to inform hazard in this approach can be found in the science approach documents for ERC2 (ECCC 2022) and HAWPr (HC 2024).

There are many limitations in the exposure database that present both challenges and uncertainties, impacting the ability of governments and others to understand which

plastics and which chemicals in plastics are on the Canadian market. Many of these data gaps are not unique to plastics, but are common challenges and uncertainties encountered when addressing risks from chemicals in products more broadly (for example, limited information on the chemical composition of products, limited availability of biomonitoring and environmental monitoring data). The approach prioritizes substances reflecting use data from markets in North America and Europe (for example, REACH), as there is a paucity of information on substances used in plastics from other regions of the world, most notably China. In a study screening plastic toys for chemicals in the Netherlands (VWA 2005), it was noted that 73% of the 113 toys sampled were from China.

Plastics are a mixture of monomers, processing aids, additives and other NAIS. While this prioritization exercise looks at substances in plastic individually, it is likely that substances in plastic have cumulative effects that are not considered in this approach. As methodologies develop to consider the potential cumulative nature of substances in plastic, future prioritization exercises will attempt to incorporate them into the hazard screening approaches.

In Canada, it is recognized that many plastics are imported as manufactured items, and it is further expected that, in most cases, the importer does not provide, or is unable to provide, information regarding which substances were used in the manufacture of those products, or if those chemicals are still present in the final product. This results in limitations for this information to be captured by industry reporting mechanisms.

There is also limited information available on the range(s) of concentrations of chemicals used in plastic materials, particularly with respect to variations of their concentrations in various polymer matrices. For example, there is limited information on the variations in the concentration of additives used in Polyvinyl Chloride (PVC) materials compared to polystyrenes, or in rigid PVC versus soft PVC. There is also a lack of available information on the potential for release of chemicals from different plastic/polymer matrices, in particular for plastics that are not intended to be used as food contact materials, and under which conditions such releases would occur. Addressing NIAS, such as unintentional residues, in plastics also presents a challenge, as, in most cases, these NIAS are unknown to the manufacturer or importer. The concentration of unintentional residues was reported by Aurisano et al. (2021b) as typically being <1%. This concentration threshold was considered, for the purposes of this prioritization approach, to be a sufficient rationale to not consider these types of exposures further.

This approach relies on available information on factors such as the hazardous properties of a substance used or suspected to be used in plastic, volumes in commerce of the substance, the relative potential of the substance to be released from plastic based on the plastic matrix the substance is used in, and the use or function of the substance in plastic. However, it is recognized that this information contains its own uncertainties and represents only a surrogate for the potential release of a substance and the potential exposures of humans and the environment to the substance from its use in plastics.

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Annex 1. Primary exposure indicators

For the purposes of the primary exposure screening of this prioritization approach, a threshold cutoff for global production volumes was put in place to identify substances as potential candidates for further work. To be considered further, a substance must have a reported production volume of more than 100 tonnes in one or more of the following jurisdictions: Canada (for example, as reported in response to a CEPA section 71 notice), the OECD High Production Volume program, United States Chemical Data Reporting (CDR), and/or Europe (volumes registered under REACH as well as from the Substances in Preparations in Nordic countries (SPIN) database). In addition to identifying substances used globally in high volumes, the following Tier 1 and 2 indicators (Tables A1-1 and A1-2) were used to inform potential use as additives in plastics.

Table A1-1. Tier 1 Primary exposure indicators

Indicator source/list	Source
Sampling of 113 toys for chemical composition	VWA 2005
List of substances from Toy testing information from 25 peer reviewed studies	Aurisano et al. 2021a
Listed as “Likely” in plastics in the Chemicals associated with Plastics Packaging Database (CPPDb)	Groh et al. 2019
A list of plastics additives from ECHA’s Plastic Additives Initiative mapping exercise	ECHA 2019b
PlastChem substances with Use in plastics	Wagner et al. 2024
PlastChem substances with Presence in plastics	Wagner et al. 2024
PlastChem substances Released from plastics	Wagner et al. 2024

Table A1-2. Tier 2 Primary exposure indicators

Indicator source/list	Source
Review of about 6,000 chemicals found to be in plastics and mapped their use, function and developed an inventory of assessed and regulated chemicals in plastics - Used available information on primary function and or polymer type as indicators	Aurisano et al. 2021b
Study systematically collected and analyzed publicly available information on intentionally added substances	Wiesinger et al. 2021

Indicator source/list	Source
(such as monomers, additives, and processing aids) in plastics of all industrial sectors. In particular, this study investigated chemical identities, use patterns (functions, compatible polymer types, industrial sectors of use, geographical distribution, and production volumes), and reported hazard classifications. Furthermore, based on reported hazard classifications, production volumes, and regulatory status, substances of potential concern are identified. - Used available information on function, polymer type, building sector (for example, food contact, toys) as indicators	
Listed as “Possibly” in plastics in the Chemicals associated with Plastics Packaging Database (CPPDb) - Used to help inform function or polymer type if other Tier 2 indicators were identified, but not used directly as an indicator (that is, not used as an indicator in the absence of other Tier 2 indicators being identified)	Groh et al. 2019
REACH Article Category (AC) - Select ACs - AC13b: Plastic articles: Toys intended for children’s use (and child-dedicated articles) - AC13d: Plastic articles: Articles intended for food contact - AC13f: Plastic articles: Articles with intense direct dermal contact during normal use	ECHA 2023
The Food Contact Chemicals Database (FCCDb) contains over 12,000 chemicals gathered from over 67 global/regulatory lists. Only substances with use in plastics FCCs were flagged for use. Substance was not used as Tier 2 indicator if only indication of use in plastics from all sources. This was to reflect authors noting that “The FCCdb includes 4,190 substances that are listed by just one of the 67 FCC lists. While this could be due to the specificity of a substance’s use in just one food contact material type, a particular application, or geographical location, the rarity of a substance’s listing could also indicate that it is outdated and not in use anymore or has very limited use.”	Food Packaging Forum 2020

Indicator source/list	Source
As a result, substances for which the only Tier 2 indicator was a FCCDb hit were not considered to have sufficient evidence for use as a Tier 2 indicator.	
United States Food and Drug Administration Indirect Additives Code of Federal Regulations Title 21 Included substances with indicators in plastic food contact materials under CFR Title 21, Chapter I, Subchapter B: Part 173: Secondary Direct Food Additives Permitted in Food for Human Consumption Part 175: Indirect Food Additives: Adhesives and Components of Coatings Part 177: Indirect Food Additives: Polymers Part 178: Indirect Food Additives: Adjuvants, Production Aids, and Sanitizers Part 179: Irradiation in the Production, Processing and Handling of Food Part 180: Food Additives Permitted in Food or in Contact with Food on an Interim Basis Pending Additional Study Part 181: Prior-Sanctioned Food Ingredients Included where subparts and/or sections were relevant to use in plastics food contact materials (for example, 181.27 plasticizers; 177.1200 Cellophane; 178.2010 Antioxidants and/or stabilizers for polymers)	(US FDA 2023)

Annex 2. Secondary and tertiary human exposure indicators

The following indicators (Table A2) were used to inform the potential for high exposure to consumers based on the intended use or plastics article type.

Table A2. Secondary and tertiary human exposure indicators

Indicator	Indicator source
REACH Registration article category	- ECHA 2023 - AC13b: Plastic articles: Toys intended for children's use (and child-dedicated articles) - AC13d: Plastic articles: Articles intended for food contact - AC13f: Plastic articles: Articles with intense direct dermal contact during normal use
Detected in Toys	- Aurisano et al. 2021a - Groh et al. 2019 - VWA 2005 - Wiesinger et al. 2021
Intended for use in Food Contact Materials	- Aurisano et al. 2021a - Groh et al. 2019 - FCCDb Version 5.0 - Wiesinger et al. 2021

Annex 3. Secondary and tertiary environmental exposure indicators

The following indicators (Table A3) were used to inform the potential for environmental exposure based on the intended use or plastics article type.

Table A3. Secondary and tertiary environmental exposure indicators

Indicator	Indicator source
REACH Registration article category	- ECHA 2023 - AC13a: Plastic articles: Large surface area articles - AC13g: Plastic articles: Other plastic articles
REACH Registration Environmental Release Category	- ECHA 2023 - ERC10b: Widespread use of articles with high or intended release (outdoor) - ERC12b: Processing of articles at industrial sites with high release
Industrial Sector	- Wiesinger et al. 2021
Chemical additive type	- Aurisano et al. 2021a - Wiesinger et al. 2021 - ECHA 2019b
Release of Matrix	- Aurisano et al. 2021a - Wiesinger et al. 2021 - Wagner et al. 2024

Annex 4. Regulatory status and assessment considerations of substances considered previously addressed under CEPA

Table A4-1. Chemicals in plastics previously addressed under CEPA that are recommended for further review of existing CEPA assessment and any existing risk management measures to inform future prioritization in relation to use in plastics

CAS RN	Substance name	CEPA Schedule 1 status
50-00-0	Formaldehyde	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
64-17-5	Ethanol	Substance not listed on CEPA Schedule 1
67-63-0	2-Propanol	Substance not listed on CEPA Schedule 1
71-36-3	1-Butanol	Potential future Schedule 1 addition
71-43-2	Benzene	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
75-21-8	Oxirane	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
75-28-5	Propane, 2-methyl-	Substance not listed on CEPA Schedule 1
75-56-9	Oxirane, methyl-	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
77-99-6	1,3-Propanediol, 2-ethyl-2-(hydroxymethyl)-	Substance not listed on CEPA Schedule 1
80-56-8	Bicyclo[3.1.1]hept-2-ene, 2,6,6-trimethyl-	Substance not listed on CEPA Schedule 1
88-27-7	Phenol, 4-[(dimethylamino)methyl]-2,6-bis(1,1-dimethylethyl)-	Substance not listed on CEPA Schedule 1
91-20-3	Naphthalene	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
94-13-3	Benzoic acid, 4-hydroxy-, propyl ester	Potential future CEPA Schedule 1 addition
95-50-1	Benzene, 1,2-dichloro-	Substance not listed on CEPA Schedule 1
99-76-3	Benzoic acid, 4-hydroxy-, methyl ester	Potential future CEPA Schedule 1 addition
100-37-8	Ethanol, 2-(diethylamino)-	Substance not listed on CEPA Schedule 1

CAS RN	Substance name	CEPA Schedule 1 status
100-52-7	Benzaldehyde	Substance not listed on CEPA Schedule 1
102-71-6	Ethanol, 2,2',2"-nitrilotris-	Substance not listed on CEPA Schedule 1
103-11-7	2-Propenoic acid, 2-ethylhexyl ester	Substance not listed on CEPA Schedule 1
106-46-7	Benzene, 1,4-dichloro-	Substance not listed on CEPA Schedule 1
106-97-8	Butane	Substance not listed on CEPA Schedule 1
108-39-4	Phenol, 3-methyl-	Substance not listed on CEPA Schedule 1
108-78-1	1,3,5-Triazine-2,4,6-triamine	Potential future Schedule 1 addition
108-88-3	Benzene, methyl-	Substance not listed on CEPA Schedule 1
108-95-2	Phenol	Substance not listed on CEPA Schedule 1
111-27-3	1-Hexanol	Substance not listed on CEPA Schedule 1
111-42-2	Ethanol, 2,2'-iminobis-	Substance not listed on CEPA Schedule 1
111-76-2	Ethanol, 2-butoxy-	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
111-87-5	1-Octanol	Substance not listed on CEPA Schedule 1
112-30-1	1-Decanol	Substance not listed on CEPA Schedule 1
112-53-8	1-Dodecanol	Substance not listed on CEPA Schedule 1
112-72-1	1-Tetradecanol	Substance not listed on CEPA Schedule 1
115-28-6	Bicyclo[2.2.1]hept-5-ene-2,3-dicarboxylic acid, 1,4,5,6,7,7-hexachloro-	Substance not listed on CEPA Schedule 1
121-91-5	1,3-Benzenedicarboxylic acid	Substance not listed on CEPA Schedule 1
122-20-3	2-Propanol, 1,1',1"-nitrilotris-	Substance not listed on CEPA Schedule 1
131-18-0	1,2-Benzenedicarboxylic acid, dipentyl ester	Substance not listed on CEPA Schedule 1
140-66-9	Phenol, 4-(1,1,3,3-tetramethylbutyl)-	Substance not listed on CEPA Schedule 1
143-08-8	1-Nonanol	Substance not listed on CEPA Schedule 1
149-30-4	2(3H)-Benzothiazolethione	Potential future CEPA Schedule 1 addition
542-83-6	Cadmium cyanide (Cd(CN)2)	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
614-45-9	Benzenecarboperoxoic acid, 1,1-dimethylethyl ester	Substance not listed on CEPA Schedule 1

CAS RN	Substance name	CEPA Schedule 1 status
811-97-2	Ethane, 1,1,1,2-tetrafluoro-	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
1306-19-0	Cadmium oxide (CdO)	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
1313-27-5	Molybdenum oxide (MoO3)	Substance not listed on CEPA Schedule 1
1314-13-2	Zinc oxide (ZnO)	Potential future CEPA Schedule 1 addition
7789-82-4	Molybdate ($MoO4^{2}$-), calcium (1:1), (ß-4)-	Substance not listed on CEPA Schedule 1
10101-66-3	Diphosphoric acid, ammonium manganese(3+) salt (1:1:1)	Substance not listed on CEPA Schedule 1
10108-64-2	Cadmium chloride (CdCl2)	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
25154-52-3	Phenol, nonyl-	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
32534-81-9	Benzene, 1,1'-oxybis-, pentabromo deriv.	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
32536-52-0	Benzene, 1,1'-oxybis-, octabromo deriv.	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
36653-82-4	1-Hexadecanol	Substance not listed on CEPA Schedule 1
84852-15-3	Phenol, 4-nonyl-, branched	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
85535-84-8	Alkanes, C10-13, chloro	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
85535-85-9	Alkanes, C14-17, chloro	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group

Table A4-2. Chemicals in plastics previously addressed under CEPA that were not identified as a priority for further action at this time

CAS RN	Substance name	CEPA Schedule 1 status
67-56-1	Methanol	Potential future Schedule 1 addition
74-85-1	Ethene	Substance not listed on CEPA Schedule 1
78-40-0	Phosphoric acid, triethyl ester	Potential future Schedule 1 addition
78-63-7	Peroxide, (1,1,4,4-tetramethyl-1,4-butanediyl)bis[(1,1-dimethylethyl)	Substance not listed on CEPA Schedule 1
79-94-7	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo-	Substance not listed on CEPA Schedule 1
80-43-3	Peroxide, bis(1-methyl-1-phenylethyl)	Substance not listed on CEPA Schedule 1
84-61-7	1,2-Benzenedicarboxylic acid, dicyclohexyl ester	Substance not listed on CEPA Schedule 1
84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester	Substance not listed on CEPA Schedule 1
84-69-5	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester	Substance not listed on CEPA Schedule 1
84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester	Substance not listed on CEPA Schedule 1
84-75-3	1,2-Benzenedicarboxylic acid, dihexyl ester	Substance not listed on CEPA Schedule 1
85-68-7	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	Substance not listed on CEPA Schedule 1
89-04-3	1,2,4-Benzenetricarboxylic acid, trioctyl ester	Substance not listed on CEPA Schedule 1
96-09-3	Oxirane, phenyl-	Substance not listed on CEPA Schedule 1
98-54-4	Phenol, 4-(1,1-dimethylethyl)-	Substance not listed on CEPA Schedule 1
101-14-4	Benzenamine, 4,4'-methylenebis[2-chloro-	Substance not listed on CEPA Schedule 1
103-23-1	Hexanedioic acid, bis(2-ethylhexyl) ester	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
103-83-3	Benzenemethanamine, N,N-dimethyl-	Substance not listed on CEPA Schedule 1
105-60-2	2H-Azepin-2-one, hexahydro-	Substance not listed on CEPA Schedule 1

CAS RN	Substance name	CEPA Schedule 1 status
109-60-4	Acetic acid, propyl ester	Substance not listed on CEPA Schedule 1
109-99-9	Furan, tetrahydro-	Potential future Schedule 1 addition
110-91-8	Morpholine	Substance not listed on CEPA Schedule 1
112-34-5	Ethanol, 2-(2-butoxyethoxy)-	Substance not listed on CEPA Schedule 1
115-86-6	Phosphoric acid, triphenyl ester	Potential future Schedule 1 addition
115-96-8	Ethanol, 2-chloro-, phosphate (3:1)	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
119-47-1	Phenol, 2,2'-methylenebis[6-(1,1-dimethylethyl)-4-methyl-	Substance not listed on CEPA Schedule 1
120-55-8	Ethanol, 2,2'-oxybis-, dibenzoate	Substance not listed on CEPA Schedule 1
123-77-3	Diazenedicarboxamide	Substance not listed on CEPA Schedule 1
126-73-8	Phosphoric acid tributyl ester	Substance not listed on CEPA Schedule 1
128-37-0	Phenol, 2,6-bis(1,1-dimethylethyl)-4-methyl-	Substance not listed on CEPA Schedule 1
128-39-2	Phenol, 2,6-bis(1,1-dimethylethyl)-	Substance not listed on CEPA Schedule 1
131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester	Substance not listed on CEPA Schedule 1
131-17-9	1,2-Benzenedicarboxylic acid, di-2-propenyl ester	Substance not listed on CEPA Schedule 1
1068-27-5	Peroxide, (1,1,4,4-tetramethyl-2-butyne-1,4-diyl)bis[(1,1-dimethylethyl)	Substance not listed on CEPA Schedule 1
1163-19-5	Benzene, 1,1'-oxybis[2,3,4,5,6-pentabromo-	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
1309-64-4	Antimony oxide (Sb2O3)	Substance not listed on CEPA Schedule 1
1314-60-9	Antimony oxide (Sb2O5)	Substance not listed on CEPA Schedule 1
1330-78-5	Phosphoric acid, tris(methylphenyl) ester	Substance not listed on CEPA Schedule 1
1333-86-4	Carbon black	Substance not listed on CEPA Schedule 1

CAS RN	Substance name	CEPA Schedule 1 status
1344-37-2	C.I. Pigment Yellow 34	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
1843-03-4	Phenol, 4,4',4''-(1-methyl-1-propanyl-3-ylidene)tris[2-(1,1-dimethylethyl)-5-methyl-	Substance not listed on CEPA Schedule 1
2082-79-3	Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, octadecyl ester	Substance not listed on CEPA Schedule 1
3194-55-6	Cyclododecane, 1,2,5,6,9,10-hexabromo-	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
3319-31-1	1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester	Substance not listed on CEPA Schedule 1
6846-50-0	Propanoic acid, 2-methyl-, 2,2-dimethyl-1-(1-methylethyl)-1,3-propanediyl ester	Substance not listed on CEPA Schedule 1
9003-29-6	Butene, homopolymer	Substance not listed on CEPA Schedule 1
10081-67-1	Benzenamine, 4-(1-methyl-1-phenylethyl)-N-[4-(1-methyl-1-phenylethyl)phenyl]-	Substance not listed on CEPA Schedule 1
12656-85-8	C.I. Pigment Red 104	Substance on CEPA Schedule 1 through direct listing or potentially based on chemical class/group
13463-67-7	Titanium oxide (TiO2)	Substance not listed on CEPA Schedule 1
13674-84-5	2-Propanol, 1-chloro-, phosphate (3:1)	Potential future Schedule 1 addition
13674-87-8	2-Propanol, 1,3-dichloro-, phosphate (3:1)	Potential future Schedule 1 addition
13701-59-2	Boric acid (HBO2), barium salt	Substance not listed on CEPA Schedule 1
14807-96-6	Talc (Mg3H2(SiO3)4)	Potential future Schedule 1 addition
15432-85-6	Antimonate (SbO_3^{1-}), sodium	Substance not listed on CEPA Schedule 1
21645-51-2	Aluminum hydroxide (Al(OH)3)	Substance not listed on CEPA Schedule 1
25265-77-4	Propanoic acid, 2-methyl-, monoester with 2,2,4-trimethyl-1,3-pentanediol	Substance not listed on CEPA Schedule 1
25322-68-3	Poly(oxy-1,2-ethanediyl), α-hydro-ω-hydroxy-	Substance not listed on CEPA Schedule 1

CAS RN	Substance name	CEPA Schedule 1 status
26761-40-0	1,2-Benzenedicarboxylic acid, diisodecyl ester	Substance not listed on CEPA Schedule 1
27138-31-4	Propanol, oxybis-, dibenzoate	Substance not listed on CEPA Schedule 1
27554-26-3	1,2-Benzenedicarboxylic acid, diisooctyl ester	Substance not listed on CEPA Schedule 1
28553-12-0	1,2-Benzenedicarboxylic acid, diisononyl ester	Substance not listed on CEPA Schedule 1
53306-54-0	1,2-Benzenedicarboxylic acid, bis(2-propylheptyl) ester	Substance not listed on CEPA Schedule 1
68411-46-1	Benzenamine, N-phenyl-, reaction products with 2,4,4-trimethylpentene	Substance not listed on CEPA Schedule 1
68515-48-0	1,2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich	Substance not listed on CEPA Schedule 1
68515-49-1	1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich	Substance not listed on CEPA Schedule 1
68515-50-4	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	Substance not listed on CEPA Schedule 1
68937-41-7	Phenol, isopropylated, phosphate (3:1)	Potential future Schedule 1 addition