Government of Canada / Gouvernement du Canada

Second Phase of Polymer Rapid Screening

Results of the Screening Assessment

Environment and Climate Change Canada

Health Canada

Avril 2018

Canada

Synopsis

As part of the Chemicals Management Plan (CMP), the Government of Canada is assessing and managing, where appropriate, the potential health and ecological risks associated with certain polymers under the Canadian Environmental Protection Act, 1999 (CEPA). Three hundred and thirty-six polymers were identified as candidates for a second phase of polymer rapid screening. These 336 polymers met the categorization criteria under subsection 73(1) of CEPA, or were considered a priority based on other human health or ecological concerns.

The approach for a second phase of polymer rapid screening was applied to these 336 polymers. It involved using conservative assumptions to identify polymers that warrant further evaluation of their potential to cause harm to either human health or the environment, and those that are expected to be of low concern for human health or the environment. The approach applied extends beyond that used in the previous rapid screening of polymers based on the experience gained from that earlier activity. Additionally, information specific to the characterization of polymers that was collected through both a voluntary survey and a mandatory survey conducted under CEPA allowed refinements of the approach.

The ecological component of the second phase of polymer rapid screening consisted of four main steps to identify polymers that warrant further evaluation of their potential to cause harm. The first step involved identifying polymers which are not likely to be of ecological concern based on low reported import and manufacture quantities according to the voluntary survey and surveys conducted under section 71 of CEPA. The second and third steps of the process involved identifying polymers that are likely to have water extractability greater than 2% by weight and determining whether these polymers contain reactive functional groups; these criteria are consistent with the New Substances Notification Regulations (Chemicals and Polymers) (NSNR) (specifically, Schedule 7 items 1 and 5 of the NSNR Chemicals and Polymers (C&P)). The final step involved applying two exposure scenarios using assumptions that are protective of the environment and comparing exposure to a conservative acute ecotoxicity value for each polymer.

The human health component of the second phase of polymer rapid screening consisted of determining the location of each polymer in a risk matrix which is used to assign a low, moderate or high level of potential concern for substances based on their hazard and exposure profiles. The first step involved identifying the maximum direct and indirect exposure potential, and corresponding exposure band, for each polymer based on its use pattern, import, manufacture or use quantity and water extractability. The second step involved identifying the hazard potential, and corresponding hazard band,

for each polymer based on the presence of reactive functional groups and available toxicological data. The final step involved combining the exposure and hazard potentials to determine the overall risk potential as represented by the location in the risk matrix. Polymers which have a moderate-to-high exposure potential and high hazard potential are identified as requiring further assessment to determine their risk to human health.

Two polymers [Chemical Abstracts Service Registry Numbers (CAS RNs1) 160799-28-0 and 9051-57-4] were found to meet the broad classification of nonylphenol ethoxylates, and both polymers are considered to have been addressed through the Priority Substances List Assessment Report of Nonylphenol and its Ethoxylates in 2001. As such, these two substances will not be subject to further risk assessment work at this time under the CMP given previous risk assessment/risk management activities.

Fifty one substances were identified for further assessment. Twenty-nine polymers were identified as requiring further assessment solely due to ecological considerations and 19 polymers were identified as requiring further assessment solely due to human health considerations. The remaining three polymers were found to require further assessment due to both ecological and human health considerations.

Based on the information available, it is concluded that the 283 polymers listed in Annex II, do not meet any of the criteria under section 64 of CEPA, since they are not entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity, constitute or may constitute a danger to the environment on which life depends, or constitute or may constitute a danger in Canada to human life or health.

[1] The Chemical Abstracts Service Registry Number (CAS RN) is the property of the American Chemical Society and any use or redistribution, except as required in supporting regulatory requirements and/or for reports to the Government of Canada when the information and the reports are required by law or administrative policy, is not permitted without the prior, written permission of the American Chemical Society.

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1. Introduction

The Canadian Environmental Protection Act, 1999 (CEPA) (Canada 1999) requires the Minister of the Environment and Climate Change and the Minister of Health to conduct screening assessments of substances that met the categorization criteria set out in the Act to determine whether these substances present or may present a risk to the environment or human health.

Under CEPA, screening assessments focus on information critical to determining whether a substance meets the criteria for defining a chemical as toxic as set out in section 64 of the Act, where:

"**64.** [...] a substance is toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that

(a) have or may have an immediate or long-term harmful effect on the environment or its biological diversity;
(b) constitute or may constitute a danger to the environment on which life depends; or
(c) constitute or may constitute a danger in Canada to human life or health."

The Government of Canada has identified 336 substances, which are polymers[2], as candidates for this second phase of polymer rapid screening. These 336 polymers met the categorization criteria for persistence or bioaccumulation and inherent toxicity to human or non-human organisms, or for greatest potential for exposure to humans under subsection 73(1) of CEPA, or were identified as having health effects of concern based on classifications by other national or international agencies for carcinogenicity, genotoxicity, developmental toxicity or reproductive toxicity, or as having other ecological concerns.

Of the 336, 267 polymers were not included in the previous rapid screening of polymers due to their quantity in commerce (greater than 1000 kg per year according to Phase Two of the Domestic Substances List (DSL) Inventory Update (Canada 2012). An additional 61 polymers were identified as requiring further assessment through the Rapid Screening of Polymers Identified from Phase Two of the Domestic Substances List Inventory Update (ECCC, HC 2016). New information was obtained on these polymers from a voluntary survey (ECCC 2015) and through a mandatory polymer survey conducted under section 71 of CEPA (Canada 2015a). Finally, eight polymers which were previously assessed under Rapid Screening of Substances of Lower

[2] As described in subsection 1(1) of the New Substances Notification Regulations (Chemicals and Polymers) (Canada 2005), "polymer" means a substance that consists of:
(a) molecules characterized by the sequence of one or more types of monomer units;
(b) greater than 50% by weight of molecules having three or more monomer units that are covalently bound to one or more other monomer units or reactants;
(c) less than 50% by weight of molecules of the same molecular weight; and
(d) molecules distributed over a range of molecular weights whose differences in molecular weights are primarily attributable to differences in the number of monomer units.

Concern (Environment Canada, Health Canada 2013), and concluded as not meeting any of the criteria under section 64 of CEPA, are also included in this assessment. These eight polymers were flagged for further assessment based on a 2015 review of the Identification of Risk Assessment Priorities (Canada 2015b) process which considered information obtained via Phase Two of the DSL Inventory Update (Environment Canada, Health Canada 2014) which indicated a large increase in commercial activity of these polymers in Canada. Thirteen of the 336 polymers are from the Confidential Domestic Substances List (Canada 1994). Their identities have been masked according to section 88 of CEPA.

This document focuses on information critical to determining whether these polymers may present a risk to the environment or human health, by examining scientific information and incorporating weight of evidence and precaution.[3]

Nonylphenol and its Ethoxylates (NPE) have been assessed through the Priority Substances List Assessment in 2001 and were concluded toxic as defined under Section 64 of CEPA (Environment Canada, Health Canada 2001). NPE is a general class of substances that includes various isomers of nonylphenol and may contain varying degrees of ethoxylation. Based on the Chemical Abstracts Service Registry Numbers (CAS RN[4]) and names of the substances, two of the 336 substances being considered in this report (i.e., CAS RNs 160799-28-0 and 9051-57-4) were found to have met the definition of NPE. CAS RN 9051-57-4 is listed in a pollution prevention planning notice for Nonylphenol and its Ethoxylates Contained in Products (ECCC 2013) as a commonly used NPE salt in Canada. CAS RN 160799-28-0 is not listed in the notice above, but is highly similar to another substance, CAS RN 37251-69-7, which is a commonly used NPE in Canada. Based on the available information, evaluation of risks to human health and the environment for the two NPE substances are considered to have been addressed through the Priority Substances List Assessment of Nonylphenol and its Ethoxylates in 2001 (Environment Canada, Health Canada 2001). As such, these two substances which were identified as priorities for assessment through categorization will not be subject to further risk assessment work at this time given previous risk assessment/risk management activities.

This assessment was prepared by staff in the CEPA Risk Assessment Program at Environment and Climate Change Canada and Health Canada and incorporates input from other programs within these departments. The draft of this Screening Assessment

[3]A determination of whether one or more of the criteria of section 64 of CEPA are met is based upon an assessment of potential risks to the environment and/or to human health associated with exposures in the general environment. For humans, this includes, but is not limited to, exposures from ambient and indoor air, drinking water, foodstuffs, and products used by consumers. A conclusion under CEPA is not relevant to, nor does it preclude, an assessment against the hazard criteria specified in the Hazardous Products Regulations, which are part of the regulatory framework for the Workplace Hazardous Materials Information System for hazardous products intended for workplace use, handling and storage. Similarly, a conclusion based on the criteria contained in section 64 of CEPA does not preclude actions being taken under other sections of CEPA or other Acts.

[4] The Chemical Abstracts Service Registry Number (CAS RN) is the property of the American Chemical Society and any use or redistribution, except as required in supporting regulatory requirements and/or for reports to the Government of Canada when the information and the reports are required by law or administrative policy, is not permitted without the prior, written permission of the American Chemical Society.

(published March 2017) has undergone external review and was subject to a 60-day public comment period. While external comments were taken into consideration, the final content and outcome of the screening assessment remain the responsibility of Health Canada and Environment and Climate Change Canada.

2. Approach

2.1. Identification of polymers of low concern

International jurisdictions, including the United States (US), Australia and Canada, recognize that polymers that meet predetermined and established physical-chemical and toxicological criteria generally possess low ecological and human health hazard. As outlined in detail below, polymers that meet these sets of criteria are known internationally as Polymers of Low Concern (PLC) or in Canada as Reduced Regulatory Requirement (RRR) polymers under the New Substances Notification Regulations (Chemicals and Polymers) (NSNR C&P) (Canada 2005) and as stated in the Guidelines for the Notification and Testing of New Substances: Chemicals and Polymers (Environment Canada, Health Canada 2005). To study the applicability of PLC, the Organization for Economic Co-operation and Development (OECD) analyzed over 100 polymers that meet the criteria for PLC in various OECD member countries[5]. Based on the available information submitted by participating jurisdictions (i.e., Canada, Australia, US, and Korea), polymers that met the PLC criteria generally showed low human health and ecological concerns. As such, the use of the PLC criteria [such as those described in NSNR (C&P) (Canada 2005)] for screening of polymers is recognized as appropriate (OECD 2009).

The criteria for determining whether a polymer meets the PLC status are set out by each jurisdiction but they are generally equivalent. In Canada, the RRR criteria are set out in section 9 of the NSNR (C&P) (Canada 2005), where:

"**9**. A reduced regulatory requirement polymer is

(a) a polymer that is not one of the types listed in items 1 to 4 of Schedule 7 of the NSNR (C&P) and that has a number average molecular weight greater than 10 000 daltons, with less than 2% of its components having molecular weights of less than 500 daltons and less than 5% of its components having molecular weights of less than 1 000 daltons;
(b) a polymer that is not one of the types listed in Schedule 7 of the NSNR (C&P) and that has a number average molecular weight greater than 1 000 daltons and equal to or less than 10 000 daltons, with less than 10% of its components having molecular weights of less than 500 daltons and less than 25% of its components having molecular weights of less than 1 000 daltons; or

[5] The term "polymer of low concern" is used in other countries to describe polymers that share the same structural characteristics as polymers that meet Reduced Regulatory Requirements in Canada.

(c) a polymer that is a polyester manufactured solely from reactants listed in Schedule 8[6] of the NSNR (C&P), or an anhydrous form of those reactants, other than the reactants or their anhydrous forms that include both 1-butanol and fumaric or maleic acid."

For the purpose of this screening assessment, the PLC criteria will be utilized to first broadly screen the 334 polymers to determine whether they will be of low ecological and human health concern. Polymers with sufficient evidence to determine their PLC status will be concluded as not meeting criteria in section 64 of CEPA, and will be removed from further assessment. Polymers with insufficient or conflicting information that suggests the polymer may be synthesized in different forms not meeting the PLC criteria will be further evaluated.

2.2. Ecological considerations

The ecological component of the second phase of polymer rapid screening, as illustrated in Figure 1, consists of multiple steps that address different factors related to the potential for a polymer to cause ecological harm. The approach is intended to be pragmatic, protective of the environment, and fairly rapid, largely making use of available or easily obtainable data. Although similar to the previous polymer rapid screening assessment (ECCC, HC 2016) in terms of the ecological criteria used, this rapid screening approach made use of a more extensive data set encompassing empirical physical-chemical, structural, and ecotoxicological information. The data were obtained through responses by stakeholders to voluntary and mandatory data gathering surveys under CEPA, enabling the application of a more detailed and critical assessment.

[6] Substances that are manufactured solely with reactants listed in Schedule 8 are considered to have met the RRR criteria, irrespective of molecular weight.

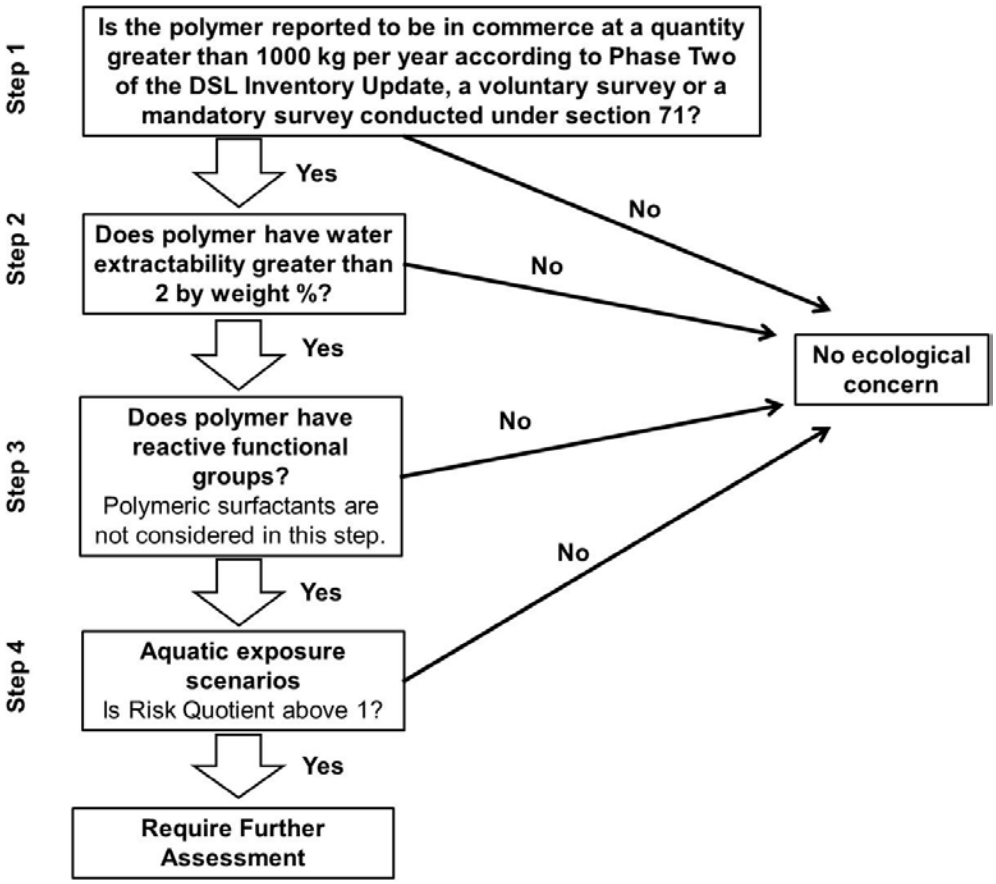

Figure 1: Overview of the second phase of the ecological polymer rapid screening.

Step 1: Identification of polymers with import and/or manufacturing volume greater than 1000 kg/year.

Polymers with import and/or manufacture volumes less than 1000 kg per year are not likely to be of ecological concern. This is consistent with the notifying trigger quantity of 1000 kg for polymers under section 7 of the NSNR (C&P) (Canada 2005), as well as experience gained in the earlier rapid screening of polymers which did not identify risk potential for any of the polymers (1000 kg per year maximum) based on results of steps 2, 3, or 4.

For the purpose of this screening assessment, the commercial activity reported through Phase Two of the DSL Inventory Update (Canada 2012), the import and manufacture volumes through a voluntary survey (ECCC 2015) and a mandatory survey conducted under section 71 of CEPA (Canada 2015a) are considered. For Step 1, if the polymer has reported quantities greater than 1000 kg per year for any of the surveys, the polymer will be considered further in Step 2. However, if the polymer is identified as not being in commerce at quantities greater than 1000 kg per year in any of the surveys, then the polymer will be identified as being of low ecological concern.

Step 2: Identification of polymers with water extractability greater than 2% by weight.

The second step involves determining whether the polymer will likely have water extractability greater than 2% by weight. A water extractability greater than 2% by weight indicates that the polymer may be more bioavailable to aquatic organisms. The increased potential for exposure to aquatic organisms may present higher ecological risk. This is consistent with the approach taken by the New Substances program, where polymers with less than or equal to 2% by weight water extractability are assumed to have low exposure potential towards aquatic organisms and notifiers are not required to conduct ecotoxicological testing.

Literature, online safety data sheet (SDS) databases, the internal New Substances database for polymers, data gathered through a voluntary survey and a section 71 survey under CEPA, and other reliable sources and databases (e.g., QSAR toolbox, ECHA chemical database) were searched for available water extractability and solubility information. For polymers where no information on water extractability could be found, professional judgement based on representative structures and chemical names was used to determine whether the polymer could potentially be extracted into water. For example, a polymer is considered to have water extractability greater than 2% by weight if it contains a functional group(s) that could potentially increase water extractability. Polymers that are formulated in water and polymers that form a stable emulsion in water are also considered to have water extractability greater than 2% by weight. Polymers with water extractability greater than 2% by weight will be considered further in Step 3, whereas polymers that are determined to have water extractability less or equal to 2% by weight will be identified as being of low ecological concern.

Step 3: Identification of polymers with reactive functional groups.

The third step in the ecological component involves identifying polymers with reactive functional groups (RFGs). RFGs are groups with chemical functionality that are considered to be reactive and may have damaging effects on the biological community. These groups are well described in Schedule 7 of the NSNR (C&P) (Canada 2005) and polymers containing RFGs may be of increased ecological concern, and require further screening. The RFGs include, among others, potentially cationic or cationic functionalities, alkoxy silanes, and phenols with unsubstituted ortho or para positions. Polymers containing any RFGs will continue to Step 4 in the approach, unless there is information available indicating that the polymer with the RFG is not of ecological concern. Furthermore, if there is ecological hazard information indicating that a polymer without RFGs may be of ecological concern, the polymer will continue to Step 4 in the approach.

To determine the presence of RFGs, structural information was gathered through voluntary and section 71 surveys of CEPA. For polymers where no representative structures were provided, structural representations were derived from information available for similar polymers: 1) obtained from the internal New Substances program database; 2) from the Chemical Abstract Services (CAS) name; or 3) based on professional knowledge on likely polymerization mechanisms. It is recognized that some

polymers may have more than one possible polymerization mechanism, leading to several possible structures. In addition, the complexity of a multicomponent polymeric reaction would increase uncertainty regarding the presence of RFGs in polymers. For these polymers, it is assumed for the purposes of rapid screening that RFGs are likely present and the polymer will require further screening.

In addition, polymeric surfactants (e.g., alcohol ethoxylates and alkyl ethoxylate sulfates) are not considered in this step and continue to Step 4 for further screening. This is due to the fact that surfactants generally do not contain RFGs. However, due to the surface active properties, surfactants may pose a significant hazard to aquatic species.

Step 4: Aquatic exposure scenarios.

The final step of the second phase of polymer rapid screening for ecological considerations involves applying environmental release scenarios to estimate environmental exposure. Two generic aquatic exposure scenarios were applied to identify potential concerns near the point of discharge of a polymer into the environment. These scenarios involve comparing conservative (i.e., ecologically protective) estimates of exposure in receiving waters [predicted environmental concentrations (PEC)] with an effects threshold [predicted no-effect concentration (PNEC)] in order to evaluate whether a polymer is likely to cause harm to the local aquatic environment. Figure 2 illustrates these exposure estimation approaches.

While the two aquatic exposure scenarios have been developed to be conservative overall, the level of conservatism generally applied to individual parameters (Table 1 and Table 4) is moderate, since it is recognized that:

- a high level of conservatism applied to each parameter can easily compound into an excessively conservative overall exposure scenario;
- it is very unlikely that each parameter would be “worst case” at the same time; and
- interdependency of some parameters exists.

Thus, values in keeping with an overall worst case scenario have been used.

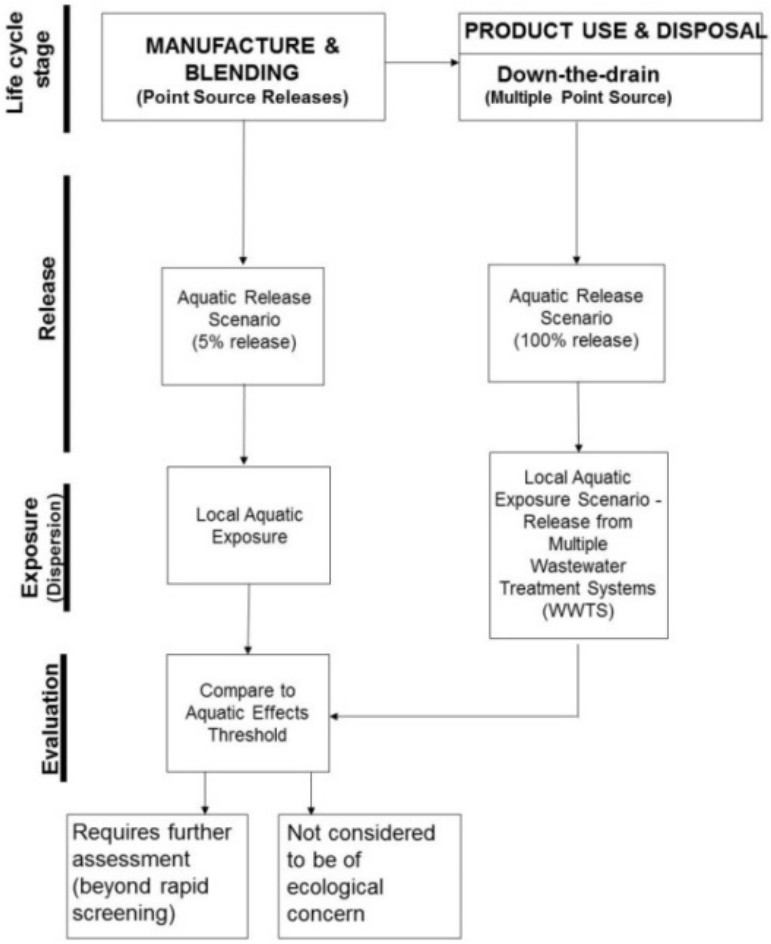

Figure 2: Overview of ecological exposure scenarios

The above approaches make use of quantity information from each reporting company gathered through Phase Two of the DSL Inventory Update (Canada. 2012), and import and/or manufacture volumes obtained through a voluntary survey (ECCC 2015) and a mandatory survey conducted under section 71 of CEPA (Canada 2015a). Some polymers have multiple reporters of use, import, and/or manufacturing quantities. For these polymers, a conservative approach is taken, where the greatest total import and manufacturing quantities or the total use quantity from all reporters provided in the voluntary (ECCC 2015) and mandatory survey under section 71 of CEPA (Canada 2015a) were used to calculate the PEC in the aquatic exposure scenarios for manufacturing and blending, and product use and disposal, respectively.

The aquatic PNEC for each of the scenarios is derived from the critical toxicity value (CTV), which is divided by an assessment factor (AF) as shown:

$$\text{Aquatic PNEC (mg/L)} = \text{CTV} / \text{AF}$$

CTVs were based on empirical or modelled data (where appropriate). Experimental ecotoxicity data were gathered through the voluntary survey and polymer survey under section 71 of CEPA, literature information, as well as read-across data from polymers

which have been assessed by the New Substances program. Polymers can have number average molecular weights that exceed the reliable range of available modelling software, thus modelling of ecotoxicity was not performed. However, ecotoxicity for certain cationic polymers could be estimated using the method described in the United States Environmental Protection Agency (US EPA) Interpretive Assistance Documents (US EPA 2013b). It should be noted that polymers with the same CAS RN but with different molecular weight or number of repeating units may have significantly different ecotoxicity profile. For example, ecotoxicity for alcohol ethoxylates surfactants may have an effective concentration (EC) greater than 100 mg/L for versions with a higher number of ethoxylates repeating units. However, polymers with the same CAS RN but with fewer numbers of ethoxylates repeating units may have an effective concentration that is less than 0.1 mg/L. Thus, the CTV for each polymer is selected on a case-by-case basis. The most conservative CTV value is selected when multiple ecotoxicity endpoints are available. The assessment factor for each polymer is also selected on a case-by-case basis, which enables the application of a more detailed and critical rapid screening type of assessment when compared to the first polymer rapid screening.

The two ecological exposure scenarios are explained in more detail below.

Industrial point-source aquatic release

The industrial point-source aquatic release scenario is based on release from an industrial facility that is manufacturing the polymer and/or using it in the preparation of products. This scenario assumes the release of 5% of the polymer from manufacturing and handling, based on conservative estimates for loss from cleaning of container residues (3%), transfer lines (1%) and process equipment (1%) (US EPA 2013a). A conservative estimate of exposure (PEC) resulting from the release of the polymer to the aquatic environment from an industrial point-source is calculated as shown below. Parameters used in this scenario are described in Table 1.

> Quantity released (kg/day) = [(Qty)(Release)(1 – Wastewater removal rate)]/duration
>
> Flow rate (m^3/s) = River flow + Wastewater flow
>
> PEC (mg/L) = [Quantity released / Flow rate](1000/86400)

The PEC is then compared to the PNEC to determine a risk quotient (PEC / PNEC). If the risk quotient is greater than one, this indicates that the conservatively estimated concentration in water exceeds the aquatic estimated no-effect level and that there exists a potential to cause harm in the aquatic ecosystem. A value below one indicates that concentrations that may cause an effect to sensitive aquatic organisms are not reached; and therefore, harm to aquatic organisms is unlikely under this scenario.

Whereas the wastewater treatment system (WWTS) removal rate was fixed at 50% for the Rapid Screening Assessment of Polymers Identified from Phase Two of the Domestic Substances List Inventory Update (ECCC, HC 2016), the removal efficiencies in this second phase of polymer rapid screening were refined according to the

properties of the polymer. Removal rate typically depends on the Number Average Molecular Weight (Mn) of the polymer as well as the charge on the polymer (US EPA 2013b). Table 2 and Table 3 summarize the removal rates for cationic, amphoteric, neutral, and anionic polymers with varying molecular weight ranges. Considering that removal rate can vary significantly between different polymer types as well as with varying Mn, the appropriate WWTS removal rate is selected on a polymer-by-polymer basis.

Table 1 – Parameters used in industrial point-source aquatic release scenario

Abbreviation	Parameter	Value	Units	Notes
Qty	Maximum quantity of polymer used at one facility	Quantity from survey	kg/year	Polymer-specific; quantity information gathered through Phase Two DSL Inventory Update, voluntary survey or mandatory survey conducted under section 71 of CEPA
Release	Release of polymer during manufacturing or handling	5	%	Based on conservative estimates of release from cleaning of container residues (3%), transfer lines (1%) and reactors (1%)
Wastewater Removal	Wastewater Treatment System (WWTS) removal efficiency	Polymer-specific		Polymer-specific; where variability in removal rates for different types of polymers and varying Mn is recognized
Duration	Duration over which polymer is released	150	days/year	Assumes variable or discontinuous use of substance over a year
Wastewater flow	WWTS flow rate	0.04	m^3/s	10^{th} percentile of WWTS flow rates in Canada
River flow	Flow of receiving watercourse	1.84	m^3/s	15^{th} percentile of the distribution of receiving watercourse flows in the country (based on the distribution of the 50^{th} percentile of flow rates); weighted by number of industries releasing to the receiving watercourse
-	Factor combining conversion from kg to mg and m^3 to L	1000		
-	Conversion factor from days to seconds	86400		
CTV	Critical toxicity value	Polymer-specific	mg/L	Polymer-specific; aquatic toxicity gathered through a voluntary survey, a mandatory survey conducted under section 71 of CEPA, literature information, or information from New Substances program
AF	Application factor	Polymer-specific		Polymer-specific

Table 2 – Wastewater removal rate for neutral, amphoteric, and cationic polymers (US EPA 2013b)

Molecular Weight (Da)	Removal Rate (%)
500 - 1000	50 – 90
> 1000	90

Table 3 – Wastewater removal rate for anionic polymers (US EPA 2013b)

Molecular Weight (Da)	Removal Rate (%)
< 5000	0 – 50
5000 - 20000	50
20000 - 50000	75
> 50000	90

Down-the-drain aquatic release from products used by consumers

The second scenario (residential releases to wastewater) considers the release of 100 % of the polymer that is contained in a product available to consumers, from multiple point-sources (i.e., wastewater system discharges). Under this scenario, a value for the PEC from down-the-drain release of a polymer contained in products is calculated as shown below. Parameters used in this scenario are described in Table 4.

Quantity released (kg/day) = [(Qty)(Release)(1 – Wastewater removal rate)(population)]/[(duration)(RPE)]

Flow rate (m^3/s) = River flow + Wastewater flow

PEC (mg/L) = [Quantity released / Flow rate](1000/86400)

As was the case for the industrial point-source aquatic release scenario, the PEC and the PNEC are combined to determine a risk quotient (PEC / PNEC).

Table 4 – Parameters used in the down-the-drain aquatic release from products used by consumers scenario

Abbreviation	Parameter	Value	Units	Notes
Qty	Total quantity of polymer in commerce in Canada	Quantity from survey	kg/year	Polymer-specific; quantity gathered through Phase Two DSL Inventory Update, voluntary survey or mandatory survey conducted under section 71 of CEPA
Release	Release of polymer from product during consumer use	100	%	Complete release for down-the-drain products assumed
Wastewater Removal	WWTS removal efficiency	Polymer specific		Polymer-specific; where variability in removal efficiency for different types of polymers and varying Mn is recognized
Duration	Duration over which polymer is released	150	days/year	Assuming variable or discontinuous use of substance over a year
RPE	Regional product effect	2,000,000	persons	Value set to represent population of a Canadian region in which total quantity of product could be used
Wastewater flow	WWTS flow rate	0.66	m^3/s	The combined ratio wastewater flow, river flow and population corresponds to the 10^{th} percentile of the distribution of dilution capacity of a water body receiving WWTS effluent (river flow + WWTS flow) weighted by population served.
River Flow	Flow of receiving watercourse	3.58	m^3/s	See Wastewater flow description above
Population	Population of representative community	100,000	persons	See Wastewater flow description above
-	Factor combining conversion from kg to mg and m^3 to L	1000		
-	Conversion factor from days to seconds	86400		
CTV	Critical Toxicity Value	Polymer-specific	mg/L	Polymer-specific; aquatic toxicity gathered through a voluntary survey, a mandatory survey conducted under section

Abbreviation	Parameter	Value	Units	Notes
				71 of CEPA, literature information, or information from New Substances program
AF	Application factor	Polymer-specific		Polymer-specific

Note that river flow distributions used in the two scenarios are different. The likelihood of harm from industrial releases is dependent on the number of industrial facilities releasing to a water body. In that scenario, a distribution of the dilution capacities of receiving waters (river flow) was generated with a weighting by the number of industrial facilities releasing to the water body. The likelihood of harm from down-the-drain release of products available to consumers is dependent on the human population that may be releasing a polymer to a WWTS. In this scenario, a distribution of the ratio of population of the community to the dilution capacity of the receiving water body was generated. As a result, the parameters “population”, “wastewater flow” and “river flow” are inter-connected. In this scenario, it is this ratio that is important, not the actual values of the population or flow rates.

There are two possible outcomes from Step 4:

- if the scenarios indicate a potential harmful effect to aquatic organisms, the polymer is identified as requiring further assessment; or
- if the scenarios indicate a low likelihood of harm to aquatic organisms, the polymer is anticipated to present low ecological concern.

Information on the decision taken at each step for the polymers in this document are presented in ECCC 2016.

2.3. Human health considerations

The human health component of the second phase of polymer rapid screening uses a risk matrix as illustrated in Table 5. The matrix is a visual representation of human health risk as a function of exposure and hazard potential which are represented in the matrix as bands. The matrix has three exposure bands that represent different exposure potentials which increase from band 1 to 3 and three hazard bands representing different hazard potentials which increase from band A to C.

The approach is intended to prioritize higher risk polymers for further assessment. The final location of a polymer in the matrix represents its potential human health risk. The process used to determine whether polymers warrant further assessment from a human health perspective involves an assessment of both exposure and hazard potential using the procedure which follows.

Table 5 – Human health risk matrix

Hazard				
C	1C	2C*	3C*	
B	1B	2B	3B	
A	1A	2A	3A	
	1	2	3	**Exposure**

* indicates further assessment is required

Step 1: Identification of exposure band

The first step involves identifying an exposure band for each polymer based on its human exposure potential determined by considering both direct and indirect exposure. Direct exposure is anticipated from use of a polymer in products made available to Canadian consumers (see Table 7 and the accompanying descriptions of the exposure bands for some examples of these types of products). To determine if a polymer is used in or is present in a product available to Canadians, numerous additional sources of information related to both domestic and international use and product information were consulted including but not limited to:

Domestic

- Information from Phase Two of the DSL Inventory Update (Canada 2012), a voluntary survey (ECCC 2015) and a mandatory survey conducted under section 71 of CEPA (Canada 2015a);
- Health Canada's Lists of Permitted Food Additives (Health Canada 2013);
- Health Canada's List of Acceptable Polymers for use in food packaging applications (Health Canada 2014)
- Health Canada's Natural Health Products Ingredients Database (NHPID 2016);
- Health Canada's Licensed Natural Health Products Database (LNHPD 2016);
- Health Canada's Drug Product Database (DPD 2014);
- Pest Management Regulatory Agency's Product Information Database (PMRA 2014);
- Pest Management Regulatory Agency's List of Formulants (PMRA 2010);
- List of Pharmaceuticals sold in Canada (2011 & 2012) (IMS 2013);
- Notifications submitted under the Cosmetic Regulations to Health Canada;
- Notifications submitted under the Food and Drugs Act to Health Canada; and
- Notifications submitted under the NSNR to Health Canada/Environment Canada

International

- US EPA Chemical and Product Categories Database (CPCat 2014);
- Everything Added to Food in the United States Database (EAFUS 2013);
- US Food and Drug Administration's Food Additive Status List (US FDA 2013);
- US Food and Drug Administration's List of Indirect Additives used in Food Contact Substances (US FDA 2011);
- European Commission's Food Additive Database (EC 2014a);

- European Commission's Food Flavourings Database (EC 2014b);
- European Commission's Cosmetic Ingredient Database (COSING 2014);
- Household Products Database (HPD 2014);
- Hazardous Substances Data Bank (HSDB c1993-2008);
- Danish Surveys on Chemicals in Consumer Products - various (Denmark 2014);
- Safety Data Sheets - various internet sources; and
- National and international assessments and databases.

As was done in the first Polymer Rapid Screening Assessment (ECCC, HC 2016), no direct exposure was assumed for polymers with the following uses:

a. used only as intermediates in the manufacturing process;
b. used only for industrial use;
c. used only for research purposes; or
d. used only as pesticide formulants.

For polymers used in products available to consumers, the magnitude of direct exposure (i.e., oral, dermal or inhalation) is generally assumed to be significantly greater than that associated with indirect exposure (i.e., exposure to the substance outside the intended use of the product, such as through drinking water). Therefore, indirect exposure of the general population to polymers via products available to consumers (e.g., drinking water exposure resulting from a down-the-drain aquatic release from products available to consumers) is not being considered for the purpose of this rapid screening approach. However, for polymers used solely in industrial applications, indirect exposure of the general population to the polymer is expected to be more significant than direct exposure because consumers are generally not expected to come into direct contact with the polymer. Since the relatively high molecular weight of polymers generally limits their volatility, for the purpose of this rapid screening approach, indirect exposure focuses on exposure of the general population from drinking water. Other indirect exposures (e.g., exposure through dust) would likely result from products available to consumers which will be addressed subsequently during the assessment of polymers identified as requiring further human health assessment (see Appendix A).

Drinking water exposures were estimated based on the quantity of polymers that could be released into the environment and their water extractability. This information was obtained from the aforementioned survey responses. The quantity of polymers that could be released was estimated based on the maximum manufacture, import and use quantity data reported by a single company. Professional judgement was used to determine water extractability when survey results were contradictory or lacking. As described in Section 2.2, professional judgement involved an assessment of the representative structure and chemical name of the polymer or water extractability data for similar polymers.

Water extractable polymers were assumed to most likely distribute and be available in the aquatic environment. On the contrary, polymers having a water extractability of less than 2% by weight were assumed less likely to distribute in the aquatic environment

based on their greater potential to be removed during wastewater treatment processes, for example, via filtration processes. Therefore, to estimate drinking water exposure, it was assumed that polymers having a water extractability of greater than 2% by weight would not undergo any removal during wastewater treatment while polymers having a water extractability of less than or equal to 2% by weight would undergo 90% removal.

Drinking water exposures were estimated using the industrial point-source aquatic release scenario equations (see step 4 of section 2.2), the parameters in Table 6 and the equation below.

Drinking water intake (mg/kg bw/day) = PEC x (0.253 ln(Age) + 0.548) / (18.099 x ln(Age) + 1.9808)

Table 6 – Parameters used in the industrial point-source aquatic release scenario for the calculation of indirect human exposure

Abbreviation	Parameter	Value	Units	Notes
Qty	Maximum quantity of polymer used at one facility	100 000 or 1 000 000	kg/year	Based on quantity information gathered through Phase Two DSL Inventory Update, a voluntary survey or a mandatory survey conducted under section 71 of CEPA
Release	Release of polymer during manufacturing or handling	5	%	Based on conservative estimates of release from cleaning of container residues (3%), transfer lines (1%) and reactors (1%)
Wastewater Removal	Wastewater Treatment System (WWTS) removal efficiency	0 or 90		Dependent on water extractability; 0% was assumed for polymers with water extractability >2% by weight and 90% for polymers with water extractability ≤2% by weight. As a worst-case, it is assumed that removal at drinking water treatment facilities is 0%.
Duration	Duration over which polymer is released	150	days/year	Assuming variable or discontinuous use of substance over a year
Wastewater flow	WWTS flow rate	0.04	m^3/s	10^{th} percentile of WWTS flow rates in Canada
River flow	Flow of receiving watercourse	1.84	m^3/s	15^{th} percentile of the distribution of receiving watercourse flows in the country (based on the distribution of the 50^{th} percentile of flow rates); weighted by number of industries releasing to the receiving watercourse
-	Factor combining conversion from kg to mg and m^3 to L	1000		
-	Conversion factor from days to seconds	86400		
Age	Average age of representative group	2.25 or 39.5	years	Toddlers and adults

Direct and indirect exposure is classified into the following three exposure bands which are outlined in Table 7 and described below.

Table 7 – Human health exposure band classification

Exposure band	Criteria
3	A polymer in products available to consumers that are intended to be consumed (e.g., foods, drugs, and natural health products) or intentionally applied directly to the body (e.g., cosmetics)
2	A polymer with consumer use in household products that are not intended to be applied directly to the body or consumed (e.g., cleaning products, house paint, and motor oil); or
	A polymer with industrial use and a reported single-company import, manufacture or use quantity > 1 000 000 kg with a water extractability ≤ 2% by weight % or > 100 000 kg with water extractability > 2% by weight
1	A polymer used in manufactured articles where it is reacted into or contained within the finished product (e.g., disposable cutlery); or
	A polymer with industrial use and a reported single-company import, manufacture or use quantity ≤ 1 000 000 kg with a water extractability ≤ 2% by weight or ≤ 100 000 kg with a water extractability > 2% by weight

The highest exposure band (3) is designated for polymers which are expected to have high direct exposure resulting from their use in products available to consumers that are intended for consumption or application to the body, such as cosmetics, drugs and natural health products. Exposure to these polymers may be frequent and sustained in nature and may occur via the dermal, oral and inhalation routes. As described previously, the direct exposure associated with these uses is expected to be greater than the indirect exposure resulting from these uses or industrial applications.

The middle exposure band (2) is designated for polymers which are anticipated to have moderate direct or indirect exposure. Moderate direct exposure may result from the use of polymers in household products that are not intended to be applied to the body or consumed, such as cleaning products, house paint and sealants. Direct exposure may occur during the application and use of these products even though it may or may not be intentional, for example, paint may get on the hands of a person painting a room of their house. Use of these products may be frequent or infrequent in nature but exposure is generally less sustained in nature than exposure to products which are intentionally applied to the body or consumed.

Indirect exposure may result from the industrial use of polymers in high quantities, particularly for polymers with water extractability greater than 2% by weight since they are more likely to become distributed in the aquatic environment following an environmental release. Drinking water exposures were estimated to be greater than 10^{-4} mg/kg bw/day for polymers being imported, manufactured or used by a single company at quantities of greater than 100 000 kg for polymers with water extractability of greater

than 2% by weight or at quantities greater than 1 000 000 kg for polymers with a water extractability of less than or equal to 2% by weight.

The lowest exposure band (1) is designated for polymers which are anticipated to have low direct or indirect exposure. This includes polymers which are used to form manufactured articles and which are often contained within or reacted into a cured or hardened polymer matrix during industrial manufacturing. In these types of applications, direct exposure is expected to be limited to migration of the polymer from articles during contact or handling and the polymer's decomposition or degradation products. Direct exposure is expected to be lower than in the middle and highest exposure bands as these polymers generally have high molecular weights that limit their uptake following contact; and thus, reduces their exposure potential.

Low indirect exposure is anticipated for polymers that are used in industrial applications at low quantities and/or for polymers which have water extractability of less than 2% by weight since they are less likely to become distributed in the aquatic environment following an environmental release. Drinking water exposures were estimated to be in the 10^{-4}-10^{-5} mg/kg bw/day range for polymers being imported, manufactured or used by a single company at quantities of 100 000 kg or less for polymers with water extractability of greater than 2% by weight or 1 000 000 kg or less for polymers with water extractability of less than or equal to 2% by weight. The New Substances program has assessed over 8000 polymers and indirect exposure assessments, via drinking water intakes in the range of 10^{-4}-10^{-5} mg/kg bw/day, have not resulted in any unacceptable risks to human health.

If there was an indication that a polymer is being used in multiple applications and could fall into more than one exposure band, the higher applicable band was selected. For example, if a polymer is used industrially in an adhesive to manufacture automobile parts (exposure band 1), in consumer floor adhesive products (exposure band 2) and in nail cosmetics (exposure band 3), exposure band 3 was selected.

Step 2: Identification of hazard band

The second step involves identifying a hazard band for each polymer based on its human hazard potential. This was determined by considering the presence of RFGs in the polymer and toxicological data. Identification of a hazard band was performed independently of the identification of an exposure band.

The criteria which established the hazard bands are defined in Table 8.

Table 8 – Human health hazard band classification

Hazard band	Criteria
C	Polymer contains RFGs of concern to human health;
	Polymer degradation may release substances that are known to be a concern to human health;
	Polymer contains metals which are known to be associated with human health concerns; and
	Toxicity data on the notified substance or a structurally-related substance shows concern for human health
B	Polymer contains structural features, such as ethylene glycol, amines or maleic acid anhydrides, which may be associated with human health risks;
	Polymer is suspected of degrading but degradants are not known to be a concern to human health;
	Polymer does not contain metals which are known to be associated with human health concerns; and
	Toxicity data on substance or structurally related substance indicates minimal or no concern for human health
A	Polymer does not contain RFGs or other structural features which may be a concern to human health;
	Polymer degradation is not expected to release substances that are known to be a concern to human health;
	Polymer does not contain metals which are known to be associated with human health concerns; and
	Toxicity data on substance or structurally related substance does not indicate a concern for human health

The two most important criteria in establishing the hazard band are (I) the presence of RFGs of concern to human health and (II) the availability of toxicological data. For the purpose of this assessment, RFGs are those listed in NSNR (C&P) under Schedule 7 item 5(b) and those not listed under Schedule 7 item 5(a) (Canada 2005). These include groups other than carboxylic acid groups, aliphatic hydroxyl groups, unconjugated olefinic groups that are considered “ordinary” (not specially activated either by being part of a larger functional group, such as a vinyl ether, or by other activating influences, for example, strongly electron-withdrawing sulfone group with which the olefinic groups interact) butenedioic acid groups, blocked isocyanates including ketoxime-blocked isocyanates, thiols, unconjugated nitrile groups, halogens excluding reactive halogen groups such as benzylic or allylic halides, and conjugated olefinic groups present in naturally-occurring fats, oils and carboxylic acids.

As described in Section 2.2, to determine the presence of RFGs of concern to human health, structural information was gathered through a voluntary survey (ECCC 2015) and a mandatory survey conducted under section 71 of CEPA (Canada 2015a). For polymers where no representative structures were available, structural representations were derived from information for similar polymers: 1) provided under the New Substances program; 2) available from the CAS name; or 3) based on professional

knowledge on likely polymerization mechanisms. It is recognized that some polymers may have more than one possible polymerization mechanism, leading to several possible structures. For these polymers, it is assumed that RFGs are present and the polymer will require further screening.

When available, a surrogate polymer is used in situations where assessments are conducted with little to no information on the polymer being reviewed. An appropriate surrogate is determined to be acceptable if the monomer composition, representative structure, molecular weight and oligomer size distribution, and physical/chemical properties, such as water extractability and log K_{ow}, are similar to the polymer being assessed.

When no or minimal toxicological data is available, the polymer is assigned to a hazard band based primarily on the presence of RFGs, the presence of toxic monomers, molecular weight and oligomer size distribution and professional judgement based on polymer data from the internal database of polymers from the New Substances program.

Toxicological data on the polymers was obtained through a voluntary survey (ECCC 2015) and a mandatory survey conducted under section 71 of CEPA (Canada 2015a), as well as the following sources:

- Toxnet (Toxnet 2013);
- ChemIndex (CHEMINDEX 2004);
- Safety Data Sheets - various internet sources; and
- National and international assessments and databases.

Toxicological data (found in the internal New Substances database as well as other internet databases and resources) was also identified for structurally-related polymers, which have similar monomer composition and applications.

The highest hazard band (C) is associated with polymers which are known or suspected to have a RFG of concern to human health. It is also assigned to polymers that are known to degrade and release degradants of concern to human health, such as metals or that are known to have high levels of a residual monomer associated with a human health concern, such as methylene diphenyl diisocyanate (CAS RN 101-68-8). The highest hazard band is also assigned to polymers for which toxicological data on the polymer or a structurally-related polymer shows or suggests that the polymer may pose a health risk. Results suggesting a moderate-to-high hazard classification for genotoxicity/carcinogenicity or developmental/reproductive toxicity endpoints are more likely to be assigned band C than data indicating a moderate-to-high hazard classification for acute toxicity endpoints. Professional judgement is applied based on the toxicity data available and the particular endpoint to determine whether it warrants band C or is placed in the middle band B. When available toxicological data for a polymer is only suggestive of toxicity, or if there is a lack of confidence in the data available, the polymer must also contain a structural feature of concern in order to be included in this band. Polymers that fall within this highest hazard band may require

further consideration to determine whether they pose a health risk under certain exposure conditions.

The middle hazard band (B) is associated with polymers which do not contain any RFGs or metals of concern to human health but may contain other structural features such as ethylene glycol, aliphatic and aromatic amines or maleic acid anhydrides which may be associated with human health effects such as sensitization, therefore, these polymers were considered as having a structural feature which may be associated with adverse human health effects but have insufficient information or evidence of toxicity to warrant the highest hazard band. It is also assigned to polymers that contain monomers of concern to human health that are not known to be released from the polymer or for which insufficient information is available to conclusively determine their degradation potential. In general, the middle hazard band is assigned to polymers for which some concerns (toxicity data or structural features) are identified but based on professional judgment and weight of evidence, are not anticipated to pose a human health risk when incorporated into polymers due to steric hindrance and reduced absorption; and therefore, do not require further consideration, regardless of exposure.

The lowest hazard band (A) is associated with polymers which do not contain a RFG or other structural feature or metals which are known to be associated with human health concerns. If these polymers are composed of monomers which are associated with human health concerns, and the monomers are fully reacted into the backbone of the polymer and no longer pose a health risk, then these polymers are also assigned to this band. The toxicological information available on the polymer or structurally-related polymer does not indicate a hazard concern for human health. These polymers are considered low hazard; and therefore, do not require further consideration, regardless of exposure.

Step 3: Identification of final location in risk matrix

The last step in the second phase of polymer rapid screening for human health consideration involves determining the final location (cell) of a polymer in the 3x3 risk matrix (Table 9). This is done by combining the exposure and hazard band determination for each polymer. For example, a polymer with an exposure band of 1 and hazard band of C is placed in cell 1C of the risk matrix.

Only those polymers that are placed in cells 2C or 3C, which are the two highest exposure bands and the highest hazard band of the risk matrix, are considered to require further assessment as they have the highest potential for human health risk after considering both exposure and hazard potential. Polymers that are located in these cells of the risk matrix are either used in products available to consumers that could lead to moderate-to-high direct exposure or are used industrially in quantities large enough to lead to indirect exposure, and have or are suspected of having a high hazard potential.

Polymers that are placed in all other cells of the risk matrix are considered unlikely to cause harm to human health at current levels of exposure. As a result, these polymers are not identified as requiring further human health assessment.

Table 9 – Polymer distribution in human health risk assessment matrix[a]

Hazard				
C	1C (46)	2C* (12)	3C*(10)	
B	1B (22)	2B (14)	3B (42)	
A	1A (68)	2A (34)	3A (83)	
	1	2	3	**Exposure**

[a] Values do not include the two NPE polymers or the three polymers which meet the criteria for classification as PLC.
* indicates further assessment is required

3. Screening assessment results

3.1. Identification of polymers of low concern (PLC)

Three hundred and thirty-four polymers were screened against the PLC criteria, as described in Section 2.1. Based on the available information, three polymers (CAS RNs 25038-59-9, 66070-62-0, and 67761-98-2) were identified as meeting RRR criterion 9(c) as described in Section 2.1. Polymers that meet this criterion are polyesters manufactured solely using reactants stipulated in Schedule 8 of NSNR (C&P) (Canada 2005). Polyesters that are produced solely from reactants listed on Schedule 8 of the NSNR (C&P) (Canada 2005) meet PLC criteria and are generally considered to have low hazard potential towards human health and the environment (OECD 2009). As such, these three polymers are identified as not likely to be a concern to the environment or human health. The reactants for all three polymers were found from searches in both National Chemical Index database (NCI 2015) and SciFinder database (SciFinder 2015). Table 10, Table 11 and Table 12 summarize the compositions for each of the three polymers.

Table 10 – Composition of 'Poly(oxy-1,2-ethanediyloxycarbonyl-1,4-phenylenecarbonyl)' (CAS RN 25038-59-9)

Reactant CAS RN	Reactant CAS name
100-21-0 [a]	1,4-Benzenedicarboxylic acid
107-21-1	1,2-Ethanediol

[a] The reactant '1,4-Benzenedicarboxylic acid' (CAS RN 100-21-0), used in the synthesis of the polymer 'Poly(oxy-1,2-ethanediyloxycarbonyl-1,4-phenylenecarbonyl)' (CAS RN 25038-59-9), may be substituted with '1,4-Benzenedicarboxylic acid, dimethyl ester' (CAS RN 120-61-6), which is also listed on Schedule 8 of NSNR (C&P).

Table 11 – Composition of 'Fatty acids, tall-oil, polymers with glycerol, pentaerythritol and phthalic anhydride' (CAS RN 66070-62-0)

Reactant CAS RN	Reactant CAS name
61790-12-3	Fatty acids, tall-oil
115-77-5	1,3-Propanediol, 2,2-bis(hydroxymethyl)-
85-44-9 [a]	1,3-Isobenzofurandione
56-81-5	1,2,3-Propanetriol

[a] '1,3-Isobenzofurandione' (CAS RN 85-44-9) is the anhydrous form of 'benzene-1,2-dicarboxylic acid' (CAS RN 88-99-3), which is listed on Schedule 8 of NSNR (C&P).

Table 12 – Composition of 'Fatty acids, tall-oil, polymers with ethylene glycol, pentaerythritol and phthalic anhydride' (CAS RN 67761-98-2)

Reactant CAS RN	Reactant CAS name
61790-12-3	Fatty acids, tall-oil
115-77-5	1,3-Propanediol, 2,2-bis(hydroxymethyl)-
107-21-1	1,2-Ethanediol
85-44-9 [a]	1,3-Isobenzofurandione

[a] '1,3-Isobenzofurandione' (CAS RN 85-44-9) is the anhydrous form of 'benzene-1,2-dicarboxylic acid' (CAS RN 88-99-3), which is listed on Schedule 8 of NSNR (C&P).

No other polymers were found to meet the PLC criteria. As such, the risk posed by the remaining polymers is evaluated in subsequent steps of the approach.

3.2. Assessment of potential to cause ecological harm

An overview of the results obtained at each step of the second phase of the ecological polymer rapid screening for the polymers covered under this approach is provided in this section. These results are summarized in Figure 3. Information on the decision taken at each step for the polymers in this document is presented in ECCC 2016.

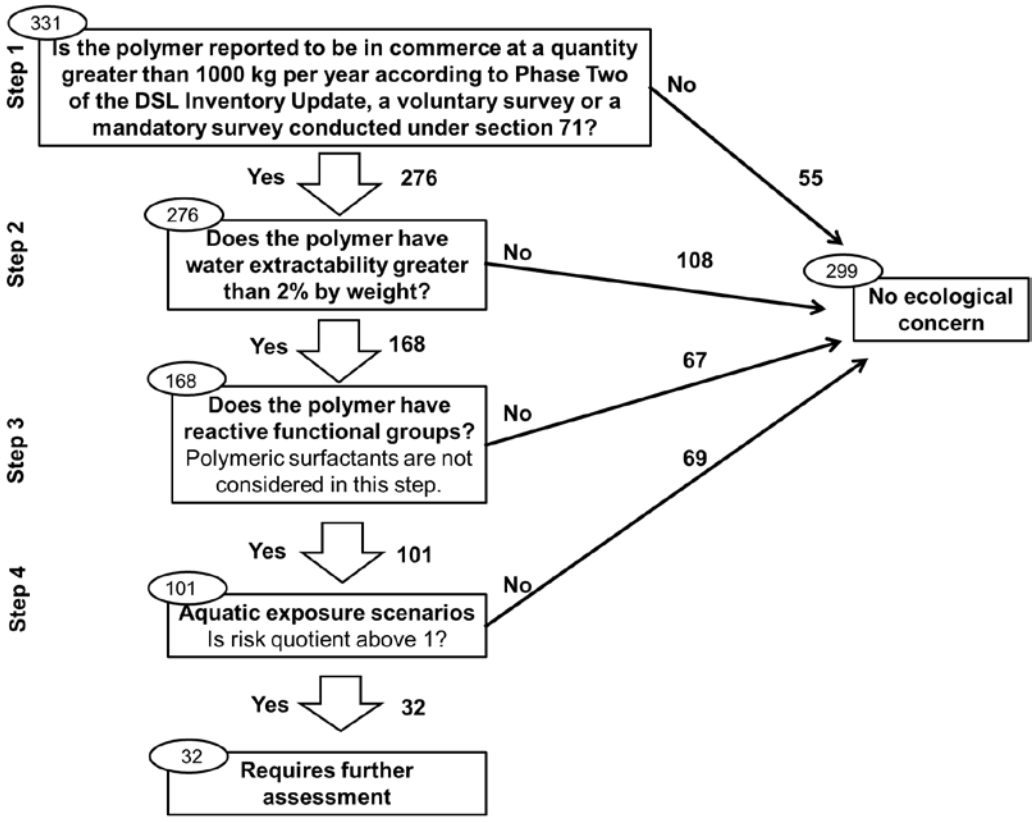

Figure 3: Summary of ecological results following application of ecological rapid screening approach.

*** Values in above figure only represent ecological results following removal of two NPE substances (section 1.1) and three polymers of low concern (sections 2.1 and 3.1). When human health decisions are taken into account the overall number of substances that are not expected to cause harm will be lower as some of the substances will require further assessment due to human health considerations.**

Step 1: Identification of polymers with import and/or manufacturing volume greater than 1000 kg/year.

Based on information collected from Phase Two of the DSL Inventory Update (Canada 2012), a voluntary survey (ECCC 2015) and a mandatory survey conducted under section 71 of CEPA (Canada 2015a), 276 polymers were identified as having reported quantities greater than 1000 kg per year in at least one of the three surveys. These polymers continue on to Step 2 of the approach. The remaining 55 polymers have been identified as having reported quantities below 1000 kg in all three surveys and are considered to be of low ecological concern.

Step 2: Identification of polymers with water extractability greater than 2% by weight.

Of the 276 polymers which proceeded to Step 2, 168 polymers were identified as having water extractability potential greater than 2% by weight. These polymers continue onto Step 3 of the approach. One hundred-eight polymers were identified as having water extractability less than 2% by weight and are considered to be of low ecological concern.

Step 3: Identification of polymers with reactive functional groups.

Based on comparison of reactive functional groups and polymerization potential, as well as information available from the New Substances program, 101 of the 168 polymers were considered to have the potential to contain one or more reactive functional groups, as described under Schedule 7 (items 1 and 5) of the NSNR (C&P) (Canada 2005) or were identified as polymeric surfactants and will continue to Step 4 of the approach. Sixty-seven polymers were identified to be of low ecological concern in this step.

Step 4: Aquatic exposure scenarios.

Aquatic exposure scenarios were generated based on quantities reported from Phase Two of the DSL Inventory Update (Canada 2012), a voluntary polymer survey (ECCC 2015) and a mandatory polymer survey conducted under section 71of CEPA (Canada 2015a). If quantities were only reported from Phase Two of the DSL Inventory Update, these volumes were used in the exposure scenarios. Furthermore, if there was no quantity reported in any of the surveys, but the polymer was identified as having been in commerce in Canada from Phase Two of the DSL Inventory Update, a maximum quantity of 1000 kg per year was used, which corresponds to the reporting threshold for polymers under this Inventory Update (Canada 2012).

Based on the industrial (manufacturing and blending) and product use and disposal release scenarios described above, as well as available ecotoxicity information for each polymer, 69 of the 101 polymers were not considered to be of ecological concern at current commercial volumes. The remaining 32 polymers were identified as polymers requiring further ecological assessment.

Summary of results from ecological assessment

In total, 32 of the polymers evaluated under the second phase of the ecological polymer rapid screening approach were identified as requiring further screening assessment from an ecological perspective. A list of the 32 polymers is provided in Appendix A. Furthermore, 299 polymers were identified as being of low ecological concern.

3.3. Assessment of potential to cause harm to human health

Of the 331 polymers examined using the second phase of polymer rapid screening for human health consideration, 309 polymers were identified as being unlikely to cause harm to human health at current levels of exposure and associated with low risk to human health.

The remaining 22 polymers were identified as having a moderate-to-high exposure potential and high hazard potential with a final risk matrix location of 2C or 3C; and thus, a potential for human health risk. Therefore, these polymers will be subject to further assessment. A list of these polymers is provided in Appendix A. Information on the final matrix location of the polymers addressed in this document is available in Health Canada (2016).

4. Summary of uncertainties

It is recognized that conclusions resulting from the second phase of polymer rapid screening have associated uncertainties, including commercial activity variations. However, the use of a wide range of information sources (relating to both exposure potential and hazard concerns identified for a polymer), as well as the use of conservative exposure scenarios increase confidence in the overall approach that the polymers identified as not requiring further assessment are unlikely to be of concern.

Uncertainties include the assumptions made to derive representative structures, potential presence and concentration of reactive functional groups, monomer composition, number average molecular weight (Mn), water extractability, and ecological and/or human health related toxicities when sufficient information were not provided. In some cases, there was uncertainty with respect to whether toxicity data listed in an SDS referred to a product, monomer or the polymer itself. In addition, it is also recognized that a given CAS RN can describe polymers that may have significantly different Mn and percent monomer composition; and hence, a different range of physical-chemical properties and hazard for each polymer. However, conservative assumptions were made for these polymers based on professional judgment.

5. Conclusions

Two polymers (CAS RNs 160799-28-0 and 9051-57-4) were found to meet broad classification of nonylphenol ethoxylates, and both polymers are considered to have been addressed through the Priority Substances List Assessment of Nonylphenol and its Ethoxylates in 2001. As such, these two substances will not be subject to further risk assessment work at this time under the CMP given previous risk assessment/risk management activities.

Fifty one substances were identified for further assessment. Twenty-nine polymers were identified as requiring further assessment solely due to ecological considerations and 19 polymers were identified as requiring further assessment solely due to human health considerations. The remaining three polymers were found to require further assessment due to both ecological and human health considerations.

Based on the information available, it is concluded that the 283 polymers listed in Appendix B do not meet any of the criteria under section 64 of CEPA, since they are not entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity, that constitute or may constitute a danger to the environment on which life depends, or that constitute or may constitute a danger in Canada to human life or health.

References

Canada. 1994. Canadian Environmental Protection Act, 1999: Masked Name Regulations, P.C. 1994-486, 24 March, 1994, SOR/1994-261. http://laws-lois.justice.gc.ca/eng/regulations/SOR-94-261/index.html.

Canada. 1999. Canadian Environmental Protection Act, 1999. S.C., 1999, c. 33. Canada Gazette Part III, vol. 22 no. 3. http://laws-lois.justice.gc.ca/eng/acts/c-15.31/.

Canada. 2005. Canadian Environmental Protection Act, 1999: New Substances Notification Regulations (Chemicals and Polymers), P.C. 2005-1484, 31 August, 2005, SOR/2005-247. http://laws-lois.justice.gc.ca/eng/regulations/SOR-2005-247/.

Canada. 2012. Dept. of the Environment. 2012. Canadian Environmental Protection Act, 1999: Notice with respect to certain substances on the Domestic Substances List. Canada Gazette, Part I, vol. 146, no. 48. Available from: http://www.gazette.gc.ca/rp-pr/p1/2012/2012-12-01/html/sup-eng.html

[Canada 2015a] Canada, Dept. of the Environment. 2015. Canadian Environmental Protection Act, 1999: Notice with respect to certain polymers on the Domestic Substances List. Canada Gazette, Part I, vol. 146, no. 30, Supplement. http://gazette.gc.ca/rp-pr/p1/2015/2015-07-25/html/notice-avis-eng.php#na2.

[Canada 2015b] Identification of Risk Assessment Priorities: Results of the 2015 Review.http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=9E41BB6B-1

CHEMINDEX [database on the internet]. 2004. Canadian Centre for Occupational Health and Safety. Available from: http://ccinfoweb.ccohs.ca/chemindex/search.html

COSING. 2014. European Cosmetic ingredient inventory [database on the internet]. European Commission Cosmetics Directive. Available from: http://ec.europa.eu/consumers/cosmetics/cosing/index.cfm?fuseaction=app.welcome

[CPCat] Chemical and Product Categories [database on the inventory]. 2014. U.S. Environmental Protection Agency. Available from: http://actor.epa.gov/cpcat/faces/home.xhtml

Denmark. 2014. Danish Surveys on Chemicals in Consumer Products. Danish Ministry of the Environment (Danish EPA). Copenhagen, Denmark. Available from: http://eng.mst.dk/chemicals/chemicals-in-products/consumers-consumer-products/danish-surveys-on-consumer-products/

[DPD] Drug Product Database [database on the Internet]. 2014. Ottawa (ON): Therapeutic Products Directorate, Health Canada. Available from: http://webprod.hc-sc.gc.ca/dpd-bdpp/index-eng.jsp

[ECCC 2013] Environment and Climate Change Canada. [2013 September]. Nonylphenol and its Ethoxylates Contained in Products - Instructions Specific to Notice. [Accessed 2016 May 18]. https://www.ec.gc.ca/planp2-p2plan/default.asp?lang=En&n=419EC26A-1

[ECCC 2015] Environment and Climate Change Canada. 2015. Polymer Voluntary Survey. Prepared by: Environment Canada, Health Canada; Existing Substances Program.

[ECCC 2016] Environment and Climate Change Canada. 2016. Gatineau (QC): ECCC. Information on the decision taken at each step for the second phase of polymer rapid screening . Available from: substances@ec.gc.ca.

[ECCC, HC 2016] Environment and Climate Change Canada, Health Canada. [Modified 2016 June 17]. Rapid Screening Assessment of Polymers Identified from Phase Two of the Domestic Substances List Inventory Update. Ottawa (ON): Government of Canada. [Accessed 2016 June 23]. http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=EF8A80B8-1.

[Environment Canada, Health Canada 2001] Environment Canada, Health Canada. [2001 April]. Priority Substances List Assessment Report - Nonylphenol and its Ethoxylates. Ottawa (ON): Government of Canada. [Accessed 2016 May 06]. http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/psl2-lsp2/nonylphenol/index-eng.php

[Environment Canada, Health Canada 2005] Environment Canada, Health Canada. 2005. Guidelines for the Notification and Testing of New Substances: Chemicals and Polymers. Ottawa (ON): Government of Canada. http://publications.gc.ca/pub?id=9.687775&sl=0

[Environment Canada, Health Canada 2013] Environment Canada, Health Canada. [Modified 2013 June 19]. Rapid Screening of Substances of Lower Concern. Ottawa (ON): Government of Canada. [Accessed 2016 Apr 11]. http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=2A7095CD-1.

[Environment Canada, Health Canada 2014] Environment Canada, Health Canada. 2014. Results from Phase Two of the Domestic Substances List Inventory Update. Environment Canada, Gatineau, QC, Canada. [Accessed 2016 June 15] https://www.canada.ca/en/health-canada/services/chemical-substances/inventory-updates.html

[EAFUS] Everything Added to Food in the United States [Internet]. 2013. U.S. Food and Drug Administration; Available from: http://www.accessdata.fda.gov/scripts/fcn/fcnNavigation.cfm?rpt=eafusListing

[EC] European Commission. 2014a. European Commission Food Additives Database [database on the internet]. European Commission Directorate General Health & Consumers. Brussels, Belgium. Taken from Annex II of Regulation (EC) No 1333/2008. Available from: https://webgate.ec.europa.eu/foods_system/main/?sector=FAD&auth=SANCAS

[EC] European Commission. 2014b. European Commission Food Flavourants database [database on the internet]. European Commission Directorate General Health & Consumers. Brussels, Belgium. Taken from Part I of Annex I of Regulation (EC) No

1334/2008. Available from: https://webgate.ec.europa.eu/foods_system/main/?sector=FFL&auth=SANCAS

Health Canada. 2013. Lists of Permitted Food Additives. Available from: http://www.hc-sc.gc.ca/fn-an/securit/addit/list/index-eng.php

Health Canada. 2016. Supporting documentation: Final Risk Matrix Location of Polymers. Ottawa (ON): Health Canada. Information in support of the Second Phase of Polymer Rapid Screening. Available from: substances@ec.gc.ca.

[HPD] Household Products Database [database on the internet]. 2014. U.S. Department of Health & Human Services; Available from: http://householdproducts.nlm.nih.gov/

[HSDB] Hazardous Substances Data Bank [database on the internet]. c1993-2008. United States National Library of Medicine, National Institutes of Health; Available from: http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

[IMS]. 2013. List of Pharmaceuticals Sold in Canada (by year) for 2011 and 2012. IMS AG Multinational Integrated Data Analysis (MIDAS) database. Cham, Switzerland

[LNHPD] Licensed Natural Health Products Database [database on the internet]. 2016. Health Canada, Government of Canada; Available from: http://www.hc-sc.gc.ca/dhp-mps/prodnatur/applications/licen-prod/lnhpd-bdpsnh-eng.php

[NCI] National Chemical Inventories™ [Database on a CD-ROM]. 2015. Issue 1. Columbus (OH): Chemical Abstract Services.

[NHPID] Natural Health Products Ingredients Database [database on the internet]. 2016. Health Canada, Government of Canada; Available from: http://webprod.hc-sc.gc.ca/nhpid-bdipsn/search-rechercheReq.do

[OECD] Organization for Economic Co-operation and Development. 2009. Data Analysis of the Identification of Correlations Between Polymer Characteristics and Potential for Health or Ecotoxicological Concern. Paris (France): OECD, Environment Directorate. Report No.: ENV/JM/MONO(2009)1. [Accessed 2016 Apr 11]. http://www.oecd.org/env/ehs/risk-assessment/42081261.pdf.

[PMRA]. Pest Management Regulatory Agency Product Information Search [database on the internet]. 2014. Health Canada, Government of Canada; Available from: http://pr-rp.hc-sc.gc.ca/pi-ip/index-eng.php

[PMRA]. Pest Management Regulatory Agency. 2010. List of Formulants. HC Pub #: 100460. Health Canada, Government of Canada; Available from: http://dsp-psd.pwgsc.gc.ca/collections/collection_2010/arla-pmra/H114-22-2010-eng.pdf

SciFinder [Database on the Internet]. 2015. Columbus (OH): Chemical Abstract Services. Accessed May 29th, 2015. Available from: https://www.cas.org/products/scifinder

Toxnet [database on the internet]. 2013. U.S. National Library of Medicine (NLM); Available from: https://toxnet.nlm.nih.gov/

[US EPA 2013a] US EPA. 2013. ChemSTEER User Guide: Chemical Screening Tool for Exposures and Environmental Releases. [Accessed 2016 May 19]. https://www.epa.gov/sites/production/files/2015-05/documents/user_guide.pdf

[US EPA 2013b] US EPA. 2013. Interpretive Assistance Document for Assessment of Polymers: Sustainable Futures Summary Assessment. [Accessed 2016 May 18]. https://www.epa.gov/sites/production/files/2015-05/documents/06-iad_polymers_june2013.pdf

US FDA. 2011. List of Indirect Additives Used in Food Contact Substances [database on the internet]. U.S. Food and Drug Administration. Available from: https://www.accessdata.fda.gov/scripts/fdcc/?set=IndirectAdditives

US FDA. 2013. Food Additive Status List. [Retrieved February 2014] US Food and Drug Adminstration. Available from: http://www.fda.gov/food/ingredientspackaginglabeling/foodadditivesingredients/ucm091048.htm

Appendix A: Polymers identified as requiring further assessment

CAS RN[a]	Substance name	Potential ecological concern	Potential human health concern
42751-79-1	1,2-Ethanediamine, polymer with (chloromethyl)oxirane and N-methylmethanamine	X	
68134-56-5	2-Oxepanone, polymer with (chloromethyl)oxirane, N-(1,3-dimethylbutylidene)-N'-[2-[(1,3-dimethylbutylidene)amino]ethyl]-1,2-ethanediamine, 2-(methylamino)ethanol, 4,4'-(1-methylethylidene)bis[phenol] and 2,2'-oxybis[ethanol], acetate (salt)	X	
26062-79-3	2-Propen-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, homopolymer	X	
26590-05-6	2-Propen-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, polymer with 2-propenamide	X	
68002-97-1	Alcohols, C10-16, ethoxylated	X	
66455-14-9	Alcohols, C12-13, ethoxylated	X	
68439-50-9	Alcohols, C12-14, ethoxylated	X	
68131-39-5	Alcohols, C12-15, ethoxylated	X	
68951-67-7	Alcohols, C14-15, ethoxylated	X	
68439-45-2	Alcohols, C6-12, ethoxylated	X	
68439-46-3	Alcohols, C9-11, ethoxylated	X	
68155-39-5[b]	Amines, C14-18 and C16-18-unsatd. alkyl, ethoxylated	X	
68439-72-5	Amines, C8-18 and C18-unsatd. alkyl, ethoxylated	X	
68603-75-8	Amines, N-tallow alkyltrimethylenedi-, propoxylated	X	
61791-24-0	Amines, soya alkyl, ethoxylated	X	
61791-26-2	Amines, tallow alkyl, ethoxylated	X	X
68130-99-4	Aziridine, homopolymer, ethoxylated	X	
71832-81-0	Benzenesulfonic acid, hydroxy-, monosodium salt, polymer with formaldehyde and 4,4'-sulfonylbis[phenol]		X
67700-42-9	Cashew, nutshell liq., polymer with formaldehyde and phenol		X
69418-26-4	Ethanaminium, N,N,N-trimethyl-2-[(1-oxo-2-propenyl)oxy]-, chloride, polymer with 2-propenamide	X	
25085-50-1	Formaldehyde, polymer with 4-(1,1-		X

CAS RN[a]	Substance name	Potential ecological concern	Potential human health concern
	dimethylethyl)phenol		
54579-44-1	Formaldehyde, polymer with 4-(1,1-dimethylethyl)phenol and 4,4'-(1-methylethylidene)bis[phenol]		X
26022-00-4	Formaldehyde, polymer with 4-(1,1-dimethylethyl)phenol, 4,4'-(1-methylethylidene)bis[phenol] and 4-methylphenol		X
55185-45-0	Formaldehyde, polymer with ammonia, 2-methylphenol and phenol		X
32610-77-8	Formaldehyde, polymer with N,N'-bis(2-aminoethyl)-1,2-ethanediamine and phenol		X
65497-29-2	Guar gum, 2-hydroxy-3-(trimethylammonio)propyl ether, chloride	X	
125826-44-0	Hexanedioic acid, polymer with 2,2-dimethyl-1,3-propanediol, 1,6-hexanediol, hydrazine, 3-hydroxy-2-(hydroxymethyl)-2-methylpropanoic acid and 1,1'-methylenebis[4-isocyanatocyclohexane], compd. with N,N-diethylethanamine		X
1415-93-6	Humic acids		X
25988-97-0	Methanamine, N-methyl-, polymer with (chloromethyl)oxirane	X	
52722-38-0	Methanamine, N-methyl-, polymer with ammonia and (chloromethyl)oxirane	X	
25085-99-8	Oxirane, 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bis-, homopolymer	X	X
30525-89-4	Paraformaldehyde		X
25068-38-6	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane	X	X
55818-57-0	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane, 2-propenoate		X
25036-25-3	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bis[oxirane]		X
9003-35-4	Phenol, polymer with formaldehyde		X

CAS RN[a]	Substance name	Potential ecological concern	Potential human health concern
28064-14-4	Phenol, polymer with formaldehyde, glycidyl ether		X
32289-58-0	Poly(iminocarbonimidoyliminocarbonimidoylimino-1,6-hexanediyl), hydrochloride		X
28724-32-5	Poly(oxy-1,2-ethanediyl), α,α'-[(methyloctadecyliminio)di-2,1-ethanediyl]bis[ω-hydroxy-, chloride	X	
9036-19-5	Poly(oxy-1,2-ethanediyl), α-[(1,1,3,3-tetramethylbutyl)phenyl]-ω-hydroxy-	X	
9002-93-1	Poly(oxy-1,2-ethanediyl), α-[4-(1,1,3,3-tetramethylbutyl)phenyl]-ω-hydroxy-	X	
9002-92-0	Poly(oxy-1,2-ethanediyl), α-dodecyl-ω-hydroxy-	X	
68585-34-2	Poly(oxy-1,2-ethanediyl), α-sulfo-ω-hydroxy-, C10-16-alkyl ethers, sodium salts	X	
9004-82-4	Poly(oxy-1,2-ethanediyl), α-sulfo-ω-(dodecyloxy)-, sodium salt	X	
67762-19-0	Poly(oxy-1,2-ethanediyl), α-sulfo-ω-hydroxy-, C10-16-alkyl ethers, ammonium salts	X	
25322-69-4	Poly[oxy(methyl-1,2-ethanediyl)], α-hydro-ω-hydroxy-		X
67762-15-6	Soybean oil, polymer with maleic anhydride, pentaerythritol and phthalic anhydride		X
56780-58-6	Starch, 2-hydroxy-3-(trimethylammonio)propyl ether, chloride	X	
65996-62-5	Starch, oxidized		X
1401-55-4	Tannins		X
27967-29-9	Urea, polymer with ammonia and formaldehyde	X	

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[b] These substances were previously assessed under Rapid Screening of Substances of Lower Concern (Environment Canada, Health Canada 2013) identified for further assessment based on a 2015 Identification of Risk Assessment Priorities process which considered information obtained via Phase Two of the DSL Inventory Update) which indicated a large increase in commercial activity of these polymers in Canada.

Appendix B: Polymers identified as not meeting the criteria under Section 64 of CEPA

CAS RN[a] or Confidential Accession Number[b]	Substance name
26658-42-4[c]	1,2-Ethanediamine, N-(2-aminoethyl)-N'-[2-[(2-aminoethyl)amino]ethyl]-, polymer with (chloromethyl)oxirane
9003-08-1	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde
68002-25-5	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, butylated
62412-64-0	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, hydrochloride
68002-20-0	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, methylated
9003-31-0	1,3-Butadiene, 2-methyl-, homopolymer
9010-85-9	1,3-Butadiene, 2-methyl-, polymer with 2-methyl-1-propene
9003-17-2	1,3-Butadiene, homopolymer
68441-65-6	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-, adduct with 1,3-butadiene homopolymer
28574-50-7	1,3-Isobenzofurandione, 4,5,6,7-tetrabromo-, polymer with 2,5-furandione and 1,2-propanediol
68584-77-0	1,3-Propanediamine, N-(3-aminopropyl)-, polymer with (chloromethyl)oxirane and α-hydro-ω-hydroxypoly(oxy-1,2-ethanediyl), reaction products with laurylamine
66037-36-3	1,3-Propanediamine, N,N-dimethyl-, polymer with (chloromethyl)oxirane, sulfate
86706-87-8	1,3-Propanediaminium, 2-hydroxy-N,N,N,N’,N’-pentamethyl-N’-[3-[(2-methyl-1-oxo-2-propenyl)amino]propyl]-, dichloride, homopolymer
82451-48-7	1,6-Hexanediamine, N,N’-bis(2,2,6,6-tetramethyl-4-piperidinyl)-, polymer with 2,4-dichloro-6-(4-morpholinyl)-1,3,5-triazine
68201-88-7	1,6-Hexanediamine, polymer with (chloromethyl)oxirane, methyloxirane and oxirane, hydrochloride
9003-28-5	1-Butene, homopolymer
25087-34-7	1-Butene, polymer with ethene
68037-01-4	1-Decene, homopolymer, hydrogenated
75150-29-7	1-Propanaminium, N,N,N-trimethyl-3-[(1-oxo-2-propenyl)amino]-, chloride, polymer with 2-propenamide
68039-13-4	1-Propanaminium, N,N,N-trimethyl-3-[(2-methyl-1-oxo-2-propenyl)amino]-, chloride, homopolymer
58627-30-8	1-Propanaminium, N,N,N-trimethyl-3-[(2-methyl-1-oxo-2-propenyl)amino]-, chloride, polymer with 2-propenamide
9003-27-4	1-Propene, 2-methyl-, homopolymer
9003-07-0	1-Propene, homopolymer
9010-79-1	1-Propene, polymer with ethene
9006-26-2	2,5-Furandione, polymer with ethene

CAS RN[a] or Confidential Accession Number[b]	Substance name
39382-25-7	2-Butenedioic acid (E)-, polymer with α,α'-[(1-methylethylidene)di-4,1-phenylene]bis[ω-hydroxypoly[oxy(methyl-1,2-ethanediyl)]]
9005-09-8	2-Butenedioic acid (Z)-, polymer with chloroethene and ethenyl acetate
36290-04-7	2-Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt
62286-43-5	2-Oxepanone, polymer with N-(1,3-dimethylbutylidene)-N'-[2-[(1,3-dimethylbutylidene)amino]ethyl]-1,2-ethanediamine, 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane and 2,2'-oxybis[ethanol]
82066-30-6	2-Propen-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, polymer with 2-propenamide and 2-propenoic acid, sodium salt
32555-39-8	2-Propen-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, polymer with ethanedial and 2-propenamide
9003-05-8	2-Propenamide, homopolymer
157856-36-5	2-Propenamide, homopolymer, hydrolyzed, sodium salts
70750-20-8	2-Propenamide, homopolymer, reaction products with chloromethane, dimethylamine and formaldehyde
68130-63-2	2-Propenamide, homopolymer, reaction products with dimethylamine and formaldehyde
41222-47-3	2-Propenamide, N-[(dimethylamino)methyl]-, polymer with 2-propenamide
85434-86-2	2-Propenamide, polymer with (chloromethyl)oxirane, methanamine and N,N,N',N'-tetramethyl-1,2-ethanediamine
67953-80-4	2-Propenamide, polymer with formaldehyde and N-methylmethanamine
9003-18-3	2-Propenenitrile, polymer with 1,3-butadiene
9003-56-9	2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene
68610-41-3	2-Propenenitrile, polymer with 1,3-butadiene, carboxy-terminated, polymers with bisphenol A and epichlorohydrin
68258-80-0	2-Propenoic acid, 2-methyl-, 2-(1-aziridinyl)ethyl ester, polymer with methyl 2-methyl-2-propenoate and 2-methylpropyl 2-methyl-2-propenoate
129698-94-8	2-Propenoic acid, 2-methyl-, 2-(diethylamino)ethyl ester, polymer with 2-methylpropyl 2-methyl-2-propenoate
65086-64-8	2-Propenoic acid, 2-methyl-, 2-(diethylamino)ethyl ester, polymer with ethenylbenzene and tridecyl 2-methyl-2-propenoate
67953-62-2	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymer with 2-ethylhexyl 2-propenoate, ethyl 2-propenoate and 2-propenamide
65622-94-8[c]	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymer with 2-hydroxyethyl 2-propenoate, methyl 2-methyl-2-propenoate, 2-methylpropyl 2-methyl-2-propenoate and 2-propenoic acid

CAS RN[a] or Confidential Accession Number[b]	Substance name
25568-39-2	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymer with 2-propenamide
36657-47-3	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymer with dodecyl 2-methyl-2-propenoate and methyl 2-methyl-2-propenoate
60162-07-4[c]	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, sulfate (2:1), polymer with 2-propenamide
40008-96-6	2-Propenoic acid, 2-methyl-, 2-[(1,1-dimethylethyl)amino]ethyl ester, polymer with 2-methylpropyl 2-methyl-2-propenoate
9011-15-8	2-Propenoic acid, 2-methyl-, 2-methylpropyl ester, homopolymer
31346-57-3	2-Propenoic acid, 2-methyl-, butyl ester, polymer with 2-(dimethylamino)ethyl 2-methyl-2-propenoate, dodecyl 2-methyl-2-propenoate and octadecyl 2-methyl-2-propenoate
25608-33-7	2-Propenoic acid, 2-methyl-, butyl ester, polymer with methyl 2-methyl-2-propenoate
77358-01-1	2-Propenoic acid, 2-methyl-, butyl ester, polymer with methyl 2-methyl-2-propenoate and N,N',2-tris(6-isocyanatohexyl)imidodicarbonic diamide
50867-55-5	2-Propenoic acid, 2-methyl-, butyl ester, polymer with N-[3-(dimethylamino)propyl]-2-methyl-2-propenamide, dodecyl 2-methyl-2-propenoate and octadecyl 2-methyl-2-propenoate
9011-14-7	2-Propenoic acid, 2-methyl-, methyl ester, homopolymer
25852-37-3	2-Propenoic acid, 2-methyl-, methyl ester, polymer with butyl 2-propenoate
26300-51-6	2-Propenoic acid, 2-methyl-, methyl ester, polymer with butyl 2-propenoate and 2-propenoic acid
9010-88-2	2-Propenoic acid, 2-methyl-, methyl ester, polymer with ethyl 2-propenoate
68957-91-5	2-Propenoic acid, 2-methyl-, polymer with (chloromethyl)oxirane, ethenylbenzene, ethyl 2-propenoate and 4,4'-(1-methylethylidene)bis[phenol], compd. with 2-(dimethylamino)ethanol
25035-69-2	2-Propenoic acid, 2-methyl-, polymer with butyl 2-propenoate and methyl 2-methyl-2-propenoate
25987-66-0	2-Propenoic acid, 2-methyl-, polymer with butyl 2-propenoate, ethenylbenzene and methyl 2-methyl-2-propenoate
25133-97-5	2-Propenoic acid, 2-methyl-, polymer with ethyl 2-propenoate and methyl 2-methyl-2-propenoate
67846-33-7	2-Propenoic acid, 2-methyl-, polymer with N,N'-bis(2-aminoethyl)-1,2-ethanediamine, (chloromethyl)oxirane, 4,4'-(1-methylethylidene)bis[phenol] and (Z)-N-9-octadecenyl-1,3-propanediamine
9003-49-0	2-Propenoic acid, butyl ester, homopolymer

CAS RN[a] or Confidential Accession Number[b]	Substance name
25067-01-0	2-Propenoic acid, butyl ester, polymer with ethenyl acetate
26376-86-3	2-Propenoic acid, ethyl ester, polymer with 2-ethylhexyl 2-propenoate
9010-86-0	2-Propenoic acid, ethyl ester, polymer with ethene
9003-01-4	2-Propenoic acid, homopolymer
9003-04-7	2-Propenoic acid, homopolymer, sodium salt
25987-30-8	2-Propenoic acid, polymer with 2-propenamide, sodium salt
9010-77-9	2-Propenoic acid, polymer with ethene
31132-30-6	2-Propenoic acid, polymer with N-[(dimethylamino)methyl]-2-propenamide and 2-propenamide
25085-02-3	2-Propenoic acid, sodium salt, polymer with 2-propenamide
9003-39-8	2-Pyrrolidinone, 1-ethenyl-, homopolymer
68240-01-7	4,7-Methano-1H-indene, 3a,4,7,7α-tetrahydro-, polymer with ethenylbenzene, ethenylmethylbenzene, 1H-indene and (1-methylethenyl)benzene
68541-13-9	9,12-Octadecadienoic acid (Z,Z)-, dimer, polymer with 3,3'-[oxybis(2,1-ethanediyloxy)]bis[1-propanamine]
9003-20-7	Acetic acid ethenyl ester, homopolymer
9003-22-9	Acetic acid ethenyl ester, polymer with chloroethene
24937-78-8	Acetic acid ethenyl ester, polymer with ethene
25213-24-5	Acetic acid ethenyl ester, polymer with ethenol
70892-21-6	Acetic acid ethenyl ester, polymer with ethenol, reaction products with 1-isocyanatohexadecane and 1-isocyanatooctadecane
68439-51-0	Alcohols, C12-14, ethoxylated propoxylated
68551-13-3	Alcohols, C12-15, ethoxylated propoxylated
74499-34-6	Alcohols, C12-15, propoxylated
68213-23-0	Alcohols, C12-18, ethoxylated
69227-21-0	Alcohols, C12-18, ethoxylated propoxylated
111905-53-4	Alcohols, C13-15-branched and linear, butoxylated ethoxylated
111905-54-5	Alcohols, C13-15-branched and linear, ethoxylated propoxylated
68154-98-3	Alcohols, C14-18, ethoxylated propoxylated
68002-96-0	Alcohols, C16-18, ethoxylated propoxylated
9005-35-0[d]	Alginic acid, calcium salt
9005-37-2[d]	Alginic acid, ester with 1,2-propanediol
68410-99-1	Alkenes, polymd., chlorinated
10026-0[b]	Alkenylsuccinic anhydride, product with polyethylenepolyamines and inorganic acid
61790-82-7	Amines, hydrogenated tallow alkyl, ethoxylated
121053-41-6	Amines, N-coco alkyltrimethylenedi-, polymers with acrylic acid, N-(butoxymethyl)-2-propenamide, 2-(dimethylamino)ethanol, Et acrylate and styrene
10015-7[b]	Derivative of amines, polyethylenepoly-compounds with

CAS RN[a] or Confidential Accession Number[b]	Substance name
	(polybutenyl) succinic anhydride
68439-80-5	Amines, polyethylenepoly-, reaction products with succinic anhydride polybutenyl derivs.
10001-2[b]	Borated reaction product of polybutenyl succinic anhydride with ethylene diamine-piperazine polymer
84605-20-9	Amines, polyethylenepoly-, reaction products with succinic anhydride polyisobutenyl derivs.
113894-91-0[d]	Amylopectin, acetate phosphate
9002-98-6	Aziridine, homopolymer
68130-97-2[c]	Aziridine, homopolymer, reaction products with 1,2-dichloroethane
9003-53-6	Benzene, ethenyl-, homopolymer
9003-55-8	Benzene, ethenyl-, polymer with 1,3-butadiene
9017-27-0	Benzene, ethenylmethyl-, polymer with (1-methylethenyl)benzene
25035-71-6	Benzenesulfonamide, 4-methyl-, polymer with formaldehyde
25067-00-9	Benzenesulfonamide, 4-methyl-, polymer with formaldehyde and 1,3,5-triazine-2,4,6-triamine
39277-28-6	Benzenesulfonamide, ar-methyl-, polymer with formaldehyde and 1,3,5-triazine-2,4,6-triamine
1338-51-8[d]	Benzenesulfonamide, ar-methyl-, reaction products with formaldehyde
25719-60-2	Bicyclo[3.1.1]heptane, 6,6-dimethyl-2-methylene-, homopolymer
25037-45-0	Carbonic acid, polymer with 4,4'-(1-methylethylidene)bis[phenol]
94334-64-2	Carbonic dichloride, polymer with 4,4'-(1-methylethylidene)bis[2,6-dibromophenol] and phenol
103598-77-2	Carbonic dichloride, polymer with 4,4'-(1-methylethylidene)bis[phenol], 4-(1,1-dimethylethyl)phenyl ester
9000-07-1[d]	Carrageenan
68413-29-6	Cashew, nutshell liq., polymer with diethylenetriamine and formaldehyde
68413-28-5	Cashew, nutshell liq., polymer with ethylenediamine and formaldehyde
9004-36-8	Cellulose, acetate butanoate
9004-39-1	Cellulose, acetate propanoate
9004-58-4	Cellulose, ethyl 2-hydroxyethyl ether
9004-57-3	Cellulose, ethyl ether
9004-70-0	Cellulose, nitrate
9007-34-5	Collagens
63393-89-5[d]	Coumarone-indene resins
9006-65-9	Dimethicone
52285-95-7	Ethanaminium, N,N,N-trimethyl-2-[(1-oxo-2-propenyl)oxy]-, methyl sulfate, polymer with 2-propenamide
26161-33-1	Ethanaminium, N,N,N-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, chloride, homopolymer

CAS RN[a] or Confidential Accession Number[b]	Substance name
35429-19-7	Ethanaminium, N,N,N-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, chloride, polymer with 2-propenamide
101060-97-3	Ethanaminium, N,N,N-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, chloride, polymer with 2-propenamide and N,N,N-trimethyl-2-[(1-oxo-2-propenyl)oxy]ethanaminium chloride
33434-24-1	Ethanaminium, N,N,N-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, chloride, polymer with ethyl 2-propenoate and methyl 2-methyl-2-propenoate
27103-90-8	Ethanaminium, N,N,N-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, methyl sulfate, homopolymer
26006-22-4	Ethanaminium, N,N,N-trimethyl-2-[(2-methyl-1-oxo-2-propenyl)oxy]-, methyl sulfate, polymer with 2-propenamide
29320-38-5	Ethane, 1,2-dichloro-, polymer with ammonia
68155-82-8	Ethane, 1,2-dichloro-, polymer with ammonia, monohydrochloride
68938-70-5	Ethanol, 2,2’,2’’-nitrilotris-, homopolymer, compd. with chloromethane
68609-18-7	Ethanol, 2,2’,2’’-nitrilotris-, homopolymer, reaction products with chloromethane
68003-04-3	Ethanol, 2-amino-, compd. with α-(2-cyanoethyl)-ω-(4-nonylsulfophenoxy)poly(oxy-1,2-ethanediyl) (1:1)
72845-42-2	Ethanol, 2-amino-, compd. with α-(2-cyanoethyl)-ω-(nonylsulfophenoxy)poly(oxy-1,2-ethanediyl) (1:1)
68441-17-8	Ethene, homopolymer, oxidized
68459-31-4	Fatty acids, C9-11-branched, glycidyl esters, polymers with castor oil, formaldehyde, 6-phenyl-1,3,5-triazine-2,4-diamine and phthalic anhydride
105839-18-7	Fatty acids, C16 and C18-unsatd., polymers with bisphenol A, Bu glycidyl ether, epichlorohydrin and triethylenetetramine
139682-51-2	Fatty acids, C18-unsatd., dimers, polymers with bisphenol A, diethylenetriamine, epichlorohydrin, tall-oil fatty acids and triethylenetetramine
68410-23-1	Fatty acids, C18-unsatd., dimers, reaction products with polyethylenepolyamines
96591-17-2	Fatty acids, linseed-oil, reaction products with 2-amino-2-(hydroxymethyl)-1,3-propanediol and formaldehyde, polymers with Bu methacrylate, 2-(diethylamino)ethyl methacrylate, 2-hydroxyethyl acrylate and Me methacrylate
61791-00-2	Fatty acids, tall-oil, ethoxylated
67784-86-5	Fatty acids, tall-oil, ethoxylated propoxylated
68951-85-9	Fatty acids, tall-oil, polymers with bisphenol A, diethylenetriamine, epichlorohydrin and tetraethylenepentamine
68038-22-2	Fatty acids, tall-oil, polymers with bisphenol A, epichlorohydrin and rosin

CAS RN[a] or Confidential Accession Number[b]	Substance name
67761-98-2	Fatty acids, tall-oil, polymers with ethylene glycol, pentaerythritol and phthalic anhydride
66070-62-0	Fatty acids, tall-oil, polymers with glycerol, pentaerythritol and phthalic anhydride
11487-3[b]	Fatty acids, tall-oil, reaction products with monomethyl maleate and a polyethylenepolyamine
68631-00-5	Formaldehyde, polymer with 1,2-ethanediamine and nonylphenol
65876-95-1	Formaldehyde, polymer with 1,3-benzenediol, [1,1'-biphenyl]-ar,ar'-diol and [1,1'-biphenyl]triol
26139-75-3	Formaldehyde, polymer with 1,3-dimethylbenzene
32759-84-5	Formaldehyde, polymer with 2,2'-oxybis[ethanol] and 1,3,5-triazine-2,4,6-triamine
25989-02-0	Formaldehyde, polymer with 2-furanmethanol
25153-36-0	Formaldehyde, polymer with 2-furanmethanol and phenol
26354-11-0	Formaldehyde, polymer with 2-methylphenol and phenol
25086-35-5[c]	Formaldehyde, polymer with 3,5-dimethylphenol
28470-78-2	Formaldehyde, polymer with 3-chloro-1-propene and phenol
27029-76-1	Formaldehyde, polymer with 3-methylphenol and 4-methylphenol
26678-93-3	Formaldehyde, polymer with 4-(1,1,3,3-tetramethylbutyl)phenol
28453-20-5	Formaldehyde, polymer with 4-(1,1-dimethylethyl)phenol and phenol
68037-42-3	Formaldehyde, polymer with 4-(1,1-dimethylethyl)phenol, magnesium oxide complex
25085-75-0	Formaldehyde, polymer with 4,4'-(1-methylethylidene)bis[phenol]
31605-35-3	Formaldehyde, polymer with 4-nonylphenol
26335-33-1	Formaldehyde, polymer with 4-octylphenol
26811-08-5	Formaldehyde, polymer with 5,5-dimethyl-2,4-imidazolidinedione
68002-26-6	Formaldehyde, polymer with 6-phenyl-1,3,5-triazine-2,4-diamine, butylated
68037-08-1	Formaldehyde, polymer with 6-phenyl-1,3,5-triazine-2,4-diamine, ethylated methylated
25054-06-2	Formaldehyde, polymer with cyclohexanone
64102-82-5	Formaldehyde, polymer with dimethylphenol, methylphenol and phenol
9039-25-2	Formaldehyde, polymer with methylphenol and phenol
67905-96-8[c]	Formaldehyde, polymer with N-(2-aminoethyl)-1,2-ethanediamine and 4-nonylphenol
68072-39-9	Formaldehyde, polymer with N,N'-bis(2-aminoethyl)-1,2-ethanediamine, (chloromethyl)oxirane and phenol
9040-65-7	Formaldehyde, polymer with nonylphenol
120712-84-7	Formaldehyde, polymer with phenol, potassium salt
36833-16-6	Formaldehyde, polymer with tetrahydroimidazo[4,5-d]imidazole-2,5(1H,3H)-dione

CAS RN[a] or Confidential Accession Number[b]	Substance name
11482-7[b]	Formaldehyde, reaction product with phenol, polybutene derivs., polyethylene polyamines with alkenoic acid
11483-8[b]	Formaldehyde, reaction product with phenol, polybutene derivs., polyethylene polyamines, alkenoic acid and metallo acid
68410-45-7[d]	Gelatins, hydrolyzates
55295-98-2	Guanidine, cyano-, polymer with ammonium chloride ((NH4)Cl) and formaldehyde
27083-27-8	Guanidine, N,N'''-1,6-hexanediylbis[N'-cyano-, polymer with 1,6-hexanediamine, hydrochloride
39421-75-5	Guar gum, 2-hydroxypropyl ether
9000-01-5[d]	Gum arabic
37203-80-8[d]	Lignin, sodium salt
8062-15-5	Lignosulfonic acid
8061-53-8	Lignosulfonic acid, ammonium salt
8061-52-7	Lignosulfonic acid, calcium salt
8061-51-6	Lignosulfonic acid, sodium salt
37207-89-9	Lignosulfonic acid, sodium salt, polymer with formaldehyde and phenol
11200-4[b]	Substituted acrylate of a dimethyl, alkyl, substituted carbomonocycle, ammonium chloride derivative
68512-03-8	Methanamine, N,N-dimethyl-, reaction products with (chloromethyl)ethenylbenzene-divinylbenzene polymer and sodium hydroxide
31568-35-1	Methanamine, polymer with (chloromethyl)oxirane
11496-3[b]	N,N' 2-Tris(6-isocyanatohexyl)imidodicarbonic diamide, α-fluoro-ω -(2-hydroxyethyl)poly(difluoromethylene), heteromonocycle-methanol and 1-octadecanol adduct
9084-06-4	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt
64755-04-0	Naphthenic acids, reaction products with polyethylenepolyamines
124578-12-7	Octadecanoic acid, 12-hydroxy-, homopolymer, reaction products with polyethylenimine
68585-07-9	Octadecanoic acid, 12-hydroxy-, polymer with butyl 2-methyl-2-propenoate, ethenylbenzene, 2-ethylhexyl 2-propenoate, 2-hydroxyethyl 2-propenoate, 2-methyl-2-propenoic acid and oxiranylmethyl 2-methyl-2-propenoate, 1-aziridineethanol-terminated
24969-06-0	Oxirane, (chloromethyl)-, homopolymer
80044-11-7	Oxirane, (chloromethyl)-, polymer with ammonia, hydrochloride
68036-99-7	Oxirane, (chloromethyl)-, polymer with ammonia, reaction products with chloromethane
9003-11-6	Oxirane, methyl-, polymer with oxirane
9082-00-2	Oxirane, methyl-, polymer with oxirane, ether with 1,2,3-propanetriol (3:1)

CAS RN[a] or Confidential Accession Number[b]	Substance name
9038-95-3	Oxirane, methyl-, polymer with oxirane, monobutyl ether
37280-82-3	Oxirane, methyl-, polymer with oxirane, phosphate
67924-34-9	Phenol, 4-(1,1-dimethylethyl)-, polymer with (chloromethyl)oxirane and 4,4'-(1-methylethylidene)bis[phenol]
60303-68-6	Phenol, 4-(1,1-dimethylethyl)-, polymer with sulfur chloride (S2Cl2)
68555-98-6	Phenol, 4-(1,1-dimethylpropyl)-, polymer with sulfur chloride (S2Cl2)
111850-23-8	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane, reaction products with 2,2,4(or 2,4,4)-trimethyl-1,6-hexanediamine
36484-54-5	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane and methyloxirane
68123-18-2	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane, methyloxirane and oxirane
72496-95-8	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane, N,N-dimethyl-1,3-propanediamine and tetradecyloxirane
68002-42-6	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane, reaction products with 2-methyl-1H-imidazole
68910-26-9	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with (chloromethyl)oxirane, reaction products with diethylenetriamine and 4-methyl-2-pentanone
191616-99-6	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with chloromethyl)oxirane, reaction products with 5-amino-1,3,3-trimethylcyclohexanemethanamine and 2,2,4(or 2,4,4)-trimethyl-1,6-hexanediamine
29694-85-7	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with methyloxirane
68318-41-2	Phenol, 4,4'-(1-methylethylidene)bis-, polymer with N-(2-aminoethyl)-1,2-ethanediamine, (butoxymethyl)oxirane and (chloromethyl)oxirane
40039-93-8	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo-, polymer with (chloromethyl)oxirane
26265-08-7	Phenol, 4,4'-(1-methylethylidene)bis[2,6-dibromo-, polymer with (chloromethyl)oxirane and 4,4'-(1-methylethylidene)bis[phenol]
68610-51-5[d]	Phenol, 4-methyl-, reaction products with dicyclopentadiene and isobutylene
25359-84-6	Phenol, polymer with 2,6,6-trimethylbicyclo[3.1.1]hept-2-ene
40798-65-0	Phenol, polymer with formaldehyde, sodium salt
26635-92-7	Poly(oxy-1,2-ethanediyl), α,α'-[(octadecylimino)di-2,1-ethanediyl]bis[ω-hydroxy-
99734-09-5	Poly(oxy-1,2-ethanediyl), α-[tris(1-phenylethyl)phenyl]-ω-hydroxy-
25322-68-3	Poly(oxy-1,2-ethanediyl), α-hydro-ω-hydroxy-

CAS RN[a] or Confidential Accession Number[b]	Substance name
24938-91-8	Poly(oxy-1,2-ethanediyl), α-tridecyl-ω-hydroxy-
68298-81-7	Poly(oxy-1,2-ethanediyl), α-[2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl]-ω-hydroxy-
68958-60-1	Poly(oxy-1,2-ethanediyl), α-[2-[ethyl[(pentadecafluoroheptyl)sulfonyl]amino]ethyl]-ω-methoxy-
56372-23-7	Poly(oxy-1,2-ethanediyl), α-[2-[ethyl[(tridecafluorohexyl)sulfonyl]amino]ethyl]-ω-hydroxy-
68298-80-6	Poly(oxy-1,2-ethanediyl), α-[2-[ethyl[(undecafluoropentyl)sulfonyl]amino]ethyl]-ω-hydroxy-
25038-59-9	Poly(oxy-1,2-ethanediyloxycarbonyl-1,4-phenylenecarbonyl)
32131-17-2	Poly[imino(1,6-dioxo-1,6-hexanediyl)imino-1,6-hexanediyl]
9016-00-6	Poly[oxy(dimethylsilylene)]
25791-96-2	Poly[oxy(methyl-1,2-ethanediyl)], α,α',a''-1,2,3-propanetriyltris[ω-hydroxy-
9049-71-2	Poly[oxy(methyl-1,2-ethanediyl)], α-hydro-ω-hydroxy-, ether with ß-D-fructofuranosyl α-D-glucopyranoside
10680-6[b]	Alkenylsuccinimide, sulfurized
68956-74-1	Polyphenyls, quater- and higher, partially hydrogenated
68333-79-9	Polyphosphoric acids, ammonium salts
68324-30-1	Propanoic acid, 2-hydroxy-, polymer with (chloromethyl)oxirane, 2-ethylhexyl [3-[[[2-(dimethylamino)ethoxy]carbonyl]amino]-4-methylphenyl]carbamate, 2-ethylhexyl (3-isocyanatomethylphenyl)carbamate and 4,4'-(1-methylethylidene)bis[phenol]
125826-37-1	Propanoic acid, 3-hydroxy-2-(hydroxymethyl)-2-methyl-, polymer with hydrazine, α-hydro-ω-hydroxypoly(oxy-1,4-butanediyl) and 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethylcyclohexane, compd. with N,N-diethylethanamine
68834-14-0	Pyridinium, 2-ethenyl-1-methyl-, methyl sulfate, polymer with ethenylbenzene
68071-95-4	Quaternary ammonium compounds, ethylbis(hydroxyethyl)tallow alkyl, ethoxylated, Et sulfates (salts)
26780-96-1	Quinoline, 1,2-dihydro-2,2,4-trimethyl-, homopolymer
68152-61-4	Rosin, maleated, polymer with bisphenol A, formaldehyde and pentaerythritol
68038-41-5	Rosin, maleated, polymer with glycerol
68333-69-7	Rosin, maleated, polymer with pentaerythritol
65997-07-1	Rosin, polymer with formaldehyde
68910-64-5	Rosin, polymer with o-cresol, formaldehyde and tetra-Bu titanate
68648-57-7	Rosin, polymer with phenol and tall-oil rosin
9006-03-5[d]	Rubber, chlorinated
28630-33-3	Silane, dichlorodimethyl-, polymer with dichlorodiphenylsilane, trichloromethylsilane and trichlorophenylsilane

CAS RN[a] or Confidential Accession Number[b]	Substance name
63148-62-9	Siloxanes and Silicones, di-Me
70914-12-4	Siloxanes and Silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol acetate
68938-54-5[d]	Siloxanes and Silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol mono-Me ether
68951-93-9	Siloxanes and Silicones, di-Me, di-Ph, hydroxy-terminated
70131-67-8	Siloxanes and Silicones, di-Me, hydroxy-terminated
68037-64-9	Siloxanes and Silicones, di-Me, Me hydrogen, reaction products with polyethylene-polypropylene glycol monoacetate allyl ether
67762-94-1	Siloxanes and Silicones, di-Me, Me vinyl
68083-18-1	Siloxanes and Silicones, di-Me, Me vinyl, vinyl group-terminated
67762-90-7[e]	Siloxanes and Silicones, di-Me, reaction products with silica
68083-19-2	Siloxanes and Silicones, di-Me, vinyl group-terminated
67762-97-4	Siloxanes and Silicones, ethoxy Me
8050-81-5[d]	Simethicone
58205-96-2	Sorbitan, isooctadecanoate, poly(oxy-1,2-ethanediyl) derivs.
68152-81-8[d]	Soybean oil, polymd., oxidized
9005-27-0[d]	Starch, 2-hydroxyethyl ether
68512-26-5[d]	Starch, 2-hydroxyethyl ether, base-hydrolyzed
9045-28-7[d]	Starch, acetate
9063-38-1[d]	Starch, carboxymethyl ether, sodium salt
55963-33-2[d]	Starch, hydrogen phosphate
53124-00-8	Starch, hydrogen phosphate, 2-hydroxypropyl ether
11167-7[b]	Alkyl ester of styrene-maleic acid polymer, product with substituted heteromonocycle
65071-95-6	Tall oil, ethoxylated
67785-03-9	Tall oil, polymer with formaldehyde and phenol
27968-41-8[c]	Urea, polymer with cyanoguanidine and formaldehyde
9011-05-6	Urea, polymer with formaldehyde
25036-13-9	Urea, polymer with formaldehyde and 1,3,5-triazine-2,4,6-triamine
68002-19-7	Urea, polymer with formaldehyde, butylated
11504-2[b]	α-Fluoro-ω -[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]poly(difluoro-methylene), polymer with 2-methyl-2-propenoic acid 1,1-dimethylethyl ester and 2-methyl-2-propenoic acid 2-(heteromonocycle)ethyl ester
11498-5[b]	α-Fluoro-ω -[2-[(2-methyl-1-oxo-2-propenyl)oxy]ethyl]poly(difluoromethylene), polymer with 2-methyl-2-propenoic acid octadecyl ester and 2-methyl-2-propenoic acid 2-(heteromonocycle)ethyl ester
11497-4[b]	α-Fluoro-ω-[2-[(1-oxo-2-propenyl)oxy]ethyl]poly(difluoromethylene), polymer with 2-methyl-2-propenoic acid phenylmethyl ester, (Z)-2-butenedioic acid bis(2-ethylhexyl) ester and 2-methyl-2-propenoic acid 2-

CAS RN[a] or Confidential Accession Number[b]	Substance name
	(heteromonocycle) ethyl ester

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[c] These substances were previously assessed under Rapid Screening of Substances of Lower Concern (Environment Canada, Health Canada 2013) but were identified for further assessment based on a 2015 Identification of Risk Assessment Priorities process which considered information obtained via Phase Two of the DSL Inventory Update) which indicated a large increase in commercial activity of these polymers in Canada.
[d] These substances were not identified under subsection 73(1) of CEPA but were included in this assessment as they were considered as priorities based on other human health concerns.
[e] This substance is considered a surface-treated silica substance that is expected to be derived from complex reactions that may not be considered relevant polymer forming reactions. Such substances often do not contain monomer units that comprise a sequence or cannot be readily characterized so as to establish that they meet the polymer definition under the NSNR. It has also been included in the Notice with respect to certain nanomaterials in Canadian commerce and may be subject to further assessment.