Risk Management Scope

for

2-Mercaptobenzothiazole (MBT) and its Precursors

(from the Benzotriazoles and Benzothiazoles Group)

Environment and Climate Change Canada

Health Canada

March 2021

Summary of Proposed Risk Management

This document outlines the risk management options under consideration for 2-mercaptobenzothiazole (MBT) and all substances that are precursors to MBT (herein referred to as MBT and its precursors), which have been proposed to be harmful to the environment.

Precursors to MBT are considered substances that contain an MBT moiety and that can degrade to MBT through any of various transformation pathways (e.g., hydrolytic, redox, digestive or metabolic) at environmentally, industrially or physiologically relevant conditions (ECCC, HC 2021).

A non-exhaustive list of MBT and its precursors are presented in Annex A and B of this document.

In particular, the Government of Canada is considering the implementation of certain risk management instruments such as, but not limited to: regulations, environmental release guidelines, codes of practice, environmental performance agreements, pollution prevention planning notices, and environmental labelling, to minimize the release of the MBT moiety to water bodies from the industrial use of MBT and its precursors.

The main industrial sectors with exposures of concern are:

- The tire and other rubber products manufacturing sector,
- The metalworking fluids sector, and
- Some subsectors of the mining industry.

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

- General information:
    - Hydrolysis and degradation rate of benzothiazoles, including MBT and its precursors;
    - Alternatives for MBT and its precursors for any of the activities identified in section 2.1;
    - Use, manufacture and import information for the benzothiazoles listed in Annex A and B, and for any other potential MBT precursors that are not discussed in this document;
    - Analytical methods for measuring and monitoring aquatic concentrations of benzothiazoles, including MBT, its precursors, and the total concentration of MBT plus its precursors, in industrial effluents and surface water;
    - For facilities that use MBT and/or its precursors, concentrations of MBT and its precursors in industrial effluents and surface water;
    - Efficiency of treatment methods in removing MBT and/or its precursors from industrial effluents;

- Best management practices and technologies in place at facilities that use MBT and/or its precursors to reduce the release of these substances in industrial effluents;
- Socio-economic and technical impacts and benefits associated with the proposed risk management for these substances; and
- Changes in use patterns subsequent to previous data collection initiatives (noted in section 4.2 of this document).

- Tire and other rubber products manufacturing sector:
  - Use information, specifically on the use of MBT and/or its precursors as an accelerator in the vulcanization process;
  - Information on the typical quantities of unreacted MBT, and its precursors, remaining after the vulcanization process.

- Metalworking fluids sector:
  - Use information from the metalworking fluids sector, specifically on the use of MBT and/or its precursors as a corrosion inhibitor in lubricants;
  - For users of MBT and/or its precursors in metalworking fluids, whether MBT and/or its precursors are expected to be found in the final product, and if so, the potential release to the environment;
  - Feasibility of using alternatives to replace MBT and/or its precursors in the metalworking fluids sectors, for all functional uses and specifically as a corrosion inhibitor in lubricants.

- Mining industry subsectors:
  - Use information from subsectors of the mining industry that use MBT and/or its precursors as flotation reagents for mineral extraction;
  - Retention time of effluent in mine tailings storages facilities in certain subsectors of mining where MBT and/or its precursors are used;
  - For mining facilities that use MBT and/or its precursors:
    - Percentage of the handled substances released to tailings ponds;
    - Substance removal rates at onsite treatment systems before reaching tailings ponds; and
    - Substance removal rate in tailings ponds.

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 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) (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.

The substances listed in Annex A and B are referred to throughout this document as "MBT and its precursors". The substances listed in Annex A are included in the Benzotriazoles and Benzothiazoles Group under the third phase of the Chemicals Management Plan (ECCC, HC 2021). The substances in the benzothiazoles subgroup all contain the MBT moiety. This moiety was identified as the key part of the molecule which may be released to the Canadian environment based either on direct use and release of MBT, or through indirect release due to degradation of the parent compounds. Precursors to MBT are considered substances that contain an MBT moiety and that can degrade to MBT through any of various transformation pathways (e.g., hydrolytic, redox, digestive or metabolic) at environmentally, industrially or physiologically relevant conditions.

Upon exposure to water the parent compounds are expected to degrade to MBT which will largely remain in the water given its solubility; however, sorption to particulate matter is possible. In such cases, it would be expected that sorbed substances could settle to the sediment. Experimental toxicity data indicate that MBT has the potential to cause harm to aquatic organisms at low concentrations, such as effects on growth and development (ECCC, HC 2021).

The substances listed in Annex B were not assessed as part of the Benzotriazoles and Benzothiazoles Group but they contain the MBT moiety and therefore have the potential to release MBT to the environment.

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[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.

Throughout this document, **MBT and its precursors** (i.e., the substances listed in Annexes A and B) means MBT, its salts, and compounds containing MBT bonded to any chemical moiety through disulfide or sulfenamide bonds or bonded with methyl ester thiocyanic acid.

2. Issue

Health Canada and Environment and Climate Change Canada conducted a joint scientific assessment relevant to the evaluation of the Benzotriazoles and Benzothiazoles Group 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). For further information, refer to the draft screening assessment for the Benzotriazoles and Benzothiazoles Group.

2.1 Draft Screening Assessment Conclusion

On the basis of the information available, the draft screening assessment proposes that MBT and its precursors, including the substances in the benzothiazoles subgroup, are toxic under paragraph 64*(a)* of CEPA because they may be 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 (Canada 2021).

The draft screening assessment also proposes that MBT meets the persistence criteria but does not meet the bioaccumulation criteria, as defined in the *Persistence and Bioaccumulation Regulations* made under CEPA (Canada 2000). The assessment also proposes that the remainder of the substances in the benzothiazoles subgroup do not meet the persistence and bioaccumulation criteria as set out in the *Persistence and Bioaccumulation Regulations* made under CEPA.

The exposure sources of concern identified in the draft screening assessment are the potential release of MBT and its precursors to water from the following activities:

- use of MBT and/or its precursors as an accelerator in the vulcanization process in tire and other rubber products manufacturing;
- use of MBT and/or its precursors as a corrosion inhibitor in metalworking fluids; and
- use of MBT and/or its precursors as a flotation reagent in some subsectors of the mining industry.

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, the ministers propose to recommend that 2-mercaptobenzothiazole, its salts and compounds containing 2-mercaptobenzothiazole bonded to any chemical moiety through disulfide or sulfenamide bonds or bonded with methyl ester thiocyanic acid be added to the List of Toxic Substances in Schedule 1 of the Act[3].

The ministers will take into consideration comments made by stakeholders during the 60-day public comment period on the draft screening assessment for benzotriazoles and benzothiazoles and the Risk Management Scope for MBT and its precursors.

If the ministers finalize the recommendation to add 2-mercaptobenzothiazole, its salts and compounds containing 2-mercaptobenzothiazole bonded to any chemical moiety through disulfide or sulfenamide bonds or bonded with methyl ester thiocyanic acid to Schedule 1, risk management instruments will be proposed within 24 months from the date of the recommendation. The instruments are to be finalized within 18 months from the date they 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 Objective

Proposed environmental objectives are quantitative or qualitative statements on what should be achieved to address the environmental concerns.

For this group, the proposed objective is focused on addressing the exposure sources of concern outlined in section 5 of this document. As such, the proposed environmental objective for MBT and its precursors is to minimize the presence of MBT and its precursors in water bodies to levels below the predicted no-effect concentration (PNEC) of 2.05 µg/L.

[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.

3.2 Proposed Risk Management Objective

Proposed risk management objectives set quantitative or qualitative targets to be achieved by the implementation of risk management regulations, instruments and/or tools for a given substance or substances.

The proposed risk management objective for MBT and its precursors applies to the following industrial sectors: the tire and other rubber products manufacturing sector, the metalworking fluids sector, and some subsectors in the mining industry. The proposed risk management objective is to minimize the release of MBT and its precursors in industrial effluents to levels that are protective of the environment, considering technical and socio-economic factors.

This objective will be refined on the basis of stakeholder consultations and new information, the proposed risk management instruments, the outcome of the screening assessment, and socio-economic and technical considerations (refer to section 6 of this document). If the final screening assessment confirms that MBT and its precursors are toxic to the environment, revised environmental and risk management objectives will be presented in a Risk Management Approach document, which would be published concurrently with the final screening assessment.

3.3 Proposed Risk Management Options under Consideration

Proposed risk management measures would be developed with the goal of achieving the proposed risk management and environmental objectives. Measures under consideration to minimize the release of the MBT moiety to water bodies from the industrial use of MBT and its precursors in the tire and other rubber products manufacturing sector, the metalworking fluids sector, and some subsectors of the mining industry include, but are not limited to:

- **Regulations** (under the *Fisheries Act* and/or section 93 of CEPA) imposing restrictions on an activity related to MBT and its precursors or setting limits on the concentrations of MBT and its precursors that can be used, released to the environment, or present in a product.

- **Environmental Release Guidelines** (section 54 of CEPA) that set out recommended limits (expressed as concentrations or quantities) to releases of MBT and its precursors into the environment from works, undertakings or activities.

- **Codes of Practice** (section 54 of CEPA) identifying recommended procedures and practices or environmental controls relating to works, undertakings, and activities, including any subsequent monitoring activities.

- **Environmental Performance Agreements** (non-statutory instrument) negotiated among parties to achieve specified environmental results.

- **Pollution Prevention Planning Notices** (section 56 of CEPA) requiring the development of a plan to eliminate or reduce pollution at the source.

- **Environmental Labelling** as a complimentary measure for MBT and its precursors in the metalworking fluids sector. Proper labelling would promote safe handling and disposal. Furthermore, clear labelling with the substance identified and its concentration in the product would help direct its use in recycling and remanufacturing.

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 also will be considered in the instrument selection and development process. The proposed 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 substances[4]. 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 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 MBT and its precursors.

The Government of Canada plans to measure the effectiveness of the risk management actions by collecting and analyzing data, such as releases of MBT and its precursors from industrial effluents, which will help measure progress towards meeting the risk management objective.

In addition, the Government of Canada plans to collect and analyze data on the presence of MBT and, if warranted, its precursors in surface water, biosolids and sediments in order to establish a baseline environmental presence and again over time to measure progress towards meeting the environmental objective.

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[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).

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.

3.5 Risk Management Information Gaps

Interested stakeholders are invited to provide further information to inform risk management decision-making regarding MBT and its precursors, including the following:

- General information:
    - Hydrolysis and degradation rate of benzothiazoles, including MBT and its precursors;
    - Alternatives for MBT and its precursors for any of the activities identified in section 2.1;
    - Use, manufacture and import information for the benzothiazoles listed in Annex A and B, and for any other potential MBT precursors that are not discussed in this document;
    - Analytical methods for measuring and monitoring aquatic concentrations of benzothiazoles, including MBT, its precursors, and the total concentration of MBT plus its precursors, in industrial effluents and surface water;
    - For facilities that use MBT and/or its precursors, concentrations of MBT and its precursors in industrial effluents and surface water;
    - Efficiency of treatment methods in removing MBT and/or its precursors from industrial effluents;
    - Best management practices and technologies in place at facilities that use MBT and/or its precursors to reduce the release of these substances in industrial effluents;
    - Socio-economic and technical impacts and benefits associated with the proposed risk management for these substances; and
    - Changes in use patterns subsequent to previous data collection initiatives (noted in section 4.2 of this document).

- Tire and other rubber products manufacturing sector:
    - Use information, specifically on the use of MBT and/or its precursors as an accelerator in the vulcanization process;
    - Information on the typical quantities of unreacted MBT, and its precursors, remaining after the vulcanization process.

- Metalworking fluids sector:
    - Use information from the metalworking fluids sector, specifically on the use of MBT and/or its precursors as a corrosion inhibitor in lubricants;

    - For users of MBT and/or its precursors in metalworking fluids, whether MBT and/or its precursors are expected to be found in the final product, and if so, the potential release to the environment;
    - Feasibility of using alternatives to replace MBT and/or its precursors in the metalworking fluids sectors, for all functional uses and specifically as a corrosion inhibitor in lubricants.

- Mining industry subsectors:
    - Use information from subsectors of the mining industry that use MBT and/or its precursors as flotation reagents for mineral extraction;
    - Retention time of effluent in mine tailings storages facilities in certain subsectors of mining where MBT and/or its precursors are used;
    - For mining facilities that use MBT and/or its precursors:
        - Percentage of the handled substances released to tailings ponds;
        - Substance removal rates at onsite treatment systems before reaching tailings ponds; and
        - Substance removal rate in tailings ponds.

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 or informal data gathering) may be undertaken to collect additional information on MBT and its precursors to inform risk management decision making, which could include MBT precursors that were not included in the benzothiazoles subgroup.

4. Background

4.1 General Information on MBT and its Precursors

Benzothiazoles are heterocyclic compounds with similar physical and chemical properties that rarely occur naturally. All of the substances in the benzothiazoles subgroup contain the MBT moiety. Environmental releases of the MBT moiety may result from direct use and release of MBT, or through indirect release due to degradation of the parent compounds, in which case the MBT moiety may remain in the water given its solubility (ECCC, HC 2021). As such, MBT and its precursors will all contribute to the exposure and environmental impact.

4.2 Current Uses and Identified Sectors

4.2.1 Information Gathering

Use and volume information for MBT and the other substances in the benzothiazoles subgroup was obtained in part through a CEPA section 71 survey (Canada 2017). Based on the data received, several follow-up voluntary questionnaires were sent out to relevant industry stakeholders.

Reportable activities and codes included manufacturing and import of mixtures, products and manufactured items above a specific threshold, North American Industry Classification System (NAICS) codes, substance function codes, and consumer and commercial codes.

According to information submitted in response to a CEPA section 71 survey, the substances in the benzothiazoles subgroup listed in Annex A were imported into Canada in total quantities for MBT and 2(3H)-benzothiazolethione, sodium salt (SMBT) ranging from 10 000 to 100 000 kg, in 2014 or 2015; for 2-benzothiazolesulfenamide, N-(1,1-dimethylethyl) (TBBS), 2-benzothiazolesulfenamide, N-cyclohexyl- (CBS), benzothiazole, 2,2'-dithiobis- (MBTS) and 2-benzothiazolesulfenamide, N,N-dicyclohexyl- (DCBS) ranging from 100 000 and 1 000 000 kg, in 2014 or 2015. None of the substances in the benzothiazoles subgroup listed in Annex A were reported to be manufactured in Canada above the reporting threshold of 100 kg for either 2014 or 2015 (Canada 2017).

Major industrial uses of benzothiazoles include their use as: vulcanization accelerators in the manufacture of tire and other rubber products, corrosion inhibitors in metalworking fluids, and flotation reagents in some subsectors of the mining industry.

4.2.2 Vulcanization Accelerators

Based on submissions received in response to a CEPA section 71 survey (Canada 2017) and subsequent voluntary follow-up questionnaire, benzothiazoles are primarily used as process accelerators in the manufacturing of tire and other rubber products. Facilities will often employ more than one accelerator to produce rubber products (including tires) and can include accelerators from the same or different chemical groups. Benzothiazoles may either be received as a powder and weighed on site for various processes, or received in pre-weighed quantities. A majority of the accelerators are expected to be chemically bound in the rubber after vulcanization. The remaining amount of unreacted substance is predicted to be less than 1% (Wagner et al. 2018).

4.2.3 Mineral Flotation Reagent

On the basis of data obtained through a CEPA section 71 survey (Canada 2017), SMBT is used as a flotation reagent in various mining applications. In the froth

flotation process, the sodium salt will readily dissociate, yielding the MBT moiety. As such, the MBT moiety's physical-chemical properties will contribute towards the extraction of different ores, by efficiently separating the mineral from the slurry water.

4.2.4 Corrosion Inhibitors in Metalworking Fluids

According to information acquired from a CEPA section 71 survey (Canada 2017), SMBT is used as a corrosion inhibitor in lubricants. From the responses received through follow-up questionnaires sent to importers, it is mainly used in metalworking fluids.

Metalworking fluids are oils and other liquids that are used to cool and/or lubricate metal work pieces when they are being machined, ground, milled, etc. (Canada 2019a). Facilities that manufacture metal products or machinery, and those that are involved in the rebuilding and/or maintenance of these products use metalworking fluids.

Facilities in Canada may use metalworking fluids in operations such as corrosion preventive coating, heat treating, component manufacturing, adhesive bonding, and equipment repair and maintenance.

5. Exposure Sources and Identified Risks

Releases of MBT to the Canadian environment are expected to occur during the industrial use stages. As explained in section 4.1, MBT releases could be from the direct use and release of MBT or from indirect release due to degradation of the MBT precursors. 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 MBT to soil may occur via the application of biosolids from WWTS (ECCC, HC 2021). The following subsections address exposure sources of concern.

5.1 Use as Vulcanization Accelerators in Tire and Other Rubber Products Manufacturing

According to the screening assessment, MBT and its precursors are used as accelerators in the vulcanization process in tire and other rubber products manufacturing. When used, these substances are reacted and are therefore chemically bound in the products. However, it is possible that a small percentage of the unreacted starting materials remain after the vulcanization processes. During tire and other rubber products manufacturing, MBT and its precursors may be released to wastewater from compounding, vulcanization and other processes. The wastewater may go through on-site treatment systems including

an oil/water separator followed by discharge to surface water or a WWTS (ECCC, HC 2021).

5.2 Mining Subsectors that Use Mineral Flotation Reagents

The exposure scenario presented in the assessment applies to some subsectors of the mining industry in Canada that use SMBT as a flotation reagent, to assist in effectively separating the desired ore particles. When used in water, SMBT dissociates to MBT. Assuming that not all MBT could effectively be used during mining operations, nor destroyed by existing treatment processes at a given mining site, the remnant wastewater containing MBT may be discharged to a tailings pond located at a mine site and then discharged to the environment after additional treatment (settling of MBT) (ECCC, HC 2021).

5.3 Use as Corrosion Inhibitors in Metalworking Fluids

SMBT may be used as a corrosion inhibitor in various types of lubricants including metalworking fluids. The application of SMBT in metalworking fluids may result in releases to the environment when metalworking fluids are rinsed off from the metal surface during cleaning and finishing processes. In wastewater, SMBT will dissociate to produce MBT.

Use of SMBT in other types of lubricants for other applications including automotive, industrial, commercial, and institutional applications are less likely to result in releases to the environment as most spent lubricant products will be recycled and disposed of according to provincial requirements (ECCC, HC 2021).

6. Risk Management Considerations

6.1 Alternatives and Alternate Technologies

Suitability of alternative substances depend on the nature of the product and the performance characteristics desired by the manufacturer in the end-product as well as health, environmental, and socio-economic considerations.

Potential alternatives described in this section focus on the activities identified in section 2.1. It should be noted that 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.

MBT and its precursors are used as accelerators in the vulcanization of rubber, employed in both tire and other rubber products manufacturing facilities across Canada. There are several potential alternative accelerators available (Lanxess 2019; Performance Additives 2018). Potential substitutes include enamines,

which are formed by the reaction of secondary amines with carbonyl compounds. They comprise a class of secondary accelerators used in vulcanization processes, in conjunction with primary accelerators, such as thiazoles (Broussard et al. 2001; 2006).

Additionally, thiurams, including thioperoxydicarbonic diamide ($[H_2N)C(S)]_2S_2$), tetramethyl- (CAS RN[5] 137-26-8, also known as TMTD), are commonly used as process regulators for the manufacture of solid and latex rubber products, and may be used as alternatives to MBT and its precursors in certain applications. TMTD was assessed as part of the Screening Assessment for the Thiocarbamates Group. The screening assessment concludes that TMTD meets the criteria under paragraph 64(*a*) of CEPA as it is 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 (ECCC, HC 2021). As a result, TMTD is not considered a suitable alternative.

In some subsectors of the mining industry, MBT and its precursors are used as flotation reagents. Potential alternatives are available. Information on the chemical constituents of these products is not readily available.

Finally, MBT and its precursors are used as corrosion inhibitors in metalworking lubricants. A United States patent published in 2017 describes an invention relating to corrosion inhibiting compositions useful for metalworking fluids (Anderson and Williams 2015). An alternate technology developed by the Fraunhofer Institute for Laser Techonology (ILT) and RWTH Aechen University in Germany was designed to protect metal components against wear and corrosion (Fraunhofer ILT 2017). Many companies offer alternate products used for corrosion inhibition and metalworking.

In addition to alternative chemicals, investigation into process efficiency measures, end-of-pipe controls, and system improvements or innovation may assist in reducing releases of MBT and its precursors into the environment across all sectors identified.

6.2 Socio-economic and Technical Considerations

Socio-economic factors will be considered in the selection process for a regulation or 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 (TBS 2007).

[5] CAS RN: Chemical Abstracts Service Registry Number. 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.

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 (TBS 2018), the 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

7.1.1. Federal Risk Management

The National Pollutant Release Inventory (NPRI) is Canada's legislated, publicly accessible inventory of pollutant releases (to air, water, and land), disposals and recycling. Over 7,000 industrial, commercial and institutional facilities across Canada report to NPRI on more than 320 substances (Canada 2019b).

MBT (CAS RN 149-30-4) is one of the many reportable NPRI substances and is found on the 2018-2019 NPRI substance list, under the name 2-mercaptobenzothiazole. It currently has a manufacture, process or otherwise used reporting threshold of 10 tonnes, at a concentration of 1% or greater except for by-products (Canada 2019c).

For 2017 (the latest available data), 2 facilities reported MBT to NPRI, with a total of 2.7 tonnes disposed off-site, while 1.8 tonnes were recycled (Canada 2018a). These 2 facilities, both in the rubber sector, have been reporting MBT since 2016. No MBT releases were reported for 2017 or 2016 (Canada 2018a; 2018b).

To provide more information on releases, disposals and recycling of MBT in Canada and support any risk management actions, ECCC may consider whether to reduce the NPRI reporting threshold for this substance.

7.2 Pertinent International Risk Management Context

7.2.1 The United States

MBT (CAS RN 149-30-4) is found under section 313 of the *Emergency Planning and Community Right-to-Know Act* (EPCRA), requiring facilities that exceed a manufacturing, processing, or use threshold for this substance to report information on their handling practices to the *Environmental Protection Act* (EPA) (US EPA 2019a).

Two substances, SMBT (CAS RN 2492-26-4) and thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0) can be found on the list of Inert Ingredients in Pesticide Products under the *Federal Insecticide, Fungicide,*

and Rodenticide Act (US EPA 2019b). This list aims to regulate substance usage in registered pesticide products in the United States.

MBT is subject to data reporting requirements by any user or importer, under the *Code of Federal Regulations* (CFR), Title 40: Protection of Environment, Part 716: Health and Safety Data Reporting, because it is listed under section 716.120: Substances and listed mixtures to which this subpart applies (US EPA 2019c).

Under the CFR, Title 40: Protection of Environment, Part 136: Guidelines establishing test procedures for the analysis of pollutants, there are methods of detection for thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0). This substance is further regulated under Part 455: Effluent Guidelines for Pesticide Chemicals, along with 2(3H)-benzothiazolethione, zinc salt (CAS RN 155-04-4) (US EPA 2019c; 2019d; 2019e).

Thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0) and 2(3H)-benzothiazolethione, zinc salt (CAS RN 155-04-4) are listed under Section 304 of the *Clean Water Act* (CWA), which requires the EPA to develop guidelines for releases and standards for classes and categories of point sources to support the National Pollution and Discharge Elimination System (NPDES) permits program (US EPA 2019d; 2019e). Furthermore, thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0) is found within the Permit Compliance System which tracks NPDES surface water permits issued under the CWA (US EPA 2019d).

Thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0) is listed as an extremely hazardous substance under Section 302 of the EPCRA. Threshold planning quantities have been developed for this substance, to support preparedness for spills and releases. Should facilities which employ this substance exceed these limits, they must notify state emergency response commission, and engage with the local emergency planning committee in the local emergency planning process (US EPA 2019d).

Thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0) can be found within the Emergency Response Notification System, a database containing information on notifications of oil discharges and releases of hazardous chemicals (US EPA 2019d).

7.2.2 The European Union

A persistence, bioaccumulation and toxicity assessment under the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) regulation was completed for DCBS (CAS RN 4979-32-2). The conclusion, published on July 23rd, 2018, identifies DCBS as a persistent and bioaccumulative substance of very high concern in need of follow-up regulatory actions (ECHA 2018). Such actions are currently under development.

In Germany, MBT (CAS RN 149-30-4) was evaluated by the Federal Institute for Occupational Safety and Health through the Community rolling action plan . It was determined that restrictions and other community-wide measures are preventative measures to reduce potential risks (ECHA 2014). MBT is a candidate for Regulatory Management Option Analysis.

MBT is listed as an active ingredient in plant protection products under *Commission Regulation* (EC) No 2229/2004, regarding the placement of such products on the market (European Commission 2004).

Thiocyanic acid, (2-benzothiazolylthio)methyl ester (CAS RN 21564-17-0) is registered as an active substance in biocidal products under the *Biocide Products Regulations* (European Commission 2012).

7.2.3 Risk Management Alignment

Canada is partially aligned with the United States and the European Union because these jurisdictions have taken or are considering some actions to address environmental concerns from some of these substances such as restrictions on pesticide uses, reporting, guidelines for environmental releases, and environmental emergencies. However, Canada would be the only jurisdiction to propose risk management action to address releases of MBT and its precursors from industrial sources.

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 March 5, 2021.

If the final screening assessment confirms that MBT and its precursors are toxic to the environment, a Risk Management Approach document, outlining and seeking input on the proposed risk management instruments, would be published concurrently with the screening assessment. At that time, there would 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 MBT and its precursors are encouraged to identify themselves as stakeholders. The stakeholders will be informed of future decisions regarding MBT and its precursors 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 MBT and its precursors.

Publication of responses to public comments on the draft screening assessment and Risk Management Scope: Concurrent with the publication of the final 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 instruments: At the latest, 24-month from the date on which the ministers recommended that MBT and its precursors be added to Schedule 1 of CEPA.

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

Publication of the final instruments, if required: At the latest, 18-month from the publication of each proposed instrument.

These are planned timelines, and are subject to change. Please consult the schedule of risk management activities and consultations for updated information on timelines.

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ANNEX A. MBT and MBT Precursors Included in the Benzothiazoles Subgroup

CAS RN	DSL Name (Common Name)	Acronym
95-31-8	2-Benzothiazolesulfenamide, N-(1,1-dimethylethyl)	TBBS
95-33-0	2-Benzothiazolesulfenamide, N-cyclohexyl-	CBS
120-78-5	Benzothiazole, 2,2'-dithiobis-	MBTS
149-30-4	2(3H)-Benzothiazolethione (2-Mercaptobenzothiazole)	MBT
2492-26-4	2(3H)-Benzothiazolethione, sodium salt	SMBT
4979-32-2	2-Benzothiazolesulfenamide, N,N-dicyclohexyl-	DCBS

ANNEX B. Non-Exhaustive List of MBT Precursors not Included in the Benzothiazoles Subgroup

The table below is a non-exhaustive list of MBT precursors found on the *Domestic Substances List* (DSL). Further exploration of the DSL may lead to the identification of additional MBT precursors. In addition, there may be other substances containing the MBT moiety that are new to Canada (not shown).

CAS RN	Substance Name
95-29-4	2-Benzothiazolesulfenamide, N,N-bis(1-methylethyl)-
95-32-9	Benzothiazole, 2-(4-morpholinyldithio)-
102-77-2	Morpholine, 4-(2-benzothiazolylthio)-
155-04-4	2(3H)-Benzothiazolethione, zinc salt
3741-80-8	2-Benzothiazolesulfenamide, N-(2-benzothiazolylthio)-N-(1,1-dimethylethyl)-
7778-70-3	2(3H)-Benzothiazolethione, potassium salt
21564-17-0	Thiocyanic acid, (2-benzothiazolylthio)methyl ester
22405-83-0	Zinc, dichloro[2,2'-dithiobis[benzothiazole]]-, (T-4)-
32510-27-3	2(3H)-Benzothiazolethione, copper salt
38456-45-0	2(3H)-Benzothiazolethione, compd. with N-ethylethanamine (1:1)
65605-47-2	2(3H)-Benzothiazolethione, compd. with N-butyl-1-butanamine (1:1)
65605-48-3	2(3H)-Benzothiazolethione, compd. with N,N-diethylethanamine (1:1)
68911-68-2	Amines, C12-14-tert-alkyl, compds. with 2(3H)-benzothiazolethione
117920-00-0	Amines, C16-22-tert-alkyl, compds. with 2(3H)-benzothiazolethione (1:1)