Government of Canada | Gouvernement du Canada

Risk Management Scope for

Certain Substances in the Fourteen Terpene and Terpenoid Substances Group

Chemical Abstracts Service Registry Numbers (CAS RNs):

8013-10-3, 8023-75-4, 84961-67-1, 90045-36-6, 8016-37-3, 164288-52-2, 8022-56-8, 8008-93-3, 3407-42-9, 66068-84-6, 68877-29-2 and 70955-71-4

Environment and Climate Change Canada

Health Canada

January 2025

Canada

Summary of proposed risk management

This document outlines the risk management options under consideration for cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, isobornyl cyclohexanol (IBCH), sandal cyclohexanol, bornyl cyclohexanol (BCH), and sandela, which have been proposed to be harmful to human health. For the purposes of paragraph 77(1)(*a*) of the *Canadian Environmental Protection Act, 1999* (CEPA), the Government of Canada proposes to recommend that cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela be added to Part 2 of Schedule 1 to CEPA. As a result, the Government of Canada is considering the following new risk management actions:

1. For **consumer products**, including essential oils or products sold directly to consumers in vials for use in do-it-yourself (DIY) applications and resin incense:

    - Regulatory or non-regulatory actions to help reduce dermal, inhalation, and/or oral exposures to cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from essential oils used in DIY applications, and to reduce inhalation exposure to myrrh oil in resin incense products to levels that are protective of human health.

2. For **food**:
    - Regulatory or non-regulatory actions to help reduce oral exposure of the general population to *Ginkgo biloba* extract from teas.

The Government of Canada is also considering other risk management actions as follows:

1. For **cosmetics**:
    - Listing cade oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, IBCH, sandal cyclohexanol, BCH, and sandela as prohibited or restricted ingredients on Health Canada’s

Cosmetic Ingredient Hotlist[1] to help reduce dermal, inhalation, and/or oral exposure to these substances from certain cosmetics.

2. For **natural health products (NHPs) and non-prescription drugs (NPDs)**:
   - Listing *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil as restricted ingredients in Health Canada's Natural Health Products Ingredients Database (NHPID)[2] to help reduce dermal, inhalation, and/or oral exposures to these substances from certain topical NHPs or NPDs. Actions may aim to lower the concentration of these substances when used as non-medicinal ingredients (NMIs) in certain NHPs and/or NPDs to levels that are protective of human health.

3. **A public communications approach** for DIY consumer product essential oils of concern for human health.

Information on the following items should be provided on or before March 26, 2025. to the contact identified in section 8 of this document, to inform risk management decision-making:

- Potential alternative substances to cade oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, IBCH, sandal cyclohexanol, BCH, and sandela for use in cosmetics;
- Potential alternative substances to *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil for use as NMIs in NHPs;
- Current quantities and concentrations of *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil for use as NMIs in NHPs;

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[1] The Cosmetic Ingredient Hotlist is an administrative tool that Health Canada uses to communicate to manufacturers and others that certain substances may contravene the general prohibition found in section 16 of the *Food and Drugs Act* or may contravene one or more provisions of the *Cosmetic Regulations*. Section 16 of the *Food and Drugs Act* states that "No person shall sell any cosmetic that has in or on it any substance that may cause injury to the health of the user." In addition, the Hotlist includes certain substances that may make it unlikely for a product to be classified as a cosmetic under the *Food and Drugs Act*. Compliance with the provisions of section 16 are monitored, in part, through the mandatory notification provisions of section 30 of the *Cosmetic Regulations* of the *Food and Drugs Act*, which requires that all manufacturers and importers provide a list of the cosmetic's ingredients to Health Canada.

[2] The NHPID provides an electronic tool which enables members of the public to access information on the following topics:

- medicinal and non-medicinal ingredients used in NHPs;
- standard terminology used by the Natural Health Products Online System, known as "Controlled Vocabulary", referring to quality test methods, dosage forms, non-medicinal ingredient purposes, and so on; and
- pre-cleared information such as single ingredient monographs and product monographs.

- Potential alternative substances to *Ginkgo biloba* extract and wormwood oil used as NMIs in certain NPDs;
- Current quantities and concentrations of *Ginkgo biloba* extract and wormwood oil used as NMIs in certain NPDs;
- Potential alternative substances to cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from essential oils used in consumer product DIY applications;
- Current quantities and concentrations of cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from essential oils used in consumer product DIY applications;
- Current quantities and concentrations of *Ginkgo biloba* extract from certain foods (teas) available to consumers; and
- Socio-economic and technical impacts and benefits associated with the proposed risk management for cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela.

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

Note: For the purpose of this document, the definition of “do-it-yourself” is the use of certain terpenes and terpenoids at a concentration as high as 100% (as essential oils) to create homemade products such as massage oils, body moisturizers, bath uses, etc., as well as their use in aromatic diffusers or facial steamers.

The above summary is an abridged list of options under consideration to manage these substances and to seek information on identified information gaps and uncertainties. Refer to section 3 and section 7 of this document for more complete details in this regard.

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1. Context

The *Canadian Environmental Protection Act, 1999* (CEPA) (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 harmful or dangerous to the environment or human health as set out in section 64 of CEPA[3,4], and if so to manage the associated risks.

The following substances (with associated Chemical Abstracts Service Registry Numbers [CAS RNs][5]) are included in the Fourteen Terpene and Terpenoid Substances Group of the Chemicals Management Plan (CMP) (Canada 2025): cade oil (8013-10-3), jonquil oil (8023-75-4), norlimbanol (70788-30-6), *Verbena officinalis* extract (84961-67-1), *Ginkgo biloba* extract (90045-36-6), amberlyn (3738-00-9), myrrh oil (8016-37-3), cork tree extract (164288-52-2), sage oil (8022-56-8), wormwood oil (8008-93-3), isobornyl cyclohexanol (IBCH) (3407-42-9), sandal cyclohexanol (66068-84-6), bornyl cyclohexanol (BCH) (68877-29-2), and sandela (70955-71-4). Note that, as norlimbanol and amberlyn were not proposed toxic under section 64 of CEPA, they are not included within the scope of this document.

2. Issue

2.1 Draft assessment conclusion

Health Canada and Environment and Climate Change Canada conducted a joint scientific assessment relevant to the evaluation of the substances that are part of

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[3] 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.*

[4] 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, or 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 products intended for workplace use. 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.

[5] CAS RN: The Chemical Abstracts Service information 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.

the Fourteen Terpene and Terpenoid Substances Group. A notice summarizing the scientific considerations of the draft assessment for these 14 substances was published in the *Canada Gazette*, Part I, on January 25, 2025 (Canada 2025). For further information, refer to the draft assessment for the Fourteen Terpene and Terpenoid Substances Group.

Based on the information available, the draft assessment proposes that 12 of these substances, namely cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela, are proposed to be toxic under section 64(*c*) of CEPA as they are 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 2025).

It is proposed that all 14 substances in the Fourteen Terpene and Terpenoid Substances Group 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, or that constitute or may constitute a danger to the environment on which life depends under paragraphs 64(*a*) or (*b*) of CEPA, respectively (Canada 2025).

The draft assessment also proposes that norlimbanol and amberlyn do not meet any of the criteria under section 64 of CEPA (Canada 2025).

The sources of concern identified in the draft assessment are based on potential exposures to cade oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, IBCH, sandal cyclohexanol, BCH, and sandela from the use of certain cosmetics; potential exposures to *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil used as non-medicinal ingredients (NMIs) in certain natural health products (NHPs); potential exposures to *Ginkgo biloba* extract and wormwood oil used as NMIs in certain non-prescription drugs (NPDs); potential exposures to cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from the use of certain consumer products, including essential oils sold for use in do-it-yourself (DIY) applications and in resin incense; and potential exposures to *Ginkgo biloba* extract from certain foods (teas). As such, this document will focus on these specific exposure sources of concern (refer to section 5).

Of note, the proposed risk management options described in this document and the proposed conclusion outlined in the draft assessment are preliminary and may be subject to change.

2.2 Proposed Recommendation Under CEPA

On the basis of the findings of the draft assessment conducted pursuant to CEPA, the Ministers propose to recommend that cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela be added to Part 2 of Schedule 1 to CEPA[6]. Addition of a substance to Schedule 1 to CEPA enables the Government to propose certain risk management measures under CEPA to manage potential ecological and human health risks associated with the substance.

Until regulations specifying criteria for the classification of substances that pose the highest risk or that are carcinogenic, mutagenic, or toxic to reproduction are available, cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela are proposed to be added to Part 2 of Schedule 1. Following the availability of the aforementioned criteria, the substances may be moved to Part 1 of Schedule 1, if applicable.

CEPA sets out a 2-track approach for managing risks.

Under sub-section 77(3), the Ministers are required to propose recommending the addition of a substance that poses the highest risk, as defined in paragraph (a), (b) or (c), to Part 1[7] of Schedule 1 of the Act and, in developing a proposed regulation or instrument respecting preventive or control actions, to give priority

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[6] After an assessment of a given substance under Part 5 of CEPA, other than section 83, the Ministers shall propose one of the following measures: take no further action with respect to the substance, add the substance to the List referred to in section 75.1 of the Act (unless the substance is already on that List), recommend the addition of the substance to Part 1 of the list of toxic substances in Schedule 1 to CEPA (for substances that pose the highest risk) or recommend the addition of the substance to Part 2 of the list of toxic substances in Schedule 1 to CEPA (for other CEPA-toxic substances).

[7] Under subsection 77(3), a substance must be recommended for addition to Part 1 of Schedule 1 to the Act when the substance is determined to be toxic and the Ministers are satisfied that:

(a) the substance may have a long-term harmful effect on the environment and
    (i) is inherently toxic to human beings or non-human organisms, as determined by laboratory or other studies,
    (ii) is persistent and bioaccumulative in accordance with the regulations,
    (iii) is present in the environment primarily as a result of human activity, and
    (iv) is not a naturally occurring radionuclide or a naturally occurring inorganic substance;
(b) the substance may constitute a danger in Canada to human life or health and is, in accordance with the regulations, carcinogenic, mutagenic or toxic for reproduction; or
(c) the substance is, in accordance with the regulations, a substance that poses the highest risk.

to the total, partial, or conditional prohibition of activities in relation to the substance or to the release of the substance into the environment.

For other substances recommended for addition to Part 2 of Schedule 1 to the Act, the Ministers shall give priority to pollution prevention, and this could include non-regulatory or regulatory measures such as prohibition if warranted. The Ministers will take into consideration comments made by stakeholders during the 60-day public comment period on the draft assessment and Risk Management Scope document. If the Ministers finalize the recommendation to add these substances to Schedule 1, risk management instruments must, unless an exception in section 91 of CEPA applies, be proposed and finalized within a set period of time, 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 human health objective

Proposed human health objectives are quantitative or qualitative statements of what should be achieved to address human health concerns.

The proposed human health objective for cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela (the 12 proposed toxic substances in the Fourteen Terpene and Terpenoid Substances Group) is to reduce exposure of the general population to these substances to levels that are protective of human health.

3.2 Proposed risk management objectives

Proposed risk management objectives set quantitative or qualitative targets to be achieved by the implementation of risk management regulation(s), instrument(s), and/or tool(s) for a given substance or substances. In this case, the proposed risk management objectives for the 12 proposed toxic substances in the Fourteen Terpene and Terpenoid Substances Group are to:

- Reduce dermal, inhalation, and/or oral exposures of the general population to cade oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, sandela, IBCH, sandal cyclohexanol, and BCH from certain cosmetics to levels that are protective of human health;
- Reduce dermal, inhalation, and/or oral exposures of the general population to *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil used as NMIs in certain NHPs to levels that are protective of human health;

- Reduce dermal and/or inhalation exposures of the general population to *Ginkgo biloba* extract and wormwood oil used as NMIs in certain NPDs to levels that are protective of human health;
- Reduce dermal, inhalation, and/or oral exposures of the general population to cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from consumer products, including essential oils used in DIY applications and in resin incense products, to levels that are protective of human health; and
- Reduce oral exposure of the general population to *Ginkgo biloba* extract from certain teas to levels that are protective of human health.

3.3 Proposed risk management options under consideration

To achieve the proposed risk management objectives and to work towards achieving the proposed human health objective, risk management options are under consideration.

For the purposes of paragraph 77(1)(*a*) of CEPA, the Government of Canada proposes to recommend that cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela be added to Part 2 of Schedule 1 to CEPA. As a result, the Government of Canada is considering the following new risk management actions:

1. For consumer products, including essential oils or products sold directly to consumers in vials for use in DIY applications and resin incense:

    - Regulatory or non-regulatory actions to help reduce exposure to *Ginkgo biloba* extract, cade oil, jonquil oil, *Verbena officinalis* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from certain consumer products, listed below, to levels that are protective of human health, including:

        - Measures to reduce inhalation and dermal exposures to:

            - Cade oil sold to consumers for use in the following DIY applications: aromatic diffuser (users and bystanders), facial steamer, (users and bystanders), and body moisturizer.
            - Jonquil oil sold to consumers for use in the following DIY applications: aromatic diffuser (users and bystanders), facial steamer (users and bystanders), bath oils, massage oil, and body moisturizer.
            - *Verbena officinalis* extract sold to consumers for use in the following DIY applications: aromatic diffuser (users) and facial steamer (users).

- Cork tree extract sold to consumers for use in the following DIY application: aromatic diffuser (users).
- Sage oil sold to consumers for use in the following DIY applications: aromatic diffuser (users) and facial steamer (users).
- Wormwood oil sold to consumers for use in the following DIY applications: aromatic diffuser(users and bystanders), facial steamer (users), bath oils, body moisturizer, and massage oil.

- Measures to reduce inhalation exposure to:

  - Cade oil sold to consumers for use in the following DIY application: bath oils.
  - Jonquil oil sold to consumers for use in the following DIY applications: facial steamer (bystanders).
  - Myrrh oil sold to consumers for use in the following DIY applications: aromatic diffuser and facial steamer (users).
  - Sage oil sold to consumers for use in the following DIY applications: aromatic diffuser (bystanders) and facial steamer (bystanders).
  - Wormwood oil sold to consumers for use in the following DIY applications: facial steamer (bystanders).
  - Myrrh oil sold to consumers in the following ready-to-use product: home fragrance (resin incense).

- Measures to reduce dermal exposure to:

  - Cade oil sold to consumers for use in the following DIY applications: massage oil and topical preparations for abraded/damaged skin.
  - Cork tree extract sold to consumers for use in the following DIY application: massage oil.

- Measures to reduce oral exposure to:

  - *Verbena officinalis* extract sold to consumers for use in the following DIY application: liquid extract.
  - *Ginkgo biloba* extract sold to consumers for use in the following DIY application: oral supplement (liquid extract).
  - Myrrh oil sold to consumers for use in the following DIY application: essential oil use as a stomach remedy.
  - Cork tree extract sold to consumers for use in the following DIY application: oral ingestion of extract.
  - Wormwood oil sold to consumers for use in the following DIY application: oral ingestion of essential oil.

Uses identified for DIY applications are known or common uses but should not be viewed as recommended or approved by Health Canada.

2. For food/food additives applications:

    - Regulatory or non-regulatory actions to help reduce oral exposure to *Ginkgo biloba* extract from herbal teas.

The Government of Canada is also considering other risk management actions, as follows:

1. For cosmetics:

    - Listing cade oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, IBCH, sandal cyclohexanol, BCH, and sandela as prohibited or restricted ingredients on Health Canada's Cosmetic Ingredient Hotlist[8] to help reduce dermal, inhalation, and/or oral exposure to these substances from certain cosmetics.

        - List on Hotlist to reduce inhalation and dermal exposures to:

            - Cade oil in facial moisturizers and roll-on perfumes.
            - *Verbena officinalis* extract in facial moisturizers.
            - Sage oil in massage oil, hair styling product, sunless tanning product, antiperspirant, hair conditioner (rinse-off), spray perfume, makeup remover, body and face moisturizers, face masks, liquid body soaps, and shampoos.

        - List on Hotlist to reduce dermal exposure to:

            - *Verbena officinalis* extract in massage oil, body exfoliant, hand cream, and shampoo.
            - *Ginkgo biloba* extract in hair perm/straightener, permanent hair dye, face exfoliant, aftershave, sunless tanning product, massage product, face mask, body oil, hair mist, liquid face

[8] The Cosmetic Ingredient Hotlist is an administrative tool that Health Canada uses to communicate to manufacturers and others that certain substances may contravene the general prohibition found in section 16 of the *Food and Drugs Act* or may contravene one or more provisions of the *Cosmetic Regulations*. Section 16 of the *Food and Drugs Act* states that "No person shall sell any cosmetic that has in or on it any substance that may cause injury to the health of the user." In addition, the Hotlist includes certain substances that may make it unlikely for a product to be classified as a cosmetic under the *Food and Drugs Act*. Compliance with the provisions of section 16 are monitored, in part, through the mandatory notification provisions of section 30 of the *Cosmetic Regulations* of the *Food and Drugs Act*, which requires that all manufacturers and importers provide a list of the cosmetic's ingredients to Health Canada.

foundation, genital lubricant, face moisturizer, face toner, body moisturizer, hand cream, liquid body soap, spray antiperspirant, shampoo, face cleanser, and makeup remover.
    - Myrrh oil in permanent hair dye, hair styling product, massage oil, bath oils, face exfoliants, hair removal aftercare products, sunless tanning products, aftershaves, body and face moisturizers, antiperspirant, liquid body soap, spray perfume.
    - Cork tree extract in face and body moisturizers.
    - Sage oil in douches.
    - Sandela, IBCH, sandal cyclohexanol, and BCH in spray perfume and body moisturizers.

  - List on Hotlist to reduce oral exposure to:

    - Myrrh oil in tooth powder, mouthwash, and teeth whitener.
    - Sage oil in breath fresheners, mouth washes, and toothpastes.

2. For NHPs and NPDs:

   - Listing *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil as restricted ingredients in Health Canada's Natural Health Products Ingredients Database (NHPID)[9] to help reduce dermal, inhalation and/or oral exposures to these substances from certain topical NHPs and/or NPDs. Actions may aim to lower the concentration of these substances when used as NMIs in certain NHPs and NPDs to levels that are protective of human health.

     NHPs:

     - List on NHPID to reduce inhalation and dermal exposures to:

       - Sage oil in massage oil, analgesic cream, hand sanitizer, and body moisturizer.

[9] The NHPID provides an electronic tool which enables members of the public to access information on the following topics:

- medicinal and non-medicinal ingredients used in NHPs;
- standard terminology used by the Natural Health Products Online System, known as "Controlled Vocabulary", referring to quality test methods, dosage forms, NMI purposes, and so on; and
- pre-cleared information such as single ingredient monographs and product monographs.

- List on NHPID to reduce dermal exposure to:
    - *Ginkgo biloba* extract in face sunscreen and sunscreen lotion.
    - Myrrh oil in pain gel, body lotion, sunscreen lotion, and hand sanitizer.
    - Wormwood oil in hand sanitizer.
    - Cork tree extract in analgesic spray.
- List on NHPID to reduce oral exposure to:
    - *Verbena officinalis* extract in oral supplements.
    - *Ginkgo biloba* extract in oral supplements (capsules), and herbal tea blend.
    - Myrrh oil in oral capsules.
    - Sage oil in oral supplement (capsules), oral supplement (loose herbs), throat spray, and motion sickness medication.

NPDs:

- List on NHPID to reduce inhalation and dermal exposures to:
    - Wormwood oil in analgesic cream.
- List on NHPID to reduce dermal exposure to:
    - *Ginkgo biloba* extract in face sunscreen.

3. For DIY use of essential oils that are consumer products for which health concerns are identified:

    - A public communications approach for DIY essential oil consumer products as a complementary tool to reduce dermal, inhalation, and/or oral exposures to *Ginkgo biloba* extract, cade oil, jonquil oil, *Verbena officinalis* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil in the DIY applications listed under consumer products above.

Cosmetics, NHPs, and NPDs are regulated under the *Food and Drugs Act* and its regulations. For the purposes of paragraph 77(1)(*b*) of CEPA, human health risks associated with substances are regulated in cosmetics by section 16 of the *Food and Drugs Act*, in NPDs by Part C, Division 1 of the *Food and Drug Regulations*, and in NHPs by section 7 of the *Natural Health Products Regulations*.

Note that these proposed risk management actions are preliminary and subject to

change. Following the publication of this Risk Management Scope document, additional information obtained from the public comment period and from other sources will be considered, along with the information presented in this document, in the instrument selection and development process[10]. The risk management options outlined in this document may evolve through consideration of assessments and risk management options published for other CMP substances to ensure effective, coordinated, and consistent risk management decision-making.

3.4 Risk management information gaps

In order to make informed decisions on proposed risk management, more information is needed on the following:

- Potential alternative substances to cade oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, sandela, IBCH, sandal cyclohexanol, and BCH for use in cosmetics;
- Potential alternative substances to *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil for use as NMIs in NHPs;
- Current quantities and concentrations of *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil for use as NMIs in NHPs;
- Potential alternative substances to *Ginkgo biloba* extract and wormwood oil used as NMIs in certain NPDs;
- Current quantities and concentrations of *Ginkgo biloba* extract and wormwood oil used as NMIs in certain NPDs;
- Potential alternative substances to cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from essential oils used in consumer product DIY applications;
- Current quantities and concentrations of cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, and wormwood oil from essential oils used in consumer product DIY applications;
- Current quantities and concentrations of *Ginkgo biloba* extract from certain foods (teas) available to consumers; and
- Socio-economic and technical impacts and benefits associated with the proposed risk management for cade oil, jonquil oil, *Verbena officinalis*

[10] The proposed risk management regulation(s), instrument(s) or tool(s) will be selected using a thorough, consistent and efficient approach and take into consideration available information in line with the Government of Canada's *Cabinet Directive on Regulatory Management* (TBS 2012a), Red Tape Reduction Action Plan (TBS 2012b) and the *Red Tape Reduction Act* (Canada, 2015).

extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH and sandela.

3.5 Performance measurement evaluation

Performance measurement evaluates the ongoing effectiveness and relevance of the actions taken to manage risks from toxic substances[11]. Environment and Climate Change Canada and Health Canada have developed a Performance Measurement Evaluation Strategy that sets out the approach to evaluate the effectiveness of actions taken on substances found toxic under CEPA. The aim is to determine whether human health and/or environmental objectives have been met and whether there is a need to revisit the risk management approach for those substances. In evaluating progress and revisiting risk management, as warranted, these activities together will aim to manage risks effectively over time. To achieve this, the Government of Canada will review the effectiveness of the risk management action(s) for the 12 proposed toxic substances in the Fourteen Terpene and Terpenoid Substances Group.

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.

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

[11] 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 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).

For more information on performance measurement evaluation (including Health Canada and Environment and Climate Change Canada's Performance Measurement Evaluation Strategy) please visit Performance measurement for toxic substances - Canada.ca.

4. Background

Terpenes are simple hydrocarbons consisting of repeating five carbon isoprene units (C_5H_7). Terpenoids are a modified class of terpenes with different functional groups and an oxidized methyl group moved or removed at various positions. Both terpenes and terpenoids are classified according to the number of isoprene units they contain (Caputi and Aprea 2011, Perveen 2018). These substances are the components of essential oils found in a wide variety of plants. Essential oils are mixtures of volatile organic compounds originating from a single botanical source, and contribute to the flavour and fragrance of a plant. These plant-derived essential oils have many components that can be extracted from different parts of the plant (e.g., leaves, seeds, stems, flowers, roots, fruits, woods, barks, grasses, gums, tree blossoms, bulbs, flower buds) (Tisserand and Young 2014). In addition, the concentration of these major components can be affected by different factors such as the origin of the plant, species, temperature, soil, and geography; essential oils extracted from plants of the same genus and species can be chemically different even though their origin is the same.

All of the substances in the Fourteen Terpene and Terpenoid Substances Group have been included in surveys issued pursuant to a CEPA section 71 survey (Canada 2012). Based on information submitted through the section 71 survey, there were no reports of import or manufacture of cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH, and sandela above the reporting threshold of 100 kg in 2011 (Environment Canada 2013).

The substances in the Fourteen Terpene and Terpenoid Substances Group consist of discrete substances as well as representative substances for substances of unknown or variable composition, complex reaction products, or biological materials (UVCBs). The substances in this group are generally used as fragrance ingredients in cosmetics, drugs including NHPs, cleaning products, and air fresheners, and as essential oils used in DIY applications to create these products at home or added to an aromatic diffuser or facial steamer. Some of them are also present in pest control products as formulants. In addition, some of them occur naturally in food and may be used as food flavouring agents.

For the human health risk assessment, 6 of the 14 substances in this group were addressed under two subgroups, due to similarities in chemical structure, properties and/or health effects. Subgroup 1 includes sage oil and wormwood oil; both are UVCBs extracted from the *Salvia officinalis* (sage) and *Artemisia absinthium* (wormwood) plants, respectively. As the health effects datasets for both sage oil and wormwood oil were informed by thujone (a major component of both oils), these substances were assessed together as a subgroup of substances. Subgroup 2 is comprised of the discrete substances IBCH, sandal cyclohexanol and BCH, as well as the UVCB sandela, with the health effects

data on IBCH being used to inform the human health risk assessment for all substances in this subgroup. The remaining eight substances – cade oil, jonquil oil, norlimbanol, *Verbena officinalis* extract, *Ginkgo biloba* extract, amberlyn, myrrh oil, and cork tree extract (all of which are UVCBs, except for norlimbanol and amberlyn) -- were addressed individually. Exposure to these substances from environmental media is expected to be minimal due to the low quantities reported in Canada in response to a CEPA section 71 survey. Where applicable, exposures were characterized from use of cosmetics, NPDs, NHPs, possible use as food flavouring agents, cleaning products, air fresheners, and from other products available to consumers including DIY applications.

5. Exposure sources of concern and identified risks

The primary area of concern is the use of these substances in cosmetics, resin incense consumer products, NHPs, NPDs, and foods, and as essential oils in DIY consumer product applications. Certain substances in this group with aromatic properties are currently available on the Canadian market at concentrations of up to 100%. These undiluted substances can be purchased and used by consumers in aromatic diffusers, facial steamers, or added to baths, as well as to make DIY products such as homemade massage oils or body moisturizers that may result in consumer exposures. It is important to note that some known uses of essential oil products may not be recommended or approved by Health Canada. For any essential oil product that makes a health claim, look for a Natural Product Number (NPN), Homeopathic Medicine Number (DIN-HM), or Drug Identification Number (DIN) that identify Health Canada-approved, licensed products.

5.1 Cade oil

As no quality toxicity studies on cade oil were identified in the available published literature, the health effects characterization was based on information on its main components, or their relevant analogues. For non-neoplastic effects, risk from oral and dermal exposures to cade oil was based on adverse effects observed in the central nervous system of rats exposed to m-cresol by gavage (ECCC, HC 2016a). For inhalation exposure, risk was based on an inhalation study with rats exposed to o-cresol (ECCC, HC 2016a). Clinical effects included respiratory tract irritation, toxic effects on the liver, high white blood cell count, and changes in the myeloid-erythroid ratio in bone marrow.

For dermal exposure to cade oil, health risks were identified for uses in perfumes (roll-on) as well as DIY essential oil uses in facial steamers (users), massage oil preparations, body moisturizer preparations, and topical preparations on abraded/damaged skin. For inhalation exposure, the draft assessment proposed that there is a health concern associated with DIY uses of cade oil in aromatic diffusers (users and bystanders), facial steamers (users and bystanders), and bath oils.

The cancer risks from lifetime exposure to cade oil were based on neoplastic effects in the forestomach of female mice exposed orally to a cresol mixture over 2 years (ECCC, HC 2016a). The draft assessment proposed that there is a health concern from lifetime dermal and inhalation exposures to cade oil associated with the use of perfumes (roll-on) and face moisturizers, as well as DIY essential oil uses in aromatic diffusers, facial steamers, body moisturizers, and topical preparations for abraded/damaged skin.

No other sources of exposure of concern were identified.

5.2 Jonquil oil

The health effects datasets for jonquil oil were limited; therefore, the lowest effect levels for major components and their analogues were used to characterize the risk to jonquil oil. For non-neoplastic effects, the critical endpoint was based on rat developmental effects (e.g., resorptions, fetal skeletal variations) using benzyl benzoate (Koçkaya and Kılıç 2011). For neoplastic effects, the development of hepatocellular carcinomas in male rats, who were administered methyl eugenol in a 2-year study (NTP 2000), was considered to be the most relevant endpoint for the characterization of risk.

The draft assessment proposed that there is a health concern from dermal and/or inhalation exposures to jonquil oil from DIY uses in aromatic diffusers (for users and bystanders), facial steamers (for users and bystanders), bath oils, massage oil preparations, and body moisturizer preparations.

For neoplastic effects, the draft assessment proposed that there is a health concern associated with lifetime dermal and inhalation exposures to jonquil oil from DIY uses in aromatic diffusers, facial steamers, bath oils, massage oil preparations, and body moisturizer preparations.

No other sources of exposure of concern were identified.

5.3 Verbena officinalis extract

The database for health effects of *Verbena officinalis* whole extract was limited. As a result, the health effects of the major and bioactive components of *Verbena officinalis* extract (that is, verbenalin, verbascoside, hastatoside, citral, and isobornyl formate) were considered in the draft assessment. For oral and dermal scenarios, the lowest critical effect level was based on increased post-implantation losses and reduced body weight gain in dams observed in an oral developmental study on rats treated with citral (Nogueira et al. 1995). The health risk from inhalation exposure to *Verbena officinalis* extract was based on a rat developmental toxicity study administering citral as an aerosol or vapour via whole-body inhalation. Critical effects were based on maternal toxicity (that is, mortality, abortion, reduced body weights, ocular opacity, breathing difficulty,

nasal discharge, salivation, and severe respiratory tract irritation) (Gaworski et al. 1992 as cited in ECCC, HC 2020b).

Dermal exposure to *Verbena officinalis* extract from the use of massage oils, body exfoliants, shampoos, hand creams, and face moisturizers, and from DIY essential oil use in aromatic diffusers and face steamers were proposed in the draft assessment as a concern for human health. Oral exposure to oral supplements (NHPs) and DIY products available to consumers, namely liquid extracts, were also characterized as a health risk. With respect to inhalation exposure, *Verbena officinalis* extract was considered a health risk from the use of face moisturizers and the DIY use of essential oil in aromatic diffusers and face steamers. No other sources of exposure of concern were identified.

5.4 *Ginkgo biloba* extract

Health effects of *Ginkgo biloba* extract were characterized by toxicity studies conducted on the extract, rather than individual components. Based on the overall available information, critical effects associated with exposures to *Ginkgo biloba* extract are reproductive and developmental toxicity and carcinogenicity. Non-neoplastic effects from dermal and oral exposures to *Ginkgo biloba* extract were based on reduced body weight and reduced intrauterine growth of rat fetuses when parental animals were exposed orally to *Ginkgo biloba* leaf extract for 14 days (Pinto et al. 2007). The risk for carcinogenic effects from lifetime exposure to *Ginkgo biloba* extract was based on an increased incidence of hepatocellular adenomas and/or carcinomas in male mice exposed orally to *Ginkgo biloba* leaf extract for 2 years (NTP 2013).

For non-neoplastic effects, the draft assessment identified a health concern for dermal exposure to *Ginkgo biloba* extract from hair perm/straightener, permanent hair dye, face exfoliant, aftershave, sunless tanning product, massage product, face mask, body oil, liquid face foundation, genital lubricant, face moisturizer, face toner, body moisturizer, hand cream, body soap (liquid), spray antiperspirant, shampoo, face cleanser, makeup remover, face sunscreen (NHP and NPD), and sunscreen lotion (NHP)**Error! Reference source not found.**. For oral exposure to *Ginkgo biloba*, health concerns were identified from uses in oral supplement (capsule) (NHP), herbal tea blend (NHP), oral supplement (liquid extract), and herbal tea (food).

The draft assessment also proposed that, for all of these products of concern as well as for hair mist products, *Ginkgo biloba* extract posed a health risk for carcinogenic effects.

5.5 Myrrh oil

The draft assessment identified the possible risks from exposure to myrrh oil using species-specific extracts from the *Commiphora* species. Genotoxic and carcinogenic effects for myrrh oil were not identified. For characterizing risk from

exposure to myrrh oil, critical effects identified were effects on biochemistry (that is, bile acids) and reproductive parameters (that is, sperm levels) based on subchronic oral studies conducted on rats and mice using an extract of *Commiphora mukul* (NTP 2020).

A health risk was identified for dermal exposure to myrrh oil from the use of permanent hair dye, hair styling products, massage oils, bath oils, face exfoliants, hair removal aftercare products, sunless tanning products, aftershaves, body moisturizers, face moisturizers, antiperspirants, liquid body soaps, spray perfumes, pain gels (NHPs), body lotions (NHPs), sunscreen lotions (NHPs), and hand sanitizers (NHPs), as well as DIY essential oil use in aromatic diffusers and facial steamers; for inhalation exposure to resin incense and from DIY essential oil use in aromatic diffusers and face steamers; and for oral exposure to tooth powder, mouthwashes, teeth whiteners, oral capsules (NHPs), and DIY use as a stomach remedy. No other sources of exposure of concern were identified.

5.6 Cork tree extract

The draft assessment noted that the health effects dataset for cork tree extract was limited and, as such, considered data for both cork tree extract and its major component, berberine. However, a 28-day, oral study conducted on rats was identified to be the most appropriate study for the risk characterization of exposure to cork tree extract (Alam et al. 2021).

Daily dermal exposure to cork tree extract from the use of face moisturizers and body moisturizers as well as short-term intermittent use of analgesic sprays (NHP) and DIY essential oil use in massage oil preparations were proposed in the draft assessment as a concern to human health, as was daily oral exposure from DIY products available to consumers used for oral ingestion of cork tree extract. Daily use of cork tree extract in DIY aromatic diffusers was also proposed as a health concern for users from both dermal and inhalation exposures.

5.7 Subgroup 1: Sage oil and wormwood oil

Sage oil:

The draft assessment noted that the health effects dataset for sage oil (from *Salvia officinalis*) was limited and therefore also considered data for the major component, thujone. A chronic, oral, 2-year study conducted using α-, β-thujone in rats was considered to be the most relevant study for the characterization of risk following exposure to sage oil, on the basis of clonic seizures observed in male rats (NTP 2011).

Health risks were identified for dermal and inhalation exposures to sage oil from uses in massage oils (cosmetics and NHPs), hair styling products, sunless tanning products, face masks, analgesic creams (NHPs), antiperspirants, conditioners (rinse-off), spray perfumes, makeup removers, face moisturizers,

liquid body soaps, shampoos, body moisturizers (cosmetics and NHPs), hand sanitizers (NHPs), and DIY essential oil use in aromatic diffusers and face steamers. Health risks for dermal exposure from uses in douches were identified, as were health risks for oral exposures for breath fresheners, mouthwashes, toothpastes, throat sprays (NHPs), motion sickness medications (NHPs) and oral supplements (capsules and loose herbs) (NHPs). No other sources of exposure of concern were identified.

Wormwood oil:

The draft assessment noted that the health effects dataset for wormwood oil was limited and therefore also considered data for the major component, thujone. The same toxicity endpoint based on clonic seizures in male rats exposed to α-, β-thujone (NTP 2011) that was used for sage oil was also used to assess health risks for exposure to wormwood oil. Health effects data related to carcinogenicity were not identified for either wormwood oil or wormwood extracts.

Health risks were identified for dermal exposures to wormwood oil from hand sanitizers (NHP), and for dermal and inhalation exposures from analgesic creams (NPD) and DIY essential oil use in aromatic diffusers, facial steamers, body moisturizers, bath oils, and massage oils. For oral exposure, health risks were identified for DIY products available to consumers used for oral ingestion of wormwood oil extract. No other sources of exposure of concern were identified.

5.8 Subgroup 2: Sandela and cyclohexanols (IBCH, sandal cyclohexanol, and BCH)

Health effects data were available for IBCH, while datasets for sandal cyclohexanol, BCH, and sandela were considered to be limited. As these substances are structurally similar and their names may be used interchangeably, toxicological data for IBCH were used to inform the health effects assessment of all substances within subgroup 2. Health risks were characterized based on effects from a combined repeated-dose and reproduction/developmental study on rats administered IBCH orally, which included parental toxicity on reproductive organs and effects on pups (for example, viability, pup weight, etc.) (Anonymous 2018 as cited in ECHA 2021d). Studies examining potential carcinogenic effects to IBCH were not identified and available data suggest IBCH is not likely genotoxic.

Daily dermal exposures to substances in this subgroup from the use of spray perfumes and body moisturizers are expected to pose a health risk

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6. Risk management considerations

6.1 Alternatives and alternate technologies

Available information for IBCH, sandal cyclohexanol, BCH, and sandela suggest that these substances are primarily used as fragrance ingredients. These substances have a characteristic woody odour and are synthetic alternatives to sandalwood fragrance (Scentree n.d.; de Groot 2020). Health Canada is also considering measures to reduce exposures to sandalwood oil from certain cosmetics (ECCC, HC 2021). No publicly available information on alternatives to the other 8 proposed toxic substances in the Fourteen Terpene and Terpenoid Substances Group were identified for cosmetics, consumer products, NHPs, NPDs, and food products. Follow-up information from stakeholders is requested, if known.

6.2 Socio-economic and technical considerations

Socio-economic factors will be considered in the selection process for a regulation and/or instrument respecting preventive or control actions, and in the development of the risk management objectives as per the guidance provided in the Treasury Board document *Assessing, Selecting, and Implementing Instruments for Government Action* (TBS 2007). Socio-economic factors will also be considered in the development of regulation(s), instrument(s), and/or tool(s) as identified in the *Cabinet Directive on Regulation* (TBS 2018) and Red Tape Reduction Action Plan (TBS 2012) and the *Red Tape Reduction Act* (Canada 2015).

7. Overview of Existing Risk Management

7.1 Related Canadian risk management context

In general, cosmetics, NHPs, and NPDs are regulated under the *Food and Drugs Act* and its regulations as follows.

Cosmetics:

The human health risks of substances in cosmetics are primarily managed by the *Cosmetic Regulations* under the *Food and Drugs Act* and the *Cosmetic Regulations*. The addition or modification of the entries in the *Cosmetic Ingredient Hotlist* (Hotlist) inform stakeholders and the public about substances that, according to Health Canada, may contravene section 16 of the *Food and Drugs Act* or may contravene one or more provisions of the *Cosmetic Regulations* when they are present in a cosmetic. Section 16 of the *Food and Drugs Act* states, among other things, that “No person shall sell any cosmetic that has in or on it any substance that may cause injury to the health of the user.”

NHPs:

NHPs are regulated under the *Food and Drugs Act* and the *Natural Health Products Regulations* (NHPR) and undergo pre-market review in accordance with the NHPR. The risks to human health of substances in NHPs are primarily managed under section 7 of the NHPR, which provides for issuance or amendments to a product licence if the licence is not likely to result in injury to the health of a purchaser or consumer. The NHPID provides information on substances used as medicinal ingredients (MIs) and/or NMIs in NHPs. The NHPID entries for substances can be revised to describe limits on the quantity and recommended uses of substances in NHPs to inform the public and stakeholders on potential health concerns. Natural health product applicants may access the information when completing a product licence application. Health Canada may access the information in the NHPID when reviewing a product licence application which may inform how a product is managed under the provisions of the NHPR, such as section 7.

NPDs:

NPDs are regulated under the *Food and Drugs Act* and the *Food and Drug Regulations* and undergo pre-market review in accordance with the *Food and Drug Regulations*. The risks to human health of substances in NPDs is primarily managed under section C.01.014.2 of the *Food and Drug Regulations*, which provides for refusal of issuance of a drug identification number if the sale of the NPD may cause injury to the health of the purchaser or consumer. The NHPID provides information on substances used as NMIs in NPDs. The NHPID entries for substances can be revised to describe limits on the quantity and recommended uses of substances in NPDs to inform the public and stakeholders on potential health concerns. A manufacturer of a drug may access the information in the NHPID when making an application for a drug identification number. Health Canada may access the information in the NHPID when reviewing a drug application which may inform how a NPD is managed under provisions of the *Food and Drugs Regulations*, such as section C.01.014.2.

7.1.1 Cade oil

Cade oil is the volatile oil extracted from the wood and branches of *Juniperus oxycedrus*. *Juniperus oxycedrus* is listed in the NHPID with a medicinal role as classified as a NHP substance falling under Schedule 1, item 1 (a plant or a plant material) of the NHPR. Juniper tar (another term for cade oil) is listed in the NHPID with a medicinal role as classified as an NHP substance falling under Schedule 1, item 2 (an extract) of the NHPR. *Juniperus oxycedrus* wood essential oil is listed in the NHPID with a non-medicinal role for topical use only as fragrance ingredient, where only rectified (purified) oils may be used, and the finished product may not contain more than 1 ppb of PAHs.

Cade oil is also reported to be used as a formulant in pest control products, such as animal repellents, insect repellents and sanitizers (personal communication, emails from the Pest Management Regulatory Agency [PMRA], Health Canada, to the Risk Management Bureau, Health Canada, dated June 2021; unreferenced).

7.1.2 Jonquil oil

Methyl eugenol was used as an analogue for *trans*-methyl isoeugenol; a component of jonquil oil. Methyl eugenol is listed on the Cosmetic Ingredient Hotlist (Canada 2014).

7.1.3 *Verbena officinalis* extract

Verbena officinalis (plant) and Herba Verbenae (part of the *Verbena officinalis* plant) are listed in the NHPID (2022) with a medicinal role as classified as an NHP substance falling under Schedule 1, item 1 (a plant or a plant material) of the NHPR. *Verbena officinalis* and its preparations are listed in the Licensed Natural Health Products Database (LNHPD) as being present as MIs or NMIs in NHPs (LNHPD 2021; personal communication, emails from the Natural and Non-prescription Health Products Directorate [NNHPD], Health Canada, to the Existing Substances and Risk Assessment Bureau [ESRAB], Health Canada, dated June 2021; unreferenced).

7.1.4 *Ginkgo biloba* extract

Ginkgo biloba (plant), folium ginkgo (leaves), and semen ginkgo (seeds) are listed in the NHPID with a medicinal role as classified as NHP substances falling under Schedule 1, item 1 (a plant or a plant material) of the NHPR. Such entries of the NHPID are also associated with the following additional details and/or restrictions that, in order to reduce toxicity, *Ginkgo biloba* seeds must be either dry-fried or baked at a medium temperature until they turn deep yellow in order to break down ginkgotoxin before use as a Traditional Chinese Medicine ingredient. Testing must be performed to ensure that the finished product meets the toxicity restrictions for Ginkgolic acids not more than 5 ppm. *Ginkgo biloba* leaf extract is listed in the NHPID with a non-medicinal role for topical use as skin-conditioning agent. *Ginkgo biloba* and its preparations are listed in the LNHPD as being present as a MI or NMI in NHPs (LNHPD 2021), as well as in NPDs based on data obtained from HC's Drug Product Database (DPD) (personal communication, emails from the NNHPD and Therapeutic Products Directorate, Health Canada, to the ESRAB, Health Canada, dated 2021; unreferenced).

7.1.5 Myrrh oil

Myrrh oil is extracted from plants of the *Commiphora* genus, such as *Commiphora myrrha* and *Commiphora mukul*. *Commiphora myrrha* is listed in the NHPID with a medicinal role as classified as an NHP substance falling under Schedule 1, item 1 (a plant or a plant material) of the NHPR. Myrrh absolute and

myrrh essential oil are listed in the NHPID with a medicinal role as classified as NHP substances falling under Schedule 1, item 2 (an extract) of the NHPR. *Commiphora myrrha* gum oil, *Commiphora myrrha* leaf cell extract, *Commiphora myrrha* resin, *Commiphora myrrha* resin extract, and myrrh oil are listed in the NHPID with a non-medicinal role for topical or oral use as a flavour enhancer, fragrance ingredient, masking agent, and/or skin protectant. *Commiphora myrrha* and its preparations are listed in the LNHPD (2022) as being present as MIs or NMIs in NHPs (personal communication, emails from the , HealthNNHPD, Heath Canada, to the ESRAB, Health Canada, dated June 2021; unreferenced).

Myrrh oil is reported to be used as a formulant in pest control products, such as insect repellents and insecticides (personal communication, emails from the PMRA, Health Canada, to the ESRAB, Health Canada, dated June 2021; unreferenced).

As mentioned above, its use as a food flavouring agent is subject to the provisions of section 4(1)(*a*) of the *Food and Drugs Act*.

7.1.6 Cork tree extract

Cork tree extract is obtained from the powdered bark of the *Phellodendron amurense* tree that is native to Asia (Kumar et al. 2007). *Phellodendron amurense* and Cortex *Phellodendri amurensis* (part of plant) are listed in the NHPID with a medicinal role as classified as NHP substances falling under Schedule 1, item 1 (a plant or a plant material) of the NHPR. *Phellodendron amurense* bark extract is listed in the NHPID with a non-medicinal role for topical use as a skin-conditioning agent. *Phellodendron amurense* and its preparations are listed in the LNHPD (2021) as being present as a MI or NMI in NHPs (personal communication, emails from the NNHPD, Health Canada, to the Risk Management Bureau, Health Canada, dated June 2021; unreferenced).

7.1.7 Subgroup 1 (sage oil and wormwood oil)

7.1.7.1 Sage oil

Salvia officinalis and dalmation sage essential oil are listed in the NHPID with a medicinal role as classified as NHP substances falling under Schedule 1, items 1 and 2 (a plant or a plant material and extract, respectively) of the NHPR. Sage leaf dry, sage leaf powder, S*alvia officinalis* (sage) leaf extract*, Salvia officinalis* (sage) leaf oil, and *Salvia officinalis* (sage) oil are listed in the NHPID with a non-medicinal role for oral or topical use as a flavour enhancer, fragrance ingredient, masking agent, skin-conditioning agent, skin protectant, and/or tonic. *Salvia officinalis* and its preparations are listed in the LNHPD (2021) as being present as a MI or NMI in NHPs (personal communication, emails from the NNHPD, Health Canada, to the ESRAB, Health Canada, dated June 2021; unreferenced).

Sage oil is also reported to be used as a formulant in pest control products, such as animal repellents, insect repellents and sanitizers (personal communication,

emails from the PMRA, Health Canada, to the ESRAB, Health Canada, dated June 2021; unreferenced).

As mentioned above, its use as a food flavouring agent is subject to the provisions of section 4(1)(*a*) of the *Food and Drugs Act*.

7.1.7.2 Wormwood oil

Artemisia absinthium is listed in the NHPID with a medicinal role as classified as an NHP substance falling under Schedule 1, item 1 (a plant or a plant material) of the NHPR, further associated with the following restriction detail: "*Artemisia absinthium* contains thujone. For adults, the upper limit for total daily intake of thujone from health products is 6 mg. Product licence applications for oral products should include a copy of a certificate of analysis or any other equivalent document demonstrating that the thujone content of a daily dose of the product is acceptable. Because thujone content of the herbal materials can vary, the thujone content should be determined for each batch during production of the product". *Artemisia absinthium* extract is listed in the NHPID with a non-medicinal role for topical use only as a skin-conditioning agent. *Artemisia absinthium* and its preparations are listed in the LNHPD (2021) as being present as a MI or NMI in NHPs (personal communication, emails from the NNHPD, Health Canada, to the ESRAB, Health Canada, dated June 2021; unreferenced).

Wormwood oil is also reported to be used as a formulant in pest control products, such as animal repellents, insect repellents and sanitizers (personal communication, emails from the PMRA, Health Canada, to the ESRAB, Health Canada, dated June 2021; unreferenced).

As mentioned above, its use as a food flavouring agent is subject to the provisions of section 4(1)(*a*) of the *Food and Drugs Act*.

7.1.8 Subgroup 2 (IBCH, sandal cyclohexanol, BCH and sandela)

IBCH, sandal cyclohexanol, BCH and sandela were also reported to be used as a formulants in pest control products, such as animal repellents, insect repellents and sanitizers (personal communication, emails from the PMRA, Health Canada, to the Risk Management Bureau, Health Canada, dated June 2021; unreferenced).

7.2 Pertinent international risk management context

Internationally, risk management actions exist for some of the proposed toxic substances in the Fourteen Terpene and Terpenoid Substances Group:

7.2.1 Sage oil and wormwood oil

United States

Both substances are listed under section 503A and 503B of the *Federal Food, Drug, and Cosmetic Act* as bulk substances nominated for use in drug compounding. Although compounded drugs are not Food and Drug Administration-approved, sage oil and wormwood oil are approved substances for drug compounding as long as it is carried out by a licensed pharmacist in a state-licensed pharmacy or federal facility, or by a physician, as well as compounding by or under the direct supervision of a licensed pharmacist in an outsourcing facility.

7.2.2 Cade oil

Europe

Cade oil is listed in Annex A of Regulation (EU) No 230/2013 on the withdrawal from the market of certain animal feed additives belonging to the group of flavouring and appetizing substances.

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 document or other information that would help to inform decision-making (such as outlined in sections 3.2 or 3.3). Please submit additional information and comments prior to March 26, 2025.

If the final assessment confirms that cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH and sandela are toxic under section 64 of CEPA, a Risk Management Approach document, outlining and seeking input on the proposed risk management instruments, would be published concurrently with the final 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:

Substances Management Information Line
Chemicals Management Plan
Environment and Climate Change Canada
Gatineau, Quebec K1A 0H3
Tel: 1-800-567-1999 | 819-938-3232
Email: substances@ec.gc.ca

Companies who have a business interest in cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH and sandela are encouraged to identify themselves as stakeholders. Stakeholders will be informed of future decisions regarding cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH and sandela and may be contacted for further information.

8.2 Timing of actions

Electronic consultation on the draft assessment report and Risk Management Scope: January 25, 2025 to March 26, 2025. This should include the submission of public comments, additional studies, and/or information on cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH and sandela.

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

Publication of responses to public comments on the Risk Management Approach, if applicable and if required, the proposed instrument(s): At the latest, 24 months from the date on which the ministers recommended that cade oil, jonquil oil, *Verbena officinalis* extract, *Ginkgo biloba* extract, myrrh oil, cork tree extract, sage oil, wormwood oil, IBCH, sandal cyclohexanol, BCH and sandela 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(s).

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

These are planned timelines and are subject to change.

9. References

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Annex A – Substances requiring Risk Management from the Fourteen Terpene and Terpenoid Substances Group

Substance	**CAS RN**
Oils, cade (Cade oil)	8013-10-3
Oils, jonquil (Jonquil oil)	8023-75-4
Verbena officinalis, ext. (*Verbena officinalis* extract)	84961-67-1
Ginkgo biloba, ext. (*Ginkgo biloba* extract)	90045-36-6
Oils, myrrh (Myrrh oil)	8016-37-3
Cork tree, *Phellodendron amurense*, ext. (Cork tree extract)	164288-52-2
Oils, sage (Sage oil)	8022-56-8
Oils, wormwood (Wormwood oil)	8008-93-3
Cyclohexanol, 3-(5,5,6-trimethylbicyclo [2.2.1] hept-2-yl)- (Isobornyl cyclohexanol [IBCH])	3407-42-9
Cyclohexanol, 4-(5,5,6-trimethylbicyclo [2.2.1] hept-2-yl)- (Sandal cyclohexanol)	66068-84-6
Cyclohexanol, (1,7,7-trimethylbicyclo [2.2.1] hept-2-yl)- (Bornyl cyclohexanol [BCH])	68877-29-2
Phenol, 2-methoxy-, reaction products with 2,2-dimethyl-3-methylenebicyclo [2.2.1] heptane, hydrogenated (Sandela)	70955-71-4