Discussion Paper – Proposed Elements for a Code of Practice for the Environmentally Sound Management of End-of-life Mercury-containing Lamps and Targeted Guidance for the North

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1. Introduction

Environment Canada is developing a code of practice to provide technical guidance for the environmentally sound management of mercury-containing lamps at end-of-life. The code of practice will take into consideration the international guidelines developed by the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal[1] and the OECD 2004 Recommendation on the Environmentally Sound Management of Waste,[2] as well as best management practices for managing mercury wastes from provinces, territories and industry.

Recognizing the challenge of managing end-of-life products in northern and remote communities, Environment Canada will also develop targeted guidance for remote areas and the North to provide information on options for diversion and end-of-life management of mercury-containing lamps tailored to their specific needs and circumstances.

[1] The *Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury* were adopted by the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (by decision BC-10/7) in October 2011.

[2] Organisation for Economic Co-operation and Development, 2004, *Recommendation on the Environmentally Sound Management of Waste*.

The code of practice and targeted guidance are part of a broader risk management strategy[3] for ensuring that mercury wastes are managed appropriately in Canada. Also, they will serve as practical guidance that provinces, territories and industry may use to support the objectives of the Minamata Convention on Mercury, adopted in October 2013.[4] This convention commits Parties to take measures to address all aspects of the mercury life cycle, including measures to control atmospheric emissions and releases to land and water, and requirements for the environmentally sound management of mercury wastes.

This document outlines key elements of the code of practice and the targeted guidance for consultation with provincial, territorial and municipal environmental authorities, industry, and non-governmental organizations.

2. Background

Mercury is a volatile, highly toxic substance and is listed on Schedule 1[5] of the *Canadian Environmental Protection Act, 1999*. Mercury can be released to the environment from anthropogenic activities such as the use and disposal of products containing mercury. Once released, mercury becomes persistent (i.e., it cycles between air, water, land, plants and animals for extended periods of time) and has the potential to accumulate in living organisms. In the environment, mercury converts into methyl mercury, which becomes increasingly potent as it moves up the food chain. In humans, methyl mercury can cause an array of health problems including brain damage and neurological development effects in fetuses, infants and young children.

In Canada, the responsibility for managing and reducing waste is shared among federal, provincial, territorial and municipal governments. Municipal governments are responsible for collecting and managing waste from homes for recycling, composting and disposal. The authorization or approval of waste storage or management facilities to operate (i.e. under permits or licences) falls under the jurisdiction of the provinces and territories. Permits may specify conditions for facility operation, or requirements for the management of mercury wastes. As well, the development and implementation of waste management regimes are the purview of provinces and territories. At the federal level, Environment Canada exercises responsibilities with respect to international obligations under multilateral environmental agreements; international and interprovincial movements of hazardous waste; releases of toxic substances to the air, land and water; and activities on federal lands.

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[3] The broader risk management strategy includes the *Notice Regarding Pollution Prevention Planning in Respect of Mercury Releases from Dental Amalgam Waste* and the *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans in Respect of Mercury Releases from Mercury Switches in End-of-Life Vehicles Processed by Steel Mills*.

[4] Canada signed the Minamata Convention on October 10, 2013. As of August 29, 2014, 102 countries are signatories to the Convention, and 1 country (the U.S.) has ratified. The Convention will enter into force after 50 countries have ratified.

[5] Mercury and its compounds are listed on Schedule 1, Toxic Substances List, of the *Canadian Environmental Protection Act, 1999*.

For mercury-containing products such as lamps, environmentally sound management at end-of-life includes their diversion from the municipal waste stream; separation and recovery of the mercury-containing components; and recycling, or stabilization and disposal of the waste mercury. The diversion of mercury wastes from the general waste stream reduces the amount of mercury disposed of in municipal landfills, where it is difficult and expensive to address mercury emissions in air, leachate and waste water effluent. Currently, it is estimated that approximately 10% to 15% of mercury-containing lamps sold in Canada are recycled; the rest go to landfills.

Recognizing that wastes such as mercury should be managed appropriately at end-of-life, the Canadian Council of Ministers of the Environment approved the Canada-wide Action Plan for Extended Producer Responsibility in 2009, which commits jurisdictions to work together to develop an approach or regulations for extended producer responsibility to divert various end-of-life products and materials, including lamps that contain mercury, from landfills.

Federal Actions on Mercury-containing Lamps

On February 26, 2011, Environment Canada published the proposed *Regulations Respecting Products Containing Certain Substances Listed in Schedule 1 to the Canadian Environmental Protection Act, 1999*. The regulations would prohibit the use of mercury in most products and limit the mercury content in some essential products such as mercury-containing lamps. Under the regulations, lamps that contain mercury would need to be labelled with consumer information about their mercury content and safe disposal.

Administered by Natural Resources Canada, the *Energy Efficiency Regulations* for light bulbs, which came into effect in 2014,[6] set new standards for light bulbs that will effectively phase out the use of most incandescent lamps. Although the energy savings will decrease mercury releases from the power generation sector, the regulations will have the effect of increasing the use of energy-efficient lamps that contain mercury (such as fluorescent tubes and compact fluorescent lamps), thereby increasing the quantity of mercury-containing lamps that need to be managed at end-of-life.

International Action on Mercury Waste

Wastes containing mercury should be managed in an environmentally sound manner to prevent releases and emissions to the environment. This is recognized domestically and by the international community. Parties (including Canada) to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal adopted the *Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental*

[6] The *Energy Efficiency Regulations* set minimum energy efficiency standards for general service lighting for homes and businesses. The standards for 100 and 75 watt light bulbs would apply to products manufactured on or after January 1, 2014, and for 60 and 40 watt light bulbs manufactured on or after December 31, 2014.

Mercury and Wastes Containing or Contaminated with Mercury in October 2011. The Technical Guidelines provide broad guidance applicable to all Parties on capacity building, waste management plans or strategies, environmentally sound options and technologies, and best management practices, which conform to the provisions of the Basel Convention and respond to the Parties' obligations to achieve environmentally sound management of mercury wastes.

3. Approach to the Code of Practice

3.1. Purpose

Environment Canada has assessed various options for a federal approach to address the management of waste mercury-containing lamps to prevent the release of mercury to the environment. The Department is developing a code of practice that will outline the technical aspects for achieving environmentally sound management of mercury-containing lamps at end-of-life and will include targeted guidance to address the specific needs and circumstances of remote areas and the North.

Currently, the provinces of British Columbia, Manitoba and Quebec have legislated extended producer responsibility programs that require manufacturers and importers of mercury-containing lamps to establish or join a program that collects lamps and recovers the mercury in an environmentally sound manner. In addition, Ontario has a voluntary program, and many municipalities run household hazardous waste depots that collect mercury lamps.

The code of practice and targeted guidance for remote areas and the North will be voluntary tools that will complement provincial and industry-led extended producer responsibility programs. The code will promote consistent lamp recycling practices across Canada, and will serve as a reference for industry and governments by outlining considerations for environmentally sound management consistent with international agreements, industry standards and relevant guidance. It is anticipated that provincial and territorial governments may use the code and guidance within their waste management regimes, for example by incorporating elements into their extended producer responsibility or waste management regulations. Aspects of the code of practice and targeted guidance could also be referenced in industry plans for recycling programs that may be required under provincial and territorial regimes.

The code of practice and targeted guidance will be reviewed and updated periodically to take into account advancement in technologies and practices, and new developments under international agreements. In addition, Environment Canada will monitor and assess the effectiveness of the code of practice and guidance in achieving their goal of maximizing the environmentally sound recycling of mercury lamps and preventing releases of mercury from the end-of-life management of lamps.

3.2. Scope

The code of practice and targeted guidance will focus on the technical aspects of the end-of-life management of mercury-containing lamps from all sources (i.e., residential, institutional and commercial uses), and will detail best practices and environmentally sound options for the handling, collection, storage, transportation, recycling, and disposal of mercury to prevent mercury releases to the environment. Examples of types of mercury-containing lamps include: fluorescent (linear – T5, T8, T12; compact; nonlinear; induction; cold cathode; external electrode; other), mercury vapour discharge, sodium vapour discharge, metal halide discharge, automotive, other discharge lamps, and cold cathode tubing for signage or cove lighting.

3.3. Environmentally Sound Management

For the purpose of the code of practice and guidance, environmentally sound management means taking all practical steps to ensure that wastes consisting of, containing or contaminated with mercury or mercury compounds are managed in a manner that will protect human health and the environment against adverse effects, which might result from such wastes.[7] To achieve this outcome, Environment Canada will develop a code of practice and targeted guidance for remote areas and the North for the environmentally sound management of mercury waste from lamps. The code of practice will take into consideration international requirements for mercury waste management under multilateral environmental agreements to which Canada is bound as well as industry best management practices and the Canadian experience to ensure the code of practice is appropriate for the Canadian situation. In developing the code of practice and targeted guidance, Environment Canada will review international guidance, such as the Basel Convention technical guidelines for mercury waste, which may have useful elements that could be tailored to the Canadian context.

For spent mercury-containing lamps, environmentally sound management means ensuring that the waste lamps are collected separately from the general waste stream, and handled, transported, processed and stored in a manner that prevents releases of the mercury into the environment, and that the waste products are treated to recover the mercury or stabilized prior to environmentally sound disposal.

3.4. Effectiveness Evaluation

Environment Canada will monitor the implementation of the code and targeted guidance for remote areas and the North, and assess their effectiveness, in achieving their goal of

[7] Based on the definitions under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, which defines environmentally sound management as “taking all practical steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against adverse effects, which might result from such wastes”, and the scope for mercury wastes as defined by the Convention’s Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury (which were adopted in 2011).

maximizing the environmentally sound recycling of mercury lamps and preventing releases of mercury from the end-of-life management of lamps. As a tool to monitor implementation, Environment Canada will consider a reporting mechanism.

4. Key Elements for a Code of Practice for the Environmentally Sound Management of Mercury-containing Lamps at End-of-Life

Key elements of the code of practice include provisions for:

- handling, separation, collection
- transportation
- storage
- waste management operations (i.e., recovery and recycling, and final disposal)
- facility design and construction
- facility operation and maintenance
- environmental management systems
- environmental response plans
- training and awareness
- reporting

4.1. Handling, Separation, Collection

General considerations will be described for the handling, separation and collection of waste mercury-containing lamps. The information could include recommendations for diverting mercury-containing lamps from the municipal waste stream; handling to prevent breakage and minimize human exposure and releases to the environment; separating lamp waste from other wastes to prevent contamination; use of appropriate collection containers that minimize breakage and are capable of containing mercury vapour or mercury-contaminated powder from broken lamps; and proper labelling of collection containers.

4.2. Transportation

General provisions for the transportation of spent mercury-containing lamps and mercury wastes will be discussed. Information could include an explanation of requirements for the transportation of mercury wastes, including recyclable materials, under current federal regulations, in particular the *Transportation of Dangerous Goods Regulations*, the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* and the *Interprovincial Movement of Hazardous Waste Regulations*. Technical information on the packaging, containment, labelling, tracking and use of authorized carriers of mercury wastes for transport could also be outlined.

4.3. Facilities

Provisions for facility design and construction to prevent leakage or releases of mercury from storage and waste management facilities could include recommendations on locating or siting facilities; facility ventilation systems that prevent human exposure to mercury-contaminated air, and are equipped with mercury-emission controls to prevent mercury-contaminated air from being emitted to the environment; and construction materials for facilities (e.g., floors of storage sites that are impervious to mercury or mercury compounds). Guidance pertaining to systems for emissions monitoring, waste water collection, facility security, and fire alarm and protection may also be included.

Guidance on facility operation and maintenance may include provisions for developing and implementing environmental management systems (e.g., ISO 14001 for Environmental Management Systems), and securing the facility and restricting access. Measures to safeguard human health and safety should be implemented at mercury waste storage facilities, and may include processes for reporting injuries, accidents, releases or other incidents; employee training; insurance coverage for worker compensation; provision of personal protective equipment; and use of engineering controls to minimize exposure.

4.4. Storage

Recommendations on the environmentally sound storage of waste mercury-containing lamps and mercury-contaminated components from such waste could include technical considerations for the design, construction, operation and maintenance of the storage facilities.

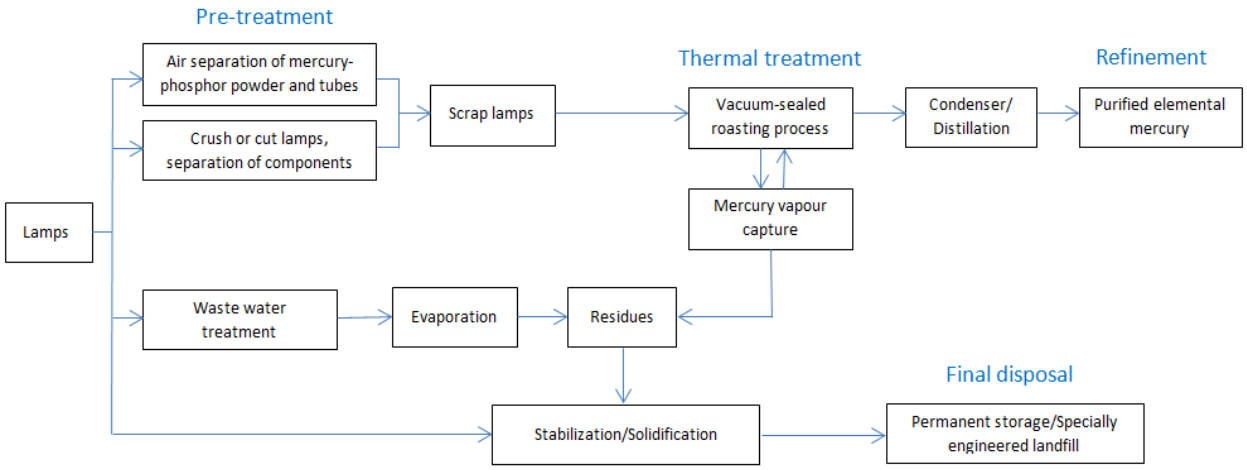
Provisions for storage facility design and construction to prevent leakage or releases of mercury from storage facilities, beyond those identified in section 4.3 for all facilities, could include recommendations pertaining to storage container(s) that are compatible with the material stored, and adequate storage containment capacity. Additional guidance on storage facility operation and maintenance may include storage areas, proper containment, recommended storage periods, monitoring and inspection of storage site(s) and containers, and record keeping.

4.5. Waste Management

An overview of recovery, recycling and disposal operations that are environmentally sound management options will be provided, taking into consideration the Basel Convention Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of Elemental Mercury and Wastes Containing or Contaminated with Mercury. Recovery and recycling of mercury from spent lamps includes pre-treatment (e.g., air separation of mercury-phosphor powder and tubes, mechanical crushing to separate lamp components), treatment to recycle or reclaim mercury and mercury compounds (e.g., thermal treatment, chemical oxidation, chemical precipitation, adsorption treatment), and distillation to purify the mercury for re-use. Environmentally sound disposal of mercury wastes from lamps include: physico-chemical treatment or stabilization of mercury waste and disposal in landfills specially engineered to handle mercury waste; and thermal treatment with mercury vapour capture and subsequent

treatment of the captured mercury. Figure 1 illustrates mercury flows from waste lamps to recovery or final disposal.

Figure 1: Flow of mercury from end-of-life lamps to recovery or disposal



Recommendations for the environmentally sound recycling, recovery and disposal of mercury-containing lamps and their mercury-contaminated components could include technical considerations for the design, construction, operation and maintenance of facilities that manage and process mercury wastes from lamps.

Provisions for waste management facility design and construction to prevent leakage or releases of mercury, beyond those identified in section 4.3 for all facilities, could include recommendations for processing equipment, and recovery and disposal methods. Additional guidance for waste management facility operation and maintenance may include provisions for processing areas and equipment, incineration emissions, landfill leachate, and monitoring, inspection and testing of disposal sites.

4.6. Emergency Response Plans

Facility emergency response plans may include information on identifying potential hazards, worker training programs, general emergency protocol, emergency communication plans, and review and testing of emergency response plans. The code may provide information on procedures to respond to general spills, accidents or other emergencies that take into consideration existing guidance by Health Canada and other sources.

4.7. Training and Outreach

It is essential that workers understand the environmental and health risks associated with mercury, as well as the measures in place to ensure that mercury is not released to the

environment. Recommendations for worker training may include development and implementation of training programs for facility workers on the environmental management systems, health and safety (including how to use personal protective equipment), and emergency response plans and procedures.

Public participation is a key aspect of successfully diverting mercury lamps from municipal landfills to environmentally sound recycling. A recommendation for the development and implementation of outreach programs to encourage public participation in recycling programs and provide information on proper lamp disposal at collection depots will be included.

4.8. Reporting

To facilitate the assessment of the effectiveness of the code, Environment Canada will consider a reporting mechanism. Stakeholders may be requested to retain records and provide information on the following:

- efforts to implement the code
- how the code is being used by governments and industry
- which elements of the code are implemented and how
- challenges faced in implementing the code
- updates on the development and implementation of extended producer responsibility or stewardship programs for lamps, including their success in diverting lamps from the general waste stream

5. Targeted Guidance for Remote Communities and the North

This guidance will present information on diversion options and end-of-life management for northern and remote communities. In developing this guidance, Environment Canada intends to consult with jurisdictional authorities from the territories as well as the provinces. Information could address capacity building, information sharing on practical options, lessons learned, and experiences from northern and remote communities on their efforts to manage mercury wastes in an environmentally responsible manner.

6. Seeking Your Views

In addition to receiving general feedback on the code of practice and the targeted guidance and their approach, Environment Canada would appreciate your views on the following questions:

- Are there sources of information that should be considered during the development of the code or targeted guidance (e.g., international standards, standards developed by industry or third party certification bodies)?
- What are some of the challenges faced in recycling mercury lamps?
- What elements would be most useful in a code or targeted guidance?
- What are your views on a reporting mechanism?

- What type of information would stakeholders have that could be used for reporting and/or assessing the effectiveness of the code and targeted guidance?
- Do you wish to participate in consultations and/or be added to our distribution list for updates on the development of the code or targeted guidance?

Stakeholders are invited to provide written comments on this discussion document during a 60-day comment period, which will end on **November 28, 2014**.

Environment Canada will review all written comments and consider all input received in the drafting of proposed code of practice and targeted guidance for remote areas and the North. The draft code of practice will then be published for public comment.

7. How to Contact Us

Please submit your written comments by **November 28, 2014**, to one of the addresses provided below.

By mail: Waste Programs
Waste Reduction and Management Division
Environment Canada
Place Vincent Massey
351 St. Joseph Boulevard, 9th Floor
Gatineau QC K1A 0H3

By email: dechethgwaste@ec.gc.ca
Please type "Consultation on proposed code of practice for mercury-containing lamps" in the subject line of your message.

Related links:

For more information on mercury and the environment, please visit the Environment Canada website www.ec.gc.ca/mercure-mercury/.