



Risk Management Scope
for
Long-chain Aliphatic Amines
(including DPDAB CAS RN 68479-04-9)

Environment and Climate Change Canada

Health Canada

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Summary of Proposed Risk Management

This document outlines the risk management options under consideration for long-chain aliphatic amines, including the nine long-chain aliphatic amines identified as priorities for assessment, which have been proposed to be harmful to the environment. These substances were assessed as part of the Aliphatic Amines Group. In addition, one long-chain aliphatic amine in this group, 1,3-propanediamine, N-[3-(tridecyloxy)propyl]-, branched, referred to as DPDAB (CAS RN 68479-04-9), which is captured in the group of long-chain aliphatic amines proposed to be harmful to the environment, has also been proposed to be harmful to human health.

The Government of Canada is considering regulatory and non-regulatory instrument(s) to address environmental concerns related to long-chain aliphatic amines.

To address human health concerns from DPDAB, the Government of Canada is considering regulatory or non-regulatory measures to help reduce consumer exposure to DPDAB from certain adhesive products intended for consumer use, specifically a two-component marine epoxy.

To inform risk management decision-making, information on the following topics should be provided (ideally on or before May 5, 2021) to the contact details identified in section 8 of this document:

- alternatives for long-chain aliphatic amines for any of the uses of concern;
- socio-economic impacts of replacing long-chain aliphatic amines for any of the uses of concern;
- use, manufacture, and import information for the long-chain aliphatic amines meeting the definition provided in section 2.1, including those listed in annexes A and B, or products containing these substances;
- industrial use information on the use of long-chain aliphatic amines as intermediates for the production of other substances, in the formulation of polyol blend for polyurethane foam production, in the formulation of asphalt emulsions, as well as in the production and processing of long-chain aliphatic amines;
- use information from the mining industry, specifically on the use of long-chain aliphatic amines as flotation or reverse flotation agents;
- information from the potash industry, specifically on the use and fate of long-chain aliphatic amines used as anti-caking agents;
- information on the quantities and concentrations of long-chain aliphatic amines present as unreacted residues in household, industrial and institutional cleaners and personal care products that are released down the drain;

- information on releases of long-chain aliphatic amines to the aquatic environment;
- analytical methods for measuring and monitoring aquatic concentrations of long-chain aliphatic amines;
- socio-economic and technical impacts and benefits associated with the proposed risk management for these substances;
- environmental and/or effluent monitoring results of dissolved long-chain aliphatic amines from site releases;
- best management practices and technologies in place to reduce the release of long-chain aliphatic amines to the aquatic environment from industrial facilities;
- ranges of concentrations and uses of any DPDAB-containing adhesive products available to consumers in Canada; and
- details on chemical alternatives and/or technologies to DPDAB and their feasibility, as applicable to Canadian importers.

The risk management options outlined in this Risk Management Scope document may evolve through consideration of assessments and risk management options or actions published for other Chemicals Management Plan (CMP) substances as required to ensure effective, coordinated, and consistent risk management decision-making.

Note: The above summary is an abridged list of options under consideration to manage these substances and to seek information on identified gaps. Refer to section 3 of this document for more complete details in this regard. It should be noted that the proposed risk management options may evolve through consideration of additional information obtained from the public comment period, literature and other sources.

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1. Context

The *Canadian Environmental Protection Act, 1999* (CEPA) (Government of Canada, 1999) provides the authority for the Minister of the Environment and the Minister of Health (the ministers) to conduct assessments to determine if substances are toxic to the environment and/or harmful to human health as set out in section 64 of CEPA^{1,2}, and if so to manage the associated risks.

As part of the third phase of the Chemicals Management Plan, the ministers plan to assess and manage, where appropriate, the potential health and ecological risks associated with approximately 1550 substances (Canada 2016).

The substances listed in Annexes A and B are referred to throughout this document as “long-chain aliphatic amines”. The list in Annex A includes the nine long-chain aliphatic amines that met categorization criteria under subsection 73(1) of CEPA or were considered a priority on the basis of other human health concerns (Canada 2021). Annex B provides a non-exhaustive list of substances that meet the definition of long-chain aliphatic amines provided in section 2.1. The draft screening assessment of aliphatic amines proposes all substances that meet the definition of long-chain aliphatic amines to be harmful to the environment. In addition, the long chain aliphatic amine, 1,3-propanediamine, N-[3-(tridecyloxy)propyl]-, branched, known as DPDAB, is also proposed to be harmful to human health.

2. Issue

Health Canada and Environment and Climate Change Canada conducted a joint scientific assessment of aliphatic amines in Canada. A notice summarizing the scientific considerations of the draft screening assessment for these substances was published in the *Canada Gazette*, Part I, on March 6, 2021 (Canada 2021).

¹ Section 64 of CEPA: *For the purposes of [Parts 5 and 6 of CEPA], except where the expression “inherently toxic” appears, 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.*

² A determination of whether one or more of the criteria of section 64 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 *Hazard Product Regulations*, which are a part of the regulatory framework for the Workplace Hazardous Materials Information System for products intended for workplace use. Similarly, a conclusion on the basis of the criteria contained in section 64 of CEPA does not preclude actions being taken under other sections of CEPA or other Acts.

For further information, refer to the [draft screening assessment for the Aliphatic Amines Group](#).

2.1 Draft Screening Assessment conclusion

On the basis of the information available, the draft screening assessment proposes that all long-chain aliphatic amines, including hexadecyldimethylamine, octadecylamine, cocoamine, BHTAA, HTAAA, TAAA, TAPDA, DPDAB and TMTADA, are toxic under section 64(a) of CEPA because they are entering or may enter the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity (Canada 2021). The long-chain aliphatic amines subject to this proposed conclusion are defined as:

- Monoamine subclass:
 - Monoamines that include one or two long-chain alkyls (C8-C22 linear or branched, saturated or unsaturated) attached to the nitrogen, with the remaining one or two substituents being any combination of hydrogen atoms or methyl groups;
 - Ethers of 1-propaneamine, N-methylpropanamine or N,N-dimethylpropanamine with one long-chain alkyl (C8-C22 linear or branched, saturated or unsaturated);
- Diamine subclass:
 - 1,3-propanediamines and N- and N'-methylated-1,3-propanediamines with one long-chain alkyl (C8-C22 linear or branched, saturated or unsaturated); and
 - Ethers of 1,3-propanediamine and N- and N'-methylated-1,3-propanediamines with one long-chain alkyl (C8-C22 linear or branched, saturated or unsaturated).

The description of the alkyl-chain length in the definition above refers to the number of carbon atoms in the long alkyl-chain(s) (after the last functional group in the case of diamines and ethers). This definition includes long-chain aliphatic amines alone or as part of a salt. Annex A provides a list of the nine long-chain aliphatic amines that met categorization criteria under subsection 73(1) of CEPA or were considered a priority on the basis of other human health concerns. Annex B provides a non-exhaustive list of substances that meet the definition of long-chain aliphatic amines.

On the basis of the information available, the draft screening assessment also proposes that the long-chain aliphatic amine DPDAB also meets the criteria under paragraph 64(c) of CEPA as it is entering or may enter the environment in a quantity or concentration or under conditions that constitute or may constitute a danger in Canada to human life or health (Canada 2021).

The draft screening assessment also proposes that long-chain aliphatic amines with C14 or greater alkyl-chains meet the bioaccumulation criteria as set out in the *Persistence and Bioaccumulation Regulations* of CEPA, but those with alkyl -

chains less than C14 do not, and that long-chain aliphatic amines do not meet the persistence criteria as set out in the *Persistence and Bioaccumulation Regulations* of CEPA (Canada 2000).

The ecological exposure sources of concern identified in the draft screening assessment are the potential release of long-chain aliphatic amines from the following activities:

- production and processing of long-chain aliphatic amines;
- use as intermediates in the chemical industry for the production of other substances;
- use in the formulation of polyol blend for polyurethane foam production;
- use as flotation agents in iron ore extraction;
- use in the formulation of asphalt emulsions;
- use as anti-caking agents in the formulation of fertilizers; and
- the presence of long-chain aliphatic amines as unreacted residues in household, industrial, and institutional cleaners and personal care products that are released down the drain.

The exposure source of concern to human health for DPDAB was identified in the draft screening assessment from dermal exposure to a limited number of products available to consumers (namely a two-component marine adhesive epoxy) (refer to section 5).

As such, this document will focus on these activities and exposure sources (refer to section 5).

2.2 Proposed recommendation under CEPA

On the basis of the findings of the draft screening assessment conducted as per section 68 or 74 of CEPA, the ministers propose to recommend that long chain-aliphatic amines, as defined in Section 2.1, be added to the List of Toxic Substances in Schedule 1 of the Act³.

The Ministers will take into consideration comments made by stakeholders during the 60-day public comment period on the draft screening assessment for the Aliphatic Amines Group (Canada 2021) and this Risk Management Scope document.

If the Ministers finalize the recommendation to add long-chain aliphatic amines, as defined above, to Schedule 1, risk management instrument(s) will be proposed within 24 months from the date on which the Ministers recommended that long-chain aliphatic amines be added to Schedule 1 of CEPA, and finalized within 18

³ When a substance is found to meet one or more of the criteria under section 64 of CEPA, the Ministers can propose to take no further action with respect to the substances, add the substance to the Priority Substances List for further assessment, or recommend the addition of the substance to the List of Toxic Substances in Schedule 1 of the Act.

months from the date on which the risk management instrument(s) are proposed, as outlined in sections 91 and 92 of CEPA (refer to section 8 for publication timelines applicable to this group of substances).

3. Proposed risk management

3.1 Proposed environmental and human health objectives

Proposed environmental and human health objectives are quantitative or qualitative goals to address environmental and human health concerns.

For this group, the proposed objectives address the exposure sources of concern outlined in section 5 of this document. The proposed environmental and human health objectives are, respectively, to:

- reduce the concentration of long-chain aliphatic amines in surface water to levels that are protective of aquatic organisms, specifically to below the predicted no effect concentration of 0.22 µg/L; and
- reduce exposure to DPDAB from products available to consumers to levels that are protective of human health.

3.2 Proposed risk management objectives

Proposed risk management objectives set quantitative or qualitative targets for risk management instruments and/or tools. The proposed risk management objectives for long-chain aliphatic amines, including DPDAB, are to:

- minimize the releases of long-chain aliphatic amines to surface water, such that levels are protective to the environment and are technically and economically feasible; and
- reduce exposure of the general population to DPDAB in certain marine adhesive epoxy products available to consumers, to levels that are protective of human health.

If the proposed conclusions are confirmed in the final screening assessment, these objectives will be refined on the basis of stakeholder consultation and new information, the proposed risk management instruments, the outcome of the screening assessment, and socio-economic and technical considerations (refer to section 6). Environmental, human health, and risk management objectives will be revised where needed and presented in the Risk Management Approach document that will be published concurrently with the screening assessment for these substances.

3.3 Proposed risk management options under consideration

To achieve the proposed risk management objectives and to work towards achieving the proposed environmental objective, the proposed risk management options under consideration for long-chain aliphatic amines are regulatory and/or non-regulatory controls to minimize releases of long-chain aliphatic amines to water from certain industrial exposure sources of concern described in sections 5.1 to 5.6. The Government of Canada will work with industry to gather information on the presence of long-chain aliphatic amines in cleaning and personal care products that are released down the drain described in section 5.7, in order to determine whether there is a need for risk management.

To achieve the proposed risk management objective and to work towards achieving the human health objective, the proposed risk management options under consideration are regulatory and/or non-regulatory controls to reduce consumer exposure to DPDAB from certain marine adhesive epoxy products.

Note that these proposed risk management options are preliminary and subject to change. Following the publication of this document, additional information obtained from the public comment period and from other sources will also be considered in the instrument selection and development process. The risk management options may also evolve through consideration of assessments and risk management options or actions published for other CMP substances to ensure effective, coordinated, and consistent risk management decision-making.

3.4 Performance measurement and evaluation

Performance measurement evaluates the ongoing effectiveness and relevance of the actions taken to manage risks from toxic substances⁴. The aim is to determine whether human health and/or environmental objectives have been met and if there is a need to revisit the risk management approach for that substance, to ensure that risks are managed effectively over time. To achieve this, the Government of Canada will review, on a regular basis, the effectiveness of the risk management actions for long-chain aliphatic amines.

The Government of Canada plans to measure the effectiveness of the risk management actions by collecting and analyzing data to measure progress towards meeting the risk management objectives.

⁴ Performance measurement can be performed at two levels:

- Instrument-based performance measurement evaluates the effectiveness of an individual instrument in meeting the specific risk management objectives that were set out when the risk management tool was designed. The results of performance measurement will help determine if additional risk management or assessment is needed (*i.e.*, evaluate whether risk management objectives have been met); and
- Substance-based performance measurement considers performance of all final risk management instruments applied to a chemical substance and relevant data or indicators of exposure to the environment or human health (*i.e.*, evaluate whether human health and/or environmental objectives have been met).

In addition, the Government of Canada plans to collect and analyze data on the presence of long-chain aliphatic amines in surface water in order to establish a baseline environmental presence and again over time to measure progress towards meeting the environmental objective.

The results of performance measurement and evaluation will inform whether further risk management action is warranted and will be made available to Canadians along with recommendations for further action, if applicable.

3.5 Risk management information gaps

Interested stakeholders can provide further information to inform risk management decision-making regarding long-chain aliphatic amines, including:

- alternatives for long-chain aliphatic amines for any of the uses of concern;
- socio-economic impacts of replacing long-chain aliphatic amines for any of the uses of concern;
- use, manufacture, and import information for the long-chain aliphatic amines meeting the definition provided in section 2.1, including those listed in annexes A and B, or products containing these substances;
- industrial use information on the use of long-chain aliphatic amines as intermediates for the production of other substances, in the formulation of polyol blend for polyurethane foam production, in the formulation of asphalt emulsions, as well as in the production and processing of long-chain aliphatic amines;
- use information from the mining industry, specifically on the use of long-chain aliphatic amines as flotation or reverse flotation agents;
- information from the potash industry, specifically on the use and fate of long-chain aliphatic amines used as anti-caking agents;
- information on the quantities and concentrations of long-chain aliphatic amines present as unreacted residues in household, industrial and institutional cleaners and personal care products that are released down the drain;
- information on releases of long-chain aliphatic amines to the aquatic environment;
- analytical methods for measuring and monitoring aquatic concentrations of long-chain aliphatic amines;
- socio-economic and technical impacts and benefits associated with the proposed risk management for these substances;
- environmental and/or effluent monitoring results of dissolved long-chain aliphatic amines from site releases;
- best management practices and technologies in place to reduce the release of long-chain aliphatic amines to the aquatic environment from industrial facilities;

- ranges of concentrations and uses of any DPDAB-containing adhesive products available to consumers in Canada; and
- details on chemical alternatives and/or technologies to DPDAB and their feasibility, as applicable to Canadian importers.

Stakeholders that have information to help address these gaps should provide it on or before May 5, 2021 to the address identified in section 8.

Data collection initiatives (such as section 71 surveys, voluntary surveys or informal data gathering) are planned to be undertaken to collect additional information on long-chain aliphatic amines to inform risk management decision making, which would include long-chain aliphatic amines on the *Domestic Substances List*, such as those provided in Annex A and Annex B.

4. Background

4.1 General information on long-chain aliphatic amines

Long-chain aliphatic amines are cationic surfactants with similar physical-chemical properties and ecotoxicity. As such, they may co-occur in and affect the environment collectively.

4.2 Current manufacturing, uses and identified sectors

4.2.1 Information gathering

Use information for long-chain aliphatic amines was obtained in part through a survey issued pursuant to section 71 of CEPA (Canada 2012a), which requested information on 2011 manufacturing/ importing volumes, NAICs codes, substance function codes and substance consumer and commercial codes. An additional data-gathering questionnaire was sent to importers and manufacturers in 2016 (ECCC 2016), and several follow-ups were made with specific companies and industry associations.

Major industrial uses of long-chain aliphatic amines include use as intermediates in the chemical industry for production of other substances, polyurethane foam production, flotation in mining, and formulation of asphalt emulsions and anti-caking agents.

4.2.2 Manufacturing

For the reporting year of 2011, four long-chain aliphatic amines in the Aliphatic Amines Group (cocoamine, BHTAA, HTAAA, and TAAA) were manufactured in Canada at quantities between 10 000 and 170 000 kg, and another (TAPDA) was

manufactured at quantities between 100 000 and 1 000 000 kg (Environment Canada 2013).

4.2.3 Processing intermediates

Long-chain aliphatic amines, in particular primary monoamines and diamines, serve as intermediates in the derivation of other chemical substances, such as aliphatic amine ethoxylates or amides (European Commission 2008) (Beratergremium für Umweltrelevante Alstoffe 1994). These chemical substances can be used in a wide range of additional industrial and commercial uses (e.g., antistatic agents for plastic formulations, auxiliary agents in textile industry, additives in laundry and dishwashing products).

4.2.4 Polyurethane production

Long-chain aliphatic amines are used as catalysts in the production of flexible polyurethane foam (ECCC 2016). They are used in the formulation of polyol blend (one of the components necessary in the production of polyurethane foam, which may contain from 1 to 5% of amine catalyst) and for the production of flexible polyurethane foam itself.

4.2.5 Mineral flotation

The salts of primary monoamines, ether diamine, and diamines are used in Canada as flotation agents for mineral extraction. Ether diamine products are designed for indirect flotation of iron ore. Primary monoamine and diamine products are used for direct flotation of zinc oxide, sylvite and pyrochlore/niobium ores. Aliphatic amines and their salts may be used as hydrophobic agents in flotation treatment during the extraction of different minerals (e.g. potash, iron, zinc). Ore flotation accounts for the largest use of primary aliphatic amines. According to information submitted in response to a CEPA section 71 survey, several aliphatic amine products are imported to Canada for mineral flotation (Canada 2012a).

4.2.6 Asphalt emulsions

One of the main uses of long-chain diamines is as a processing aid for asphalt and paving applications (Canada 2012a). Specifically, they act as emulsifiers for slow, medium, and rapid setting cationic asphalt emulsions that are used in cold-mix asphalt applications for road paving and repair as well as for tack and priming coats between layers of hot mixed asphalt. Cationic emulsifiers are used at a low concentration in asphalt emulsions and help increase the adherence of the asphalt to the aggregate.

4.2.7 Anti-caking agents

According to information submitted in response to a CEPA section 71 survey, long-chain aliphatic amines can be used as a component in anticaking agents that are applied to ammonium nitrile prills to prevent caking and clumping in fertilizers (Canada 2012a). Long-chain aliphatic amines, either alone or in oil or glycol dispersion, can also be added to potash crystals at potash mills to reduce potash caking during storage or transportation as well as to retain their free flowing properties (Strathdee 1982). When used in anti-caking agents, the concentration of amines in fertilizers ranges from 0.004% to 0.01% (Canada 2021).

4.2.8 Marine epoxies

One long-chain aliphatic amine, DPDAB, has been reported in the hardener portion of a two-component marine adhesive epoxy product available to consumers in Canada.

4.2.9 Cleaning and personal care products

According to information submitted in response to a CEPA section 71 survey, hexadecyldimethylamine (CAS RN 112-69-6) is reported as a residual in amine derivatives that are used for various commercial products and products available to consumers (Canada 2021). Products containing this substance that are released down the drain include household detergents, industrial and institutional cleaners, fabric softeners, shampoos, related cosmetics, and toilet soaps. The mass of unreacted long-chain aliphatic amines present in household detergents in Canada is estimated to be up to 92 000 kg/yr (Canada 2021).

4.2.10 Other uses

Long-chain aliphatic amines have many uses other than those linked to an exposure scenario of concern. They can be used as corrosion inhibitors, anti-scaling agents, processing aids, or as intermediates for applications such as fabric, textile, and leather or agricultural products. Aliphatic amines are in products such as furnishing care products, paints and coatings, building and construction materials, pest control products, automotive care products, and lubricants and greases (Environment Canada 2013).

5. Exposure sources and identified risks

Releases of long-chain aliphatic amines to the Canadian environment are expected to occur during the manufacturing, formulation and/or industrial use stages. Most releases to the environment are expected to occur primarily to

water through wastewater treatment systems (WWTS), with some releases to water directly from industrial sites. Releases of long-chain aliphatic amines to soil may occur via the application of biosolids from WWTS, or through the use of primary long-chain aliphatic amines in fertilizer formulations. The following subsections address the exposure sources of concern identified in the draft screening assessment.

5.1 Manufacturing

At manufacturing facilities for long-chain aliphatic amines, water is used during primary amine production to recover and reprocess the ammonia used during the process (ECCC 2019). While the aqueous waste from these processes passes through a central fat separator before discharging to a secondary WWTS, residual concentrations of long-chain aliphatic amines discharged to surface water remains a concern.

5.2 Processing intermediates

The chemicals derived from long-chain aliphatic amines contain unreacted residual long-chain aliphatic amines. For example, aliphatic amine ethoxylates may contain between about 0.2 and 2.2%, and diamines about 7.5% of unreacted primary monoamines (European Commission 2008). While the ethoxylation reaction does not produce wastewater, the unreacted aliphatic amines may enter wastewater due to reactor cleaning. It is expected that processing reactors are commonly cleaned only once a year for maintenance purposes.

5.3 Polyol blend formulation (used in polyurethane foam production)

Polyol blends can be made of 1 to 5% amine catalysts. The formulation of this blend may result in the release of long-chain aliphatic amines due to cleaning of the reactor. Aqueous waste from cleaning would be discharged to a wastewater treatment plant and subsequently to surface water.

5.4 Mineral flotation

The iron ore industry uses reverse cationic flotation as an efficient mechanism to remove impurities such as silica from lower grade iron ore. Assuming that the efficiency is less than 100%, unbound aliphatic amines will be present in the siliceous tailing effluent.

5.5 Formulation of asphalt emulsions

Asphalt emulsions are produced in a batch process by mixing hot asphalt and an aqueous solution of emulsifier, which can contain long-chain aliphatic amines, in a colloid mill. Wastewater is produced both through the production of the solution and the cleaning of the mill. The industrial site wastewater effluent likely discharges

to secondary or tertiary wastewater treatment systems before it is released to the environment.

5.6 Fertilizer formulation

There are different methods for adding an anticaking agent, but aliphatic amines are usually heated to approximately 70°C and evaporated or distilled onto the bulk material during mixing processes (Beratergremium für Umwelrelevante Alstoffe 1994). It is assumed that most releases will be due to cleaning after the formulation process, and that industrial site wastewater effluent is discharged to secondary or tertiary wastewater treatment systems.

5.7 Adhesive products

According to the draft screening assessment, general population exposure to DPDAB may occur through the use of a two-component marine adhesive epoxy product and environmental media. Since the hazard dataset for DPDAB was limited, a read-across approach was applied, whereby data from an analogue (1,3-propanediamine, N-[3-((C11-14, C13-rich)oxy) branched acetate) was used to inform the assessment. On the basis of the available information, the critical effects of DPDAB were identified as inflammatory effects in the small intestine, mesenteric lymph nodes, liver and lungs for both intermittent and chronic exposure scenarios.

With respect to per-event dermal exposure to DPDAB from the use of a two-component marine adhesive epoxy product (mixing and applying), a comparison of the critical effect level to the estimated exposure resulted in a margin of exposure that is considered potentially inadequate to address uncertainties in the health effects and exposure databases.

Chronic oral exposure to DPDAB from its presence in environmental media (drinking water) resulted in a margin of exposure that is considered adequate to address uncertainties in the health effects and exposure databases.

5.8 Other potential environmental risks: down the drain products

Long-chain aliphatic amines present as unreacted residues in products available to consumers that are released down the drain is a potential exposure scenario of concern. The concentration of long-chain aliphatic amines present as unreacted residues in products such as household detergents can be up to 2%. Consumer products that may contain long-chain aliphatic amines residuals and be released down the drain include household detergents, industrial and institutional cleaners, fabric softeners, shampoos, related cosmetics, and toilet soaps. Use of these products by consumers, as well as commercial and industrial uses, is expected to result in releases to wastewater treatment systems and subsequently to the environment. Further information gathering is needed to determine if there is a need for risk management.

6. Risk management considerations

6.1 Alternatives and alternate technologies

Due to the size of this group, the potential alternatives described in this section are for the uses of concern, and not individual substances. Of the sources listed in Section 5, potential alternatives exist for polyol formulation, flotation agents, asphalt emulsion formulation, and fertilizer formulation. It should be noted that potential alternatives have not been evaluated to determine whether they are safe and environmentally sustainable, and it is understood that not all alternatives may be appropriate or provide the equivalent result in quality or stability to a product.

In the formulation of polyol, long-chain aliphatic amines act as a catalyst. Other possible catalysts include Tyzor® TPT (tetra-isopropyl titanate) (Liszkowska 2015), titanium n-butoxide, and octoate salts (Molero 2005).

In iron ore mining long-chain aliphatic amines are used for reverse flotation of silica. Potential alternatives for this process include hydroxamates, and quaternary ammonium compounds (Ma 2012).

Potential alternatives for asphalt emulsion formulations include PEG-5 tallow propylenedimonium dichloride (Kao Chemicals 2016), quaternary ammonium compounds, and alkylbenzene sulphonates (Transportation Research Board 2016).

Information on potential alternatives for long-chain aliphatic amines used as anti-caking agents for fertilizers is limited. Kaolin clays, diatomaceous earth, talc and bentonite can be used as anti-caking agents for fertilizers (Hu et al. 2014).

For many of the uses of concern, quaternary ammonium compounds have the potential to be used as an alternative. Quaternary ammonium compounds are currently under assessment under the CMP. Another potential alternative, alkylbenzene sulphonates, are also currently under assessment under the CMP.

No information on alternatives to DPDAB for use in certain marine adhesive epoxy products was identified. If specific information on alternatives is known, stakeholders are asked to submit this information.

6.2 Socio-economic and technical considerations

Socio-economic factors will be considered in the selection process for an instrument respecting preventive or control actions, and in the development of the risk management objective(s) as per the guidance provided in the Treasury Board document [Assessing, Selecting, and Implementing Instruments for Government Action](#) (Treasury Board of Canada Secretariat 2007).

In addition, socio-economic factors will be considered in the development of regulations, instrument(s) or tool(s), to address risk management objective(s), as identified in the [Cabinet Directive on Regulation](#) (Treasury Board of Canada Secretariat 2018) and [Red Tape Reduction Action Plan](#) (Canada 2012b) and the [Red Tape Reduction Act](#) (Canada 2015).

7. Overview of existing risk management

7.1 Related Canadian risk management context

Four of the nine long-chain aliphatic amines identified as priorities for assessment are found on the Pest Management Regulatory Agency's (PMRA) List of Formulants (CAS RNs: 112-69-6, 61788-46-3, 61790-59-8, 61791-55-7). Additionally, eight substances in the non-exhaustive list in Annex B are on the PMRA List of Formulants (CAS RNs: 112-18-5, 112-75-3, 7173-62-8, 61790-33-8, 124-28-7, 1120-24-7, 7378-99-6, and 68439-70-3). This list records substances that are found in pest control products currently registered for use in Canada (Health Canada 2020).

No existing risk management for DPDAB in Canada was identified.

7.2 Pertinent international risk management context

No existing international risk management for DPDAB was identified.

7.2.1 The United States

In the United States, several of the long-chain aliphatic amines captured under the proposed conclusion are found in the *Toxic Substances Control Act* (TSCA) Inventory, which requires "reporting and record-keeping by persons who manufacture, import, process, and/or distribute chemical substances in commerce" (United States Environmental Protection Agency 2016a).

Fifteen long-chain aliphatic amines are on the list of Inert Ingredients in Pesticide Products, under the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA). This list aids to regulate all pesticide use or distribution in the United States (United States Environmental Protection Agency 2019a). All fifteen are approved for non-food use, and five are additionally approved for food use, with maximum allowed limits in pesticide formulations specified.

Seven long-chain aliphatic amines are listed in varying sections in the CFR, title 40: Protection of Environment, Part 180: Tolerances and Exemptions for Pesticide Chemical Residues in Food, which aims to regulate the use of active and inert ingredients in different types of pesticide products with respect to their applications (United States Environmental Protection Agency 2019b).

Many of the compounds were reported under the Chemical Data Reporting rule for the 2016 reporting period. The EPA uses this information to “support risk screening, assessment, priority setting and management activities, allowing for the construction of an in-depth picture of the types, amount, end uses, and possible exposure to chemicals in commerce” (United States Environmental Protection Agency 2016b). Furthermore, some of these compounds can be found within the Chemicals on Reporting Rules database as of 2001, which contains information on chemicals, categories, and mixtures regulated under specific sections of the TSCA, or section 313 of the *Emergency Planning and Community Right-To-Know Act*.

A few long-chain aliphatic amines of interest can be found within the Computer-Aided Management of Emergency Operations (CAMEO) chemical database. This database allows relevant stakeholders to retrieve critical response information for their chemicals, as well as determine expected hazards in the event that they are mixed together.

Three long-chain aliphatic amines are regulated by the Integrated Compliance Information System - Air, which manages air program compliance and enforcement, supporting program implementation under the *Clean Air Act* by facilitating periodic information exchange (United States Environmental Protection Agency 2016c).

7.2.2 The European Union

In the European Union, many of the long-chain aliphatic amines under the proposed conclusion are registered under the Registration, Evaluation, Authorisation, and Restriction of Chemicals (REACH) regulation (European Chemicals Agency 2017).

Twenty long-chain aliphatic amines are listed under Commission Decision (EU) 2006/257, which amended Commission Decision 96/335/EC “establishing an inventory and a common nomenclature of ingredients employed in cosmetic products” (European Commission 2006).

8. Next steps

8.1 Public comment period

Industry and other interested stakeholders are invited to submit comments on the content of this Risk Management Scope or other information that would help to inform decision-making (such as outlined in section 3.5). Please submit additional information and comments prior to May 5, 2021.

The Risk Management Approach document, which will outline and seek input on the proposed risk management instrument(s), will be published at the same time as the screening assessment. At that time, there will be further opportunity for consultation.

Comments and information submissions on the Risk Management Scope should be submitted to the address provided below:

Environment and Climate Change Canada
Gatineau, Quebec K1A 0H3
Telephone: 1-800-567-1999 (in Canada) or 819-938-3232
Fax: 819-938-5212
Email: eccc.substances.eccc@canada.ca

Companies who have a business interest in long-chain aliphatic amines are encouraged to identify themselves as stakeholders. The stakeholders will be informed of future decisions regarding long-chain aliphatic amines and may be contacted for further information.

8.2 Timing of actions

Electronic consultation on the draft screening assessment and Risk Management Scope: March 6, 2021 to May 5, 2021. This should include the submission of public comments, additional studies, and/or information on long-chain aliphatic amines.

Publication of responses to public comments on the draft screening assessment and Risk Management Scope: Concurrent to the publication of the screening assessment and, if required, the Risk Management Approach document.

Publication of responses to public comments on the Risk Management Approach, if applicable and if required, the proposed instrument(s): At the latest, 24-month from the date on which the Ministers recommended that long-chain aliphatic amines be added to Schedule 1 of CEPA

Consultation on the proposed instrument(s), if required: 60-day public comment period starting upon publication of each proposed instrument.

Publication of the final instrument(s), if required: At the latest, 18-months from the publication of each proposed instrument.

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Annex A. Long-chain aliphatic amines that met categorization criteria under subsection 73(1) of CEPA or were considered a priority on the basis of other human health concerns

Table A-1. Long-chain aliphatic amines that met categorization criteria under subsection 73(1) of CEPA or were considered a priority on the basis of other human health concerns.

CAS RN	DSL name	Common name
112-69-6 ^b	1-Hexadecanamine, N, N-dimethyl-	Hexadecyldimethylamine
124-30-1 ^b	1-Octadecanamine	Octadecylamine
61788-46-3 ^{b,c}	Amines, coco alkyl	Cocoamine
61789-79-5 ^{a,b,c}	Amines, bis(hydrogenated tallow alkyl)	Bis(hydrogenated tallow alkyl) amines (BHTAA)
61790-59-8 ^{b,c}	Amines, hydrogenated tallow alkyl, acetates	Hydrogenated tallow alkyl amines acetates (HTAAA)
61790-60-1 ^{b,c}	Amines, tallow alkyl, acetates	Tallow alkyl amines acetates (TAAA)
61791-55-7 ^{b,c}	Amines, N-tallow alkyltrimethylenedi-	N-tallow alkyltrimethylenediamines (TAPDA)
68479-04-9 ^{b,c,d}	1,3-Propanediamine, N-[3-(tridecyloxy)propyl]-, branched	1,3-Propanediamine, N-[3-(tridecyloxy)propyl]-, branched (DPDAB)
68783-25-5 ^{b,c}	Amines, N,N,N'-trimethyl-N'-tallow alkyltrimethylenedi-	N,N,N'-trimethyl-N'-tallow alkyltrimethylenediamines (TMTADA)

^a This substance was not identified under subsection 73(1) of CEPA but was included in this assessment as it was considered a priority on the basis of other human health concerns.

^b This substance is a long-chain aliphatic amine, with an alkyl-chain of equal to or greater than eight carbons

^c This CAS RN is a UVCB (unknown or variable composition, complex reaction products, or biological materials).

^d This the only substance that is proposed both eco-toxic and health toxic.

Annex B. Non-exhaustive list

Long-chain aliphatic amines on the *Domestic Substances List* (DSL) that meet the definition of long-chain aliphatic amines provided in section 2.1, but did not meet categorization criteria under subsection 73(1) of CEPA or were not considered a priority on the basis of other human health concerns.

Table B-1. Non-exhaustive list of long-chain aliphatic amines

CAS RN	DSL name
111-86-4	1-Octanamine
112-18-5	1-Dodecanamine, N,N-dimethyl-
112-75-4	1-Tetradecanamine, N,N-dimethyl-
112-90-3	9-Octadecen-1-amine, (Z)-
112-99-2	1-Octadecanamine, N-octadecyl-
124-22-1	1-Dodecanamine
124-28-7	1-Octadecanamine, N,N-dimethyl-
143-27-1	1-Hexadecanamine
929-73-7	1-Dodecanamine, hydrochloride
1120-24-7	1-Decanamine, N,N-dimethyl-
1613-17-8	1-Octadecanamine, N,N-dimethyl-, hydrochloride
1838-08-0	1-Octadecanamine, hydrochloride
1920-05-4	1-Dodecanamine, N,N-dimethyl-, acetate
2016-56-0	1-Dodecanamine, acetate
2016-57-1	1-Decanamine
2190-04-7	1-Octadecanamine, acetate
3007-31-6	1-Dodecanamine, N-dodecyl-
4455-26-9	1-Octanamine, N-methyl-N-octyl-
5538-95-4	1,3-Propanediamine, N-dodecyl-
7173-62-8	1,3-Propanediamine, N-9-octadecenyl-, (Z)-
7378-99-6	1-Octanamine, N,N-dimethyl-
7396-58-9	1-Decanamine, N-decyl-N-methyl-
10460-00-1	9-Octadecen-1-amine, (Z)-, acetate
13281-06-6	1,3-Propanediamine, N-(2-ethylhexyl)-
14676-61-0	1-Propanamine, 3-(tridecyloxy)-
19855-61-9	1-Octadecanamine, N,N-dimethyl-, acetate
22020-14-0	1-Decanamine, N-methyl-N-octyl-
22023-23-0	1,3-Propanediamine, N-[3-(tridecyloxy)propyl]-
24287-35-2	1-Tetradecanamine, N,N-dimethyl-, acetate
25324-14-5	1-Hexadecanamine, N,N-dimethyl-, acetate
28061-69-0	Octadecen-1-amine, N,N-dimethyl-
28701-67-9	1-Propanamine, 3-(isodecyloxy)-, acetate
29317-52-0	1-Propanamine, 3-(isononyloxy)-
30113-45-2	1-Propanamine, 3-(isodecyloxy)-
40165-68-2	9-Octadecen-1-amine, N-9-octadecenyl-, (Z,Z)-
50291-24-2	1-Dodecanamine, sulfate
61788-45-2	Amines, hydrogenated tallow alkyl
61788-62-3	Amines, dicoco alkylmethyl
61788-63-4	Amines, bis(hydrogenated tallow alkyl)methyl
61788-91-8	Amines, dimethyl soya alkyl

CAS RN	DSL name
61788-93-0	Amines, coco alkyl dimethyl
61788-95-2	Amines, (hydrogenated tallow alkyl) dimethyl
61789-76-2	Amines, dicoco alkyl
61790-18-9	Amines, soya alkyl
61790-33-8	Amines, tallow alkyl
61790-57-6	Amines, coco alkyl, acetates
65059-85-0	1-Heptadecanamine, N,N-dimethyl-, acetate
67700-98-5	Amines, C ₁₀₋₁₆ -alkyl dimethyl
67700-99-6	Amines, di-C ₁₄₋₁₈ -alkyl methyl
68037-91-2	Amines, C ₁₄₋₁₈ -alkyl
68037-92-3	Amines, C ₁₆₋₂₂ -alkyl
68037-95-6	Amines, C ₁₆₋₁₈ and C ₁₈ -unsatd. alkyl
68037-98-9	Amines, di-C ₁₄₋₁₈ -alkyl
68130-68-7	1,3-Propanediamine, N-[3-(C ₁₂₋₁₈ -alkyloxy)propyl] derivs.
68155-38-4	Amines, C ₁₄₋₁₈ and C ₁₆₋₁₈ -unsatd. alkyl
68439-70-3	Amines, C ₁₂₋₁₆ -alkyl dimethyl
68513-50-8	1-Tridecanamine, N-tridecyl-, branched
68603-64-5	Amines, N-(hydrogenated tallow alkyl) trimethylenedi-
68603-65-6	Amines, methyl ditallow alkyl
68610-26-4	1-Propanamine, 3-(C ₁₂₋₁₅ -alkyloxy) derivs.
68610-68-4	1-Propanamine, 3-(C ₈₋₁₀ -alkyloxy) derivs., acetates
68783-23-3	Amines, disoya alkyl
68783-24-4	Amines, ditallow alkyl
68784-38-3	1-Propanamine, 3-(C ₈₋₁₀ -alkyloxy) derivs.
68814-69-7	Amines, dimethyl tallow alkyl
68855-63-0	Amines, C ₁₆ and C ₁₈ -unsatd. alkyl
68909-95-5	1-Propanamine, 3-(tridecyloxy)-, branched and linear
68955-53-3	Amines, C ₁₂₋₁₄ -tert-alkyl
68955-54-4	Amines, C ₁₆₋₂₂ -tert-alkyl
71011-01-3	Amines, bis(hydrogenated tallow alkyl), acetates
71011-03-5	Amines, ditallow alkyl, acetates
75444-69-8	Amines, C ₁₆₋₂₂ -alkyl dimethyl
125328-36-1	Amines, C ₂₀₋₂₂ , acetates
125328-37-2	Amines, C ₂₀₋₂₂ -alkyl
125328-38-3	Amines, canola-oil alkyl
125328-39-4	Amines, N-canola-oil alkyl trimethylenedi-
125328-41-8	Amines, hydrogenated canola-oil alkyl
125328-42-9	Amines, (hydrogenated canola-oil alkyl) dimethyl
125328-43-0	Amines, hydrogenated rape-oil alkyl
125328-44-1	Amines, hydrogenated rape-oil alkyl, acetates
125328-45-2	Amines, hydrogenated tallow alkyl, distn., residues
125328-46-3	Amines, rape-oil alkyl
1078712-76-1	Amines, (2-ethylhexyl)(hydrogenated tallow alkyl) methyl