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Risk Management Scope for Cyanides

Environment and Climate Change Canada

Health Canada

February 2018

Canada

Summary of Proposed Risk Management

This document outlines the risk management options under consideration for cyanides. In particular, the Government of Canada is considering measures to reduce anthropogenic releases of cyanides to water from the following industrial sectors:

- Metal Mining: Lower the national baseline total cyanide effluent quality standard in the Metal Mining Effluent Regulations (MMER) to reduce the risks on fish and fish habitat.
- Road Salts: working with the road salt mining sector and road salt importers and users to determine the feasibility of controlling the concentration of ferrocyanide salt in road salts or its release to the environment.
- Integrated Iron and Steel Manufacturing: working with industry and the Government of Ontario to gather additional information to determine whether there is a need to further limit total cyanide concentrations released from mill wastewater treatment effluent.

Because certain data gaps remain, the following information would be helpful and should be provided (ideally on or before 11 April, 2018), to the contact identified in section 8 of this document, to inform risk management decision-making:

- Metal Mines: additional practices that could be considered to reduce releases of total cyanide below the proposed MMER limits, obtain Weak Acid Dissociable (WAD) Cyanides concentrations in effluent, exposure and reference areas of metal mining facilities that use cyanides in their process.
- Road Salt: confirmation of types of road salts used across Canada that contain cyanides, minimum concentration of ferrocyanide needed to prevent caking in various environmental conditions, technical and/or economic feasibility of anticaking alternatives to ferrocyanide, ferrocyanide controls in other jurisdictions, amounts and concentrations of ferrocyanide in imported or domestic road salts.
- Iron and Steel Manufacturing: concentrations of total cyanides, weak acid dissociable cyanides and free cyanides in integrated mill effluent and in receiving water body downstream.

The risk management options outlined in this Risk Management Scope document may evolve based on information received from the public comment period or through consideration of assessments and risk management options published for other Chemicals Management Plan substances to ensure effective, coordinated, and consistent risk management decision-making.

Note: The above summary is an abridged list of options under consideration to manage cyanides and to seek information on identified gaps. Refer to section 3 of this document for more complete details.

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1. Context

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

As part of the third phase of the Chemicals Management Plan (CMP), the ministers plan to assess and manage, where appropriate, the potential health and ecological risks associated with approximately 1550 substances (Government of Canada, 2016). The Minister of the Environment and the Minister of Health have conducted a screening assessment of cyanides. (Environment and Climate Change Canada, 2016) Ten of these substances were identified as priorities for assessment as they met categorization criteria under subsection 73(1) of CEPA, and are listed in Annex A.

2. Issue

Environment and Climate Change Canada (ECCC) and Health Canada (HC) conducted a joint scientific assessment to evaluate cyanides in Canada under section 68 or 74 of CEPA. A notice summarizing the scientific considerations of the draft screening assessment for these substances was published in the Canada Gazette, Part I, on February 10 (Canada 2018). For further information on the draft screening assessment on cyanides, refer to https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/screening-assessment-cyanides.html.

[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 the use of consumer products. A conclusion under CEPA is not relevant to, nor does it preclude, an assessment against the hazard criteria specified in the Hazard Product Regulations and the Controlled Products 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 based on the criteria contained in section 64 of CEPA does not preclude actions being taken under other sections of CEPA or other Acts.

2.1 Draft Screening Assessment Conclusion

The draft screening assessment for cyanides focuses on free cyanide (consisting of the cyanide anion (CN-) and molecular hydrogen cyanide (HCN)) and free cyanide precursors, including the 10 substances listed in annex A.

The focus of the ecological assessment is on free cyanide as the forms of primary ecotoxicological significance, consisting of the cyanide anion (CN^-) and molecular hydrogen cyanide (HCN), and on precursors of free cyanide. The chemical entity (moiety) of concern is considered to be hydrogen cyanide (HCN), as it is expected to be the dominant free cyanide species under environmentally representative conditions. Based on the information available, the draft screening assessment proposes that free cyanide and precursors of free cyanide (cyanide salts and cyanide complexes) are toxic under section 64(a) of CEPA because they are 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.

The draft screening assessment also proposes that free cyanide and precursors of free cyanide meet the criteria for persistence but do not meet the bioaccumulation criteria as set out in the Persistence and Bioaccumulation Regulations made under CEPA (Government of Canada, 2000).

The ecological risks of concern, identified in the draft screening assessment, are based on the potential release of free cyanide from three main sectors of activity including: metal mining, use of ferrocyanide-containing road salts and iron and steel manufacturing. As such, this document will focus on these activities and exposure sources of potential concern (section 5.2).

Of note, the proposed risk management options described in this document and the proposed conclusion outlined in the draft screening assessment are preliminary and may be subject to change. For further information on the draft screening assessment of cyanides, refer to https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/screening-assessment-cyanides.html.

2.2 Proposed Recommendation under CEPA

Based on the findings of the draft screening assessment conducted under Section 68 or 74 of CEPA, the ministers propose to recommend that free cyanide, cyanide salts and cyanide complexes be added to the List of Toxic Substances in Schedule 1 of the Act[3].

[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

The ministers will take into consideration comments made and information provided by stakeholders during the 60-day public comment period on the draft screening assessment and Risk Management Scope. If the final screening assessment conclusion remains the same, and the ministers finalize the recommendation to add free cyanide, cyanide salts and cyanide complexes to Schedule 1, risk management instruments must 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 Environmental Objective

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

For these substances, the proposed objective is focused on addressing the exposure sources of concern from the sectors identified in the draft screening assessment, as outlined in section 5 of this document. As such, the proposed environmental objective for cyanides is to reduce anthropogenic releases of free cyanide and precursors of free cyanide to water, so as not to exceed the long-term predicted no-effect concentration (PNEC) for aquatic organisms of 1.7 µgHCN/L.

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, instrument(s) and/or tool(s) for a given substance or substances.

The proposed risk management objective for cyanides is to achieve the lowest level of releases of free cyanide and precursors of free cyanide to water that is technically and economically feasible, taking into consideration socio-economic factors, and in the case of road salts, roadway safety.

3.3 Proposed Risk Management Options under Consideration

To achieve the proposed risk management objective and to work towards achieving the proposed environmental objective, the risk management options being considered for cyanides include the implementation of regulatory and non-regulatory controls to minimize releases of cyanides to the Canadian environment. These proposed options are described below.

Substances List for further assessment, or recommend the addition of the substance to the List of Toxic Substances in Schedule 1 of the Act.

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

3.3.1 Metal Mining

There are currently existing tools to reduce anthropogenic releases of cyanides into the environment from the metal mining sector. Since 2002, the Metal Mining Effluent Regulations (MMER) under the Fisheries Act prescribes limits on the concentration of total cyanide in effluent (Government of Canada, 2002). This is the primary risk management tool currently used to reduce cyanides releases into the environment from the metal mining sector.

Following a recent review of the MMER the department is proposing to amend the regulations and reduce a number of the limits including the limits for total cyanide to reflect improvements in achievable performance in the sector. The monthly mean limit for total cyanide will be cut in half to 0.5 mg/L and this is expected to result in lower levels of cyanides released from metal mines. In the years following the coming into force of these amendments, ECCC will continue to monitor compliance with the new limits as well as the results of the Environmental Effects Monitoring (EEM) program to assess the effectiveness of these amendments in managing the risks associated with cyanide.

Additionally, an existing Environmental Code of Practice for Metal Mines published pursuant to subsection 54(4) of CEPA includes recommendations for the management of cyanides. This risk management instrument that is complimentary to the MMER could potentially be considered for an update to further improve the management of cyanides if additional recommended management practices are identified.

Furthermore, the following risk management instruments could potentially be considered as new complimentary tools to the MMER to further reduce the release of cyanides to water from precious metal mines:

- Pollution Prevention (P2) Plan (CEPA s.56), to further reduce the concentration of cyanides in effluent from precious metal mines;
- Environmental Performance Agreement (EPA), that would have as an objective the implementation of practices related to cyanides as per the existing Code of Practice for Metal Mines or the International Cyanide Management Code for the Gold Mining Industry (Cyanide Code) (ICMI, 2015). The Cyanide Code is referred to in the existing Code of Practice. The Cyanide Code could potentially be implemented at a wider scale as

part of an EPA (only 4 Canadian mines are currently certified under this code compared to 79 mines that report using cyanide in their process).

3.3.2 Road Salts

ECCC published a Code of Practice for the Environmental Management of Road Salts in 2004 (ECCC, 2004) Under this Code, municipalities and provinces that use more than 500 tonnes of road salts per year or that have a vulnerable area in their territory are encouraged to develop salt management plans addressing salt storage, application and snow disposal and report annually to ECCC on the implementation of these plans. The Code applies to the environmental management of road salts that contain inorganic chloride salts with or without ferrocyanide salts. As such, any reductions in releases of inorganic chloride salts to the environment resulting from the Code should have a co-benefit of reducing releases of ferrocyanide salts to the environment. A review of the implementation of the Code will be undertaken in 2019.

ECCC is proposing to work with the road salt mining sector, as well as importers and users of road salts, to gather information required to determine the feasibility of controlling the concentration of ferrocyanide salts in road salts or their release to the environment.

Should it be determined that controls are necessary, revisions to the Road Salts Code of Practice could be considered to minimize the need for ferrocyanides or their release to the environment.

Other risk management options that could be considered as necessary are a CEPA Section 56 Pollution Prevention Planning Notice, CEPA Section 54 Guideline/Code of Practice or an Environmental Performance Agreement with the Canadian salt mining industry and road salt importers.

3.3.3 Iron and Steel Manufacturing

Cyanides are produced incidentally in the coke making and the blast furnace of integrated iron and steel manufacturing plants. There are currently four integrated iron and steel manufacturing facilities in Canada, all located in Ontario. Ontario Regulation 214/95: Effluent Monitoring and Effluent Limits - Iron and Steel Manufacturing Sector monitors and controls the quality of effluent discharged from iron and steel plants in Ontario (Government of Ontario, 1995). Industrial facilities that discharge wastewater directly into Ontario’s lakes and rivers must sample, analyze and report the results, including total cyanide, to the ministry via the Ministry of the Environment Wastewater System (MEWS) web application. ECCC is proposing to work with the industry and the Government of Ontario to determine whether there is a need to further limit total cyanide concentrations released from integrated mill waste water treatment plants.

3.4 Risk Management Information Gaps

To further inform decisions on proposed risk management, additional information is being sought on the following:

- Metal Mining:
    - Obtain Weak Acid Dissociable (WAD) Cyanides (CN_{WAD}) concentrations in effluent and exposure and reference areas in the receiving water bodies of metal mining facilities that use cyanides in their process,
    - Additional practices that could be considered to reduce releases of cyanide beyond the proposed MMER limits.

- Road Salt:
    - Confirmation of types of road salts used across Canada that contain cyanides,
    - Minimum concentration of ferrocyanides needed to prevent caking in various environmental conditions,
    - Technical and/or economic feasibility of anticaking alternatives to ferrocyanides,
    - Ferrocyanide controls in other jurisdictions,
    - Amounts and concentrations of ferrocyanides in imported and domestic road salt,
    - Amount of road salts used by private organizations.

- Iron and Steel Manufacturing:
    - Seek further understanding of the cyanides released from integrated mills:
    - Obtain Weak Acid Dissociable (WAD) Cyanides (CN_{WAD}) concentrations and, if available,
    - Free Cyanide (CN_{Free}) concentrations in effluent(s) reported to the Ontario Government.
    - Gain a better understanding of sampling points for the different effluents.
    - Also, if available, get CN_{WAD} and CN_T concentration data in the receiving water body downstream from the effluent(s) discharge point(s).

Should stakeholders have further information to help address these gaps, they should provide it ideally on or before April 11, 2018 to inform the risk management decision-making process, within the timelines (and to the contact) identified in section 8 of this document.

4. Background

4.1 General Information on Cyanides

The ecological screening assessment focuses on free cyanide and its precursors. Because molecular hydrogen cyanide (HCN) is expected to be the dominant species under environmentally representative conditions, it is considered the moiety of concern. The 10 substances listed in annex A were identified as priorities for assessment under CMP3, including some ferrocyanides that were discussed in the PSL1 Road Salt Assessment (ECCC, HC, 2001).

4.2 Current Uses and Identified Sectors

Cyanides are imported into Canada for use by many sectors for a wide variety of applications. In addition, cyanides are incidentally manufactured in Canada by a few sectors where high temperature and pressure processes are used. The information that was collected on these uses and sectors was reviewed and presented in detail in the draft screening assessment. The sections below provide a summary of the uses and sectors where a potential risk was identified in the draft screening assessment.

4.2.1 Metal Mining

Sodium cyanide (CAS RN 143-33-9) is used mainly as an extraction agent for precious metals (e.g., gold, silver) and to a lesser degree base metals and as a result, free cyanide and precursors of free cyanide may be released in the effluent of metal mining facilities that use it. Reporting to the MMER indicates that 61 gold and silver mines and 18 other metal mines use cyanides in their extraction process. In a CEPA Section 71 survey conducted in 2011, quantities of sodium cyanide imported into Canada for use by the metal mining sector ranged from 10 000 and 50 000 tonnes. (Government of Canada, 2012).

4.2.2 Road Salts

Tetrasodium ferrocyanide (CAS RN 13601-19-9) is used mainly as an anticaking agent in road salts and may be released to the environment by run-off from road and pavement de-icing applications. Ferrocyanides are added to road salt at the mine where they are processed. Road salts containing ferrocyanides are used in Ontario, Quebec and the Atlantic provinces. From Manitoba to the interior of British Columbia, a by-product salt from Saskatchewan potash mines that is used as road salt is not treated with ferrocyanides. On the west coast, imported rock salt is pre-treated with ferrocyanides prior to importation. In a study conducted for Environment and Climate Change Canada in 2003, approximately 300-350 tonnes of ferrocyanides per year were reported imported from European and Asian manufacturers for use as an anti-caking agent (JEGEL, 2003).

4.2.3 Iron and Steel Manufacturing

Cyanides are incidentally manufactured by processes with high temperature and pressure and may be found in gas and in wastewater from blast furnaces at integrated iron and steel manufacturing mills. The draft screening assessment identified integrated iron and steel mills as a sector of concern since high total cyanide concentrations were found in the effluents of two of the four integrated steel mills in Canada, potentially resulting in high total cyanide concentrations in the receiving environment.

5. Exposure Sources and Identified Risks

5.1 Natural Sources

A number of cyanides are naturally occurring substances that may be produced in the environment by abiotic processes (e.g., combustion) and by biota (e.g. cyanogenic glycosides; produced as a natural plant defense agent). Gaseous or particulate cyanide emissions from combustion may enter surface waters by deposition or surface runoff (Barber, Lutes, Doorn, Fuchsman, Timmenga, & Crouch, 2003). Biomass burning and forest fires are a source of HCN to the atmosphere (Li, et al., 2000) (Simpson, et al., 2011) and may represent more than 90% of all natural or anthropogenic air emissions (ECETOC, 2007). Other potential sources may include volcanoes or lightning (Cicerone & Zellner, 1983).

Higher plants produce small amounts of HCN as part of certain metabolic processes (Lechtenberg & Nahrstedt, 1999) and cyanogenic glucosides (CGs) are known to be produced in at least 2000 plant species (Speijers, 1993). Many edible plant-based foods naturally contain CGs, which have the potential to release HCN. There are numerous types of CGs (e.g., linamarin, amygdalin, dhurrin) that exist and the degree to which a particular glycoside is present varies depending on the given plant (FSANZ, 2014). Examples of foods that contain cyanogenic glycosides include lima beans, apple seeds, cassava, bamboo, stone fruit pits (e.g., apricot, peach, cherry), and flax seed. The leaching and subsequent hydrolysis of cyanogenic glucosides from plant matter may release HCN to the environment (Bjarnholt, Laegdsmand, Hansen, & Jacobsen Ohm Moller, 2008). Aquatic microorganisms such as green algae (Chlorella sp.) and particularly the blue-green algae (Anacystis nidulans) can produce HCN (Gewitz, Pistorius, Voss, & Vennesland, 1976) (Pistorius, Jetschmann, Voss, & Vennsland, 1979). A review by NICNAS determined that cyanides may be produced by other microorganisms (i.e., bacteria and fungi), as well as a small number of invertebrates (e.g., arthropods) (AGDH, 2010).

5.2 Anthropogenic Releases to the Environment

Anthropogenic releases of cyanides to the environment have been identified in the draft screening assessment as posing a risk in some sectors which are identified below, particularly when released directly to the aquatic environment.

5.2.1 Metal Mining

The cyanide anion (CN-) is the main reagent used to extract gold and other precious metals efficiently from ore (Johnson, Leinz, Grimes, & Rye, 2002). Major steps in ore processing include grinding and crushing, chemical / physical separation and dewatering (ECCC, 2009). Cyanides (e.g., NaCN) may be added in the grinding circuit or during ore separation processes involving flotation or cyanide leaching which is the dominant process for the recovery of metallic gold or silver (ECCC, 2009). Mines that use cyanides often use treatment technologies to destroy the cyanide in effluent, though some operations rely solely on natural degradation of cyanide (Hatch, 2014). In Canada, common technologies used for the removal of cyanides from mining wastes (e.g., effluent and tailings) are the SO2-air process and the hydrogen peroxide process. Natural degradation is often used as a polishing step.

Measured concentrations of cyanides in environmental media in the vicinity of metal mines across Canada were gathered from a variety of reports, studies and databases. Sources of information included reports submitted to ECCC's Environmental Effects Monitoring (EEM) Program under the MMER. This information, which is presented in the draft screening assessment and its supporting documentation, indicated that approximately 40 percent of measured concentrations of total cyanide in samples collected in areas receiving metal mining effluent exceed predicted no-effect levels.

5.2.2 Road Salts

Ferrocyanides are used as anti-caking agents in road salts to prevent clumping (EC + HC, 2001). While the ferrocyanide anion is stable and exhibits low toxicity to organisms, in solution it can fully dissociate via photolysis to produce free cyanide (HCN) (EC + HC, 2001) (Exall, Rochfort, & Marsalek, 2011). Road salts containing iron cyanides are applied as de-icing agents on roads and parking lots in Canada during the late fall, winter and early spring seasons (EC + HC, 2001) (Exall, Rochfort, & McFadyen, 2013).

5.2.3 Iron and Steel Manufacturing

Free cyanide and other species may be found in gas and in wastewater from coke plants and blast furnaces at iron and steel manufacturing facilities (Luzin, Kazyuta, Mozharenko, & Zen'kovich, 2012) (Petelin, Yusfin, & Travyanov, 2008) (Yu X, 2016). Cyanides are produced by the reaction between carbon and nitrogen under reducing conditions and high temperature (>1000 ^{o}C); conditions that are found during coking and blast furnace operations (Wong-Chong, Nakles, & Luthy, 2006c) (Petelin, Yusfin, & Travyanov, 2008). Cyanides may be found in coke oven gas (COG) and blast furnace gas, in cooling water that has been in contact with COG, in flushing liquor from cleaning of COG, or in blast furnace gas scrubber effluent (Wong-Chong G. N., 2006b) (U.S. EPA, 2008).

The Predicted Environmental Concentrations (PECs) based on total cyanide in reported effluent releases from two integrated iron and steel manufacturing sites in Ontario were greater than the long-term predicted no-effect concentration value of 1.7 µg/L (Ontario, 2016).

6. Risk Management Considerations

6.1 Alternatives and Alternate Technologies

For sectors of concern identified in the draft screening assessment, it is not expected that chemical alternatives or alternate process technologies would be a practical approach to minimizing releases of free cyanide.

However, it should be noted that there are cyanide-free gold extraction technologies currently being developed. The extent of their application is not well known.

Although alternatives to road salts are available that do not contain ferrocyanides, these have not been proven to be cost effective or efficient for wide-spread use. Municipal and provincial authorities are best qualified to determine which de-icing chemicals are suitable for use considering their local environmental sensitivities and road conditions to ensure road safety. Alternatives to road salts should therefore not be considered as an overall risk management option for ferrocyanides.

In a study conducted for Environment and Climate Change Canada in 2003, no effective alternatives to ferrocyanides as an anti-caking agent in road salts were found (JEGEL, 2003).

In the case of integrated iron and steel manufacturing, additional effluent control technologies could likely be an effective approach, as appropriate and economically feasible.

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). Socio-economic factors will also be considered in the development of regulations, instrument(s) or tool(s) as identified in the Cabinet Directive on Regulatory Management (Treasury Board of Canada Secretariat, 2012a) and the guidance provided in the Treasury Board document Assessing, Selecting, and Implementing Instruments for Government Action (Treasury Board of Canada Secretariat, 2007).

7. Overview of Existing Risk Management
7.1 Related Canadian Risk Management Context

The Canadian Council of Ministers of the Environment (CCME) water quality guidelines recommend a maximum value of 5 µg/L for free cyanide in freshwater to protect the aquatic life (CCME, 1997).

7.1.1 Metals Mines

The Metal Mining Effluent Regulations (MMER), under the Fisheries Act, authorizes the deposit of deleterious substances[4] into natural fish-bearing waters. Schedule 4 of these regulations prescribes concentration limits in effluent for certain parameters including a maximum authorized monthly mean concentration of 1 mg/L for total cyanide. Facilities are also required to conduct Environmental Effects Monitoring (EEM) programs under which water quality monitoring, including the monitoring of total cyanide, must be completed in the exposure area surrounding the point of entry of effluent into water from each discharge point and from the related reference areas.

Proposed amendments to the MMER were published under the Canada Gazette, Part I, on May 13th, 2017 and are the result of an extensive review of the regulations. The proposed amendments include lowering the authorized limits for cyanide to reflect improvements in achievable performance in the sector.

The Environmental Code of Practice for Metal Mines, published according to subsection 54(4) of CEPA, is designed to support the MMER and includes other subjects that are not dealt with in the MMER and may have an influence on the environmental impact of mining operations. The objective of the Code is to identify and promote recommended best practices to facilitate and encourage continual improvement in the environmental performance of mining facilities throughout the mine life cycle. It includes recommendations for the management of cyanides and refers to the International Cyanide Management Code (see section 7.2.1).

All provinces and territories have established effluent limits for metal mines, either by regulations, permits, licenses, or certificates of approval. The limits are generally the same as those in the MMER, or more stringent to address site-specific or jurisdiction-specific circumstances.

[4] A deleterious substance is defined by the Fisheries Act as any substance that, if added to water, makes the water deleterious to fish or fish habitat or any water containing a substance in such quantity or concentration or has been changed by heat or other means, that if added to water makes that water deleterious to fish or fish habitat.

7.1.2 Road Salts

Environment Canada developed a Code of Practice on the Environmental Management of Road Salts in 2004 (ECCC, 2004). Under this Code, municipalities and provinces that use more than 500 tonnes of road salts per year or that have a vulnerable area in their territory are encouraged to develop salt management plans addressing salt storage, application and snow disposal and report annually to ECCC on the implementation of these plans. The Code is intended to be used in conjunction with the Salt Management Guide and Syntheses of Best Practices developed by the Transportation Association of Canada (TAC, 2013), as well as any other federal, provincial, territorial or municipal maintenance standards. Releases of sodium ferrocyanide to the environment are indirectly controlled through the best management practices that are included in individual salt management plans developed to address the Code.

7.1.3 Iron and Steel Manufacturing

Environment and Climate Change Canada published an Environmental Code of Practice for Integrated Steel Mills in 2001 (ECCC, 2013). The Code lists environmental performance standards for atmospheric emissions, water and wastewater, wastes, and environmental management practices for new integrated steel mills. The Code also provides a set of environmental performance goals that existing mills can strive to achieve through continual improvement over time.

Ontario Regulation 214/95: Effluent Monitoring and Effluent Limits - Iron and Steel Manufacturing Sector (Government of Ontario, 1995) falls under the Ontario Environmental Protection Act. The purpose of the regulation is to monitor and control the quality of effluent discharged from iron and steel plants in Ontario. All industrial wastewater facilities must have an environmental compliance approval to establish, use, operate, or modify a facility. The environmental compliance approval normally imposes site-specific effluent limits and monitoring and reporting requirements for the operation of the facility. Industrial facilities that discharge effluent directly into Ontario’s lakes and rivers must sample, analyze and report the results to the ministry via the Ministry of the Environment Wastewater System (MEWS) web application.

7.2 Pertinent International Risk Management Context

7.2.1 Metal mines

Internationally, several countries have banned cyanides leach technology in mining. In the United States, Montana banned the use of cyanide heap-leach processes used in open pit mines (implemented November 6, 1998) (MEIC, 1998) and counties in the state of Colorado have the authority to ban the use of cyanides in gold mining (implemented March 22, 2007) (Associated Press, 2007)

The Czech Republic, Germany, Brazil, Costa Rica, Turkey, and some provinces in Argentina have also banned the technology (Rodriguez, 2009).

In addition, the International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold (Cyanide Code) was developed by a multi-stakeholder Steering Committee under the guidance of the United Nations Environmental Program (UNEP) and the then-International Council on Metals and the Environment (ICME) (ICMI, 2015).

The Cyanide Code is a voluntary industry program for gold and silver mining companies. It considers the best practices regarding cyanides from codes and regulations of various jurisdictions. It focuses exclusively on the safe management of cyanides and cyanidation mill tailings and leach solutions. Companies that adopt the Cyanide Code must have their mining operations that use cyanides to recover gold and/or silver audited by an independent third party to determine the status of Cyanide Code implementation. Those operations that meet the Cyanide Code requirements can be certified and 4 Canadian mines are currently certified. A unique trademark symbol can then be utilized by the certified operation. Audit results are made public to inform stakeholders of the status of cyanides management practices at the certified operation.

The objective of the Cyanide Code is to improve the management of cyanides used in gold and silver mining and assist in the protection of human health and the reduction of environmental impacts.

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 sections 3.3). Please submit additional information and comments prior to April 11, 2018. The Risk Management Approach document, which will outline and seek input on the proposed risk management instrument(s), will be published at the same time as the final screening assessment. At that time, there will be further opportunity for consultation.

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

Environment and Climate Change Canada
Chemicals Management Division
Gatineau Quebec K1A 0H3
Tel: 1-800-567-1999 | 819- 938-3232
Fax: 819-938-3231

Email: eccc.substances.eccc@canada.ca

Companies who have a business interest in cyanides are encouraged to identify themselves as stakeholders. Stakeholders will be informed of future decisions regarding cyanides and may be contacted for further information.

Following the public comment period on the Risk Management Approach document, the Government of Canada will initiate the development of the specific risk management instrument(s), where necessary. Comments received on the Risk Management Approach document will be taken into consideration in the selection or development of these instrument(s). Consultation will also take place as instrument(s) are developed.

8.2 Timing of Actions

Electronic consultation on the Risk Management Scope: February 10, 2018 to April 11, 2018.

Submission of additional studies or information on Cyanides: on or before April 11, 2018.

Publication of responses to public comments on the draft screening assessment and Risk Management Scope: on or before March 31, 2019.

Publication of the final screening assessment and, if required, the Risk Management Approach document: on or before March 31, 2019.

Publication of responses to public comments on the Risk Management Approach, if applicable and if required, the proposed instrument(s): at the latest, 24-month from the publication of the final Screening Assessment Report

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-month from the publication of each proposed instrument(s)

9. References

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Annex A. List of Substances Identified as Remaining Priorities for Assessment

CAS RN[5]	DSL name	Common name	Molecular formula	Molecular weight (g/mol)
74-90-8	Hydrocyanic acid	Hydrogen cyanide	HCN	27.03
143-33-9	Sodium cyanide	Sodium cyanide	NaCN	49.01
506-61-6	Argentate(1-), bis(cyano-C)-, potassium.	Potassium dicyanoargentate	$KAg(CN)_2$	199.00
13967-50-5	Aurate(1-), bis(cyano-c)-, potassium	Potassium dicyanoaurate	$KAu(CN)_2$	288.1
13601-19-9	Ferrate(4-), hexakis(cyano-c)-, tetrasodium, (oc-6-11)	Tetrasodium ferrocyanide (Yellow prussiate of soda YPS)	$Na_4Fe(CN)_6$	303.91
13746-66-2	Ferrate(3-), hexakis(cyano-c)-, tripotassium, (oc-6-11)-	Tripotassium ferricyanide	$K_3Fe(CN)_6$	329.25
13943-58-3	Ferrate(4-), hexakis(cyano-c)-, tetrapotassium, (oc-6-11)-	Tetrapotassium ferrocyanide (Yellow prussiate of potash YPP)	$K_4Fe(CN)_6$	368.35
14038-43-8	Ferrate(4-), hexakis(cyano-c)-, iron(3+) (3:4), (oc-6-11)-	Ferric ferrocyanide or Prussian blue, insoluble	$Fe_4[Fe(CN)_6]_3$	859.3
25869-00-5	Ferrate(4-), hexakis(cyano-c)-, ammonium iron(3+) (1:1:1),(oc-6-11)-	Ferric ammonium ferrocyanide	$Fe(CN)_6Fe(NH_4)$	291.88

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CAS RN[5]	DSL name	Common name	Molecular formula	Molecular weight (g/mol)
25869-98-1	Ferrate(4-), hexakis(cyano-c)-, iron(3+) potassium (1:1:1), (oc-6-11)-	Potassium ferric ferrocyanide (Turnbull's blue or Prussian blue, soluble)	$Fe(CN)_6FeK$	306.90