First draft report on the development of guidance on methodologies for inventories of mercury releases to land and water

15 May 2019

Introduction

The Conference of the Parties in its decision MC-2/3 on releases to land and water established a group of technical experts to develop draft guidance on methodologies for preparing inventories for a list of potentially relevant point source categories, and requested the group to prepare a report including

- a list of any significant anthropogenic point source of release categories not addressed in provisions of the Convention other than article 9; and
- a suggested roadmap and structure for the development of draft guidance on methodologies for preparing its inventories.

Decision MC-2/3 also requested the secretariat to circulate a call to parties, signatories and other stakeholders to identify possible point source categories of releases to be included in the list referred to in paragraph 1 of the decision, and to compile the submissions into a report including the relevant point source categories identified in, inter alia, the United Nations Environment Programme toolkit for identification and quantification of mercury releases, the Minamata Initial Assessments and the Global Mercury Assessment, and to share the report with the group of experts.

Comments and relevant information were received from Argentina, Canada, Costa Rica, European Union, Mauritius, Montenegro, Norway, the Secretariat of the Barcelona Convention and the Mediterranean Action Plan, and Natural Resources Defense Council. These comments were compiled and circulated to the group of technical experts.

Definition of key terms

The group reviewed the submissions through two teleconferences. The group considered that, for the identification of "relevant sources" there needs to be a common understanding of its definition. A relevant source is defined in article 9 2(b) as *any significant anthropogenic point sources of release as identified by a Party that is not addressed in other parts of the Convention*. ~~categories not addressed in provisions of the Convention other than article 9,~~ The group further identified ~~there needs to be a common understanding about~~ what is meant by key terms such as "point source" and, ~~"significant",~~ and also which release sources are not "addressed" in other provisions of the Convention.

Point source

Article 9 of the Convention provides no definition of point source. UNECE Protocol on Pollutant Releases and Transfer Register provides that each Party shall establish and maintain a publicly accessible national pollutant release and transfer register that is facility-specific with respect to reporting on point sources, and accommodates reporting on diffuse sources. It defines "facility" as one or more installations on the same site, or on adjoining sites, that are owned or operated by the same natural or legal person; and "diffuse sources" as the many smaller or scattered sources from which pollutants may be released to land, air or water, whose combined impact on those media may be significant and for which it is impractical to collect reports from each individual source. The Protocol on Heavy Metals under the UNECE Convention on Long-Range Transboundary Air Pollution and the Convention for the Protection of the Marine Environment of the North-East Atlantic include definitions of related terms such as "stationary sources" and "land-based sources".

Under the Clean Water Act of the United States of America, the term “point source” means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture. (https://www.epa.gov/cwa-404/clean-water-act-section-502-general-definitions). The European Environment Agency defines a point source as a stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g. a pipe, ditch, ship, ore pit, factory smokestack (EEA Glossary, https://www.eea.europa.eu/help/glossary/eea-glossary/point-source). Definitions used in several other jurisdictions were provided by experts.

Significant

Subparagraph 2(b) of article 9 provides that “relevant source” means any *significant* anthropogenic point source of releases as identified by a party that is not addressed in other provisions of the Convention. There is a similar qualifier in article 8 which reads "...to include at least 75 percent of the emissions in each of the source categories in article 8". Therefore, parties have to evaluate what sources ~~may decide whether a source~~ of releases to land or water within its territory is significant, and thus triggers measures for controlling and/or reducing the releases. In doing so, parties may take into account the quantity of releases, location and exposure pathways.

Addressed in other provisions of the Convention

The definition of relevant source in Article 9 refers to any significant anthropogenic point source of release "*not addressed in other provisions of this Convention*". The purpose of this section is to outline which sources are not addressed in other provisions of the Convention and thus define the scope of relevant sources in article 9. ~~Several other articles of the Convention address the control and reduction of releases of mercury and mercury compounds to land and water. Since article 9 provides for measures to control releases and development of inventory, one should consider whether other provisions address these aspects.~~

Pursuant to article 3, existing primary mercury mines are only allowed for a period of up to 15 years after entry into force of the Convention for a Party. Releases to land and water from mercury mines in this period are not addressed in article 3. ~~Mercury waste from mercury mining is covered by article 11.~~

Article 4 disallows the manufacturing of products listed in part I of annex A after the phase out date which is dependent on the exemption requests submitted by parties. However, releases to land and water from the production of products not listed in Annex A, including products that contain mercury below specified concentration limits, are not addressed in article 4. For dental amalgam in part II of annex A, a party has the option to choose, out of nine measures, to promote best environmental practice to reduce releases. As such, mercury releases from dental practices are addressed for parties that choose to promote best environmental practice, but not addressed for parties that do not choose so. Part II of annex A does not describe ~~It is not described~~ what is best environmental practice, therefore it is advisable that mercury releases from dental practices should be part of the guidance on BAT/BEP for releases.

Subparagraph 5(a) of article 5 provides that each party with one or more facilities listed in annex B shall take measures to address emissions and releases of mercury and mercury compounds. Therefore, these facilities are addressed by article 5. Release inventory is not explicitly mentioned in article 5. Releases from manufacturing processes not listed in Annex B are not addressed by article 5.

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At this stage in the process I think it is more informative to show both views where there are diverging views.

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Article 7 provides that parties that determine that artisanal and small-scale gold mining (ASGM) is more than insignificant in their territory shall take steps to reduce, and where feasible eliminate, the use of mercury and mercury compounds, and the emissions and releases to the environment of mercury. Therefore, releases from ASGM is addressed by article 7, ~~while articles 11 and 12 also address some aspects. Release inventory is not explicitly mentioned in article 7.~~

Article 8 provides that parties shall require the use of best available techniques (BAT) and best environmental practices (BEP) to control, and where feasible, reduce emissions from new sources of emission to air. It also provides that, for existing sources, parties shall take measures that may include a quantified goal, emission limit values, the use of BAT and BEP, etc. Article 8 does not deal with releases of mercury to land and water. The guidance on BAT/BEP for emissions to air takes into account the need to minimize cross-media effects, such as releases to land and water and waste. The guidelines on air emissions do not address how to reduce releases to land and water, nor present technologies for BAT/BEP for releases. Therefore, mercury releases from sources listed in annex D is not addressed in article 8. However, countries may have already implemented technologies to reduce releases when installing abatement technologies for mercury to air. ~~The guidance on BAT/BEP adopted by the Conference of the Parties takes into account the need to minimize cross-media effects. Therefore, mercury releases from sources listed in annex D may be addressed by measures to implement article 8 for some countries, and may not be addressed by others. Release inventory is not explicitly mentioned in article 8.~~

Article 10 provides that parties shall take measures to ensure that the interim storage of mercury and mercury compounds other than waste is undertaken in an environmentally sound manner. The guidelines on the environmentally sound interim storage include measures to prevent releases. Therefore, releases of mercury and mercury compounds from interim storage is addressed by this article.

Article 11 provides that parties shall take appropriate measures so that mercury waste is managed in an environmentally sound manner, taking into account the guidelines developed under the Basel Convention. Section G in the Basel Convention guidelines describes methods for environmentally sound disposal of mercury waste. Disposal of mercury waste by release into a water body (D6) or release into sea/ocean including sea-bed insertion (D7) is not an environmentally sound disposal method according to this guideline. Accordingly, releases of mercury waste that is hazardous waste into a water body or sea/ocean is not allowed according to the Basel guideline.

Collection and treatment of mercury waste is covered by Basel Convention technical guideline, but discharge and treatment of wastewater/process water is not covered by the Basel Convention technical guideline.

Releases of mercury to land and water from waste handling operations is another aspect. The Basel Convention guideline includes technologies for recycling of mercury waste, but it does not deal with reduction of releases from industries that recycles mercury waste. The guideline includes releases from waste incineration and waste landfills. ~~Therefore, this article addresses releases of mercury to land and water arising from the management of mercury waste, including for example releases from treatment of tailings and slurries from non-ferrous metal production. However, the current guidelines under the Base Convention only describes releases from waste incineration and waste landfill. Release inventory is not explicitly mentioned in article 11.~~ Overall, releases from mercury waste is addressed for some aspects of waste handling but not for addressed for other aspects.

Article 12 provides that parties shall endeavor to develop appropriate strategies for identifying and assessing sites contaminated by mercury and mercury compounds. It does not include obligation of

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parties to address the releases of mercury releases Therefore, releases from contaminated sites are not addressed by article 12.

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Consolidated list of potentially relevant point source categories

The table below is a compilation of submissions on potentially relevant point sources, based on the UNEP toolkit for identification and quantification of mercury releases. The group of technical experts has not been able to review this table in detail, and the inclusion of a source category in this list does not imply that it was agreed by the group. It should be noted that some sources under these source categories may be regarded as diffuse sources.

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Preliminary list of potentially relevant point source categories

Source category in the Toolkit		Release points*	Remarks
Source category: Extraction and use of fuels/energy sources			
5.1.1	Coal combustion in power plants	Water: Releases from coal wash. Wet and semi-wet flue gas scrubbers may release waste water. Land: Solid flue gas residues used in cement production, under roads, deposited on-site or disposed to landfill. Solids from any water cleaning likely deposited?	~~Parties may address these releases as part of cross-media measures under article 8.~~
5.1.2.1	Coal combustion in coal fired industrial boilers	Similar with 5.1.1 for some big facilities. Minor facilities may release solid residues from dust filter.	~~Parties may address these releases as part of cross-media measures under article 8.~~
5.1.2.2	Other coal use	Perhaps releases as dust from filters in some cases.	.
NEW	Coal mining	Mercury levels low unless concentrated by for example coal wash, which is known to release mercury to water and land/waste deposits. Some countries apply coal wash in the mining areas.	
5.1.3	Mineral oils - extraction, refining and use	Mercury may be released to water from offshore oil extraction as well as from oil refining. The same is likely the case for on-shore extraction. Major oil-based industrial boilers and power generation with dust filters release mercury-containing filter residues to land or waste (depending on local regulation).	
5.1.4	Natural gas - extraction, refining and use	Offshore natural gas extraction releases mercury to water. The same is likely the case for on-shore extraction. Gas extraction in high-level mercury regions may have mercury filters from which residues are disposed ~~ofvas~~ of as waste or regenerated offsite. (Gas	

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		condensates have concentrated mercury and may sometimes be deposited or released to land. In some cases, mercury is extracted from the condensate for marketing or final disposal).	
5.1.5	Other fossil fuels - extraction and use	Lack of data on this subject	
5.1.6	Biomass fired power and heat production	Major biomass industrial boilers and power generation with dust filters may release mercury-containing filter residues to land or waste (depending on local regulation).	
5.1.7	Geothermal power production	Depending on technology vents may release mercury if underground is mercury-rich; sometimes mercury is absorbed in filters and absorbents are regenerated offsite (extracted mercury is marketed or disposed as waste), or perhaps in some cases disposed as waste.	
NEW	Reprocessing of spent nuclear fuels.	Lack of information on this subject	
Source category: Primary (virgin) metal production			
5.2.1	Mercury (primary) extraction and initial processing	May have massive releases to water and land.	
5.2.2	Gold (and silver) extraction with mercury amalgamation processes	Massive mercury releases to land and water	~~Addressed in Article 7~~
5.2.3	Zinc extraction and initial processing	Mining and concentration phases likely have significant mercury releases to water and land, but data are lacking. Extraction phase (smelting) has releases to water from wet gas cleaning and may also have releases to land. Direct leach technology may have releases to water and land (no quantitative data available).	~~Parties may address these releases as part of cross-media measures under article 8.~~
5.2.4	Copper extraction and initial processing	Mining and concentration phases likely have significant mercury releases to water and land, but data are lacking. Extraction phase (smelting) has releases to water from wet gas cleaning and may also have releases to land. Direct leach technology may have	~~Parties may address these releases as part of cross-media measures under article 8.~~

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		releases to water and land (no quantitative data available).	
5.2.5	Lead extraction and initial processing	Mining and concentration phases likely have significant mercury releases to water and land, but data are lacking. Extraction phase (smelting) has releases to water from wet gas cleaning and may also have releases to land. Direct leach technology may have releases to water and land (no quantitative data available).	~~Parties may address these releases as part of cross-media measures under article 8.~~
5.2.6	Gold extraction and initial processing by methods other than mercury amalgamation	Significant releases to land (on-site) and releases to water are reported.	~~Parties may address these releases as part of cross-media measures under article 8.~~
5.2.7	Aluminium extraction and initial processing	In the step of producing the intermediate alumina from bauxite, mercury releases to water take place; releases to land may take place. No data are available on releases from the final step from alumina to aluminium.	
5.2.8	Other non-ferrous metals - extraction and processing	Mercury releases to land from silver mining has been reported. For other non-ferrous metals extraction, releases to land and water may likely take place for some metal extraction but no data are available.	
5.2.9	Primary ferrous metal production	Mercury releases to land/waste are reported and water releases from wet scrubbers applied may take place.	
NEW	Processing of ferrous metals	Downstream processing of ferrous metals is expected to have only minor Mercury emissions/releases related to fuels use. Ferrous metals recycling is covered in 5.7.2.	This was proposed by experts. Need to look at whether this is covered by 5.2.9 and 5.7.2.
NEW	Diamond mining	Anecdotal information on cleaning of diamonds with Mercury exist, but no other data are available.	
Source category: Production of other minerals and materials with mercury impurities			
5.3.1	Cement production	Mercury is concentrated in the filter dust recycling step and dust may therefore be bled regularly to the final cement product or to deposited waste/land (no data available on detailed fate).	~~Parties may address these releases as part of cross-media measures under article 8.~~
5.3.2	Pulp and paper production	Releases to land and water are reported.	

5.3.3	Production of lime and light weight aggregates	Releases to land and water from lime production are reported.	
5.3.4	Other minerals and materials	Mercury releases from fertilizer production in some countries is known but published data are not available.	
Source category: Intentional use of mercury in industrial processes			
5.4.1	Chlor-alkali production with mercury-technology	Releases to water, land and absorption in building materials reported; some facilities have significant unaccounted mercury amounts, meaning major parts of releases/emissions are not accounted for quantitatively.	Addressed by article 5.
5.4.2	VCM production with mercury catalyst	Releases to water are reported. Releases to land may happen.	Addressed by article 5.
5.4.3	Acetaldehyde production with mercury catalyst	Releases to water are reported	Addressed by article 5.
5.4.4	Other production of chemicals and polymers with mercury	Releases to water and land from production of mercury-containing chemicals or with the use of mercury in the processes may take place. Releases may take place from alcoholates production.	Sodium or potassium methylate and ethylate production is addressed by article 5.
Source category: Consumer products with intentional use of mercury			
5.5.1	Thermometers with mercury	Releases to land and or water are reported for production of some mercury-added products (from breakage/spillages). The same is expected for other mercury-added products.	Releases from the manufacturing of these products are not covered by article 4.
5.5.2	Electrical switches and relays with mercury	Releases that may reach land and or water are reported.	Releases from the manufacturing of these products are not covered by article 4.
5.5.3	Light sources with mercury	Releases that may reach land and or water are reported.	Releases from the manufacturing of these products are not covered by article 4.
5.5.4	Batteries with mercury	Releases to land and water are reported	Releases from the manufacturing of these products are not covered by article 4.
5.5.5	Polyurethane with mercury catalysts	Releases to land and or water are reported for production of some mercury-added products. Releases may perhaps take place from cleaning of polyurethane sports floors with mercury catalysts.	Manufacturing is addressed by article 5. Releases from the use are not addressed.

5.5.6	Biocides and pesticides with mercury	Releases to land and or water are reported for production of some mercury-added products .	Manufacturing will stop pursuant to article 4.
5.5.7	Paints with mercury	Releases to land and or water are reported for production of some mercury-added products During application of paints, mercury may be released to water from cleaning of spillages and tools.	Manufacturing of biocidal paints will stop pursuant to article 4. Need to look at whether non-biocidal mercury-added paints are produced.
5.5.8	Pharmaceuticals for human and veterinary uses	Releases to land and or water are reported for production of some mercury-added products Mercury may be releases to water and land through excretion.	
5.5.9	Cosmetics and related products with mercury	Releases to land and or water are reported for production of some mercury-added products. Mercury in applied cosmetics will be washed out to water from households; potentially in overall significant amounts.	Releases from the manufacturing of these products are not covered by article 4.
Source category: Other intentional product/process use			
5.6.1	Dental mercury-amalgam fillings	Releases to water are reported throughout the lifecycle of dental amalgam; from placement of new fillings, from drilling of old fillings and urine excretion while filings are in the mouth (in households).	~~Parties may address these releases under article 4.~~
5.6.2	Manometers and gauges with mercury	Releases to land and or water are reported for production of some mercury-added products (from breakage/spillages).	Releases from the manufacturing of these products are not covered by article 4.
5.6.3	Laboratory chemicals and equipment with mercury	Releases to land and or water are reported for production of some mercury-added products (from breakage/spillages).	
5.6.4	Mercury metal use in religious rituals and folklore medicine	Releases to land and water are expected from both manufacture, trade and use (no quantitative data available); ayurvedic medicine in India is a major example of mercury use.	
5.6.5	Miscellaneous product uses, mercury metal uses, and other sources	Releases to land and or water are reported for production of some mercury-added products.	
NEW	Lighthouses	Releases to land and water may take place via washing of condensed evaporated mercury and spillages	
Source category: Production of recycled metals ("secondary" metal production)			
5.7.1	Production of recycled mercury	Releases to water and land/waste are reported	

	("secondary production")		
5.7.2	Production of recycled ferrous metals (iron and steel)	Releases to water and land/waste are reported (no quantitative data)	
5.7.3	Production of other recycled metals		
Source category: Waste incineration			
5.8.1	Incineration of municipal/general waste	Releases to water from wet flue gas cleaning reported. Releases to land/waste of ash and flue gas cleaning residues.	~~Addressed by article 11.~~
5.8.2	Incineration of hazardous waste	Expected to be like incineration of municipal waste above.	~~Addressed by article 11.~~
5.8.3	Incineration of medical waste	In many developing countries medical waste is burned at sub-optimal conditions and releases to land with solid residues are to be expected. For developed countries conditions are expected to be like described for municipal waste above.	~~Addressed by article 11.~~
5.8.4	Sewage sludge incineration	Expected to be like incineration of municipal waste above.	~~Addressed by article 11.~~
5.8.5	Informal waste burning	Significant amounts of mercury-added products are burned in the open in developing countries. Some of it may evade evaporation due to low temperatures and give rise to releases to land and water (leaching of remnants).	Diffuse sources
Source category: Waste deposition/landfilling and waste water treatment			
5.9.1	Controlled landfills/deposits	Releases to water (through leaching) are reported.	~~Addressed by article 11.~~
5.9.2	Diffuse disposal under some control	This source category refers to use of residues under roads and similar, which may be considered as releases to land, with potential for slow releases to water.	Diffuse sources
5.9.3	Informal local disposal of industrial production waste	In such instances releases to land and water may be expected.	Diffuse sources
5.9.4	Informal dumping of general waste	Informal dumping is in itself a release to land. It may also cause releases to water.	Diffuse sources
5.9.5	Waste water system/treatment	Releases to water and land (sludge application as fertilizer) are reported.	
Source category: Crematoria and cemeteries			
5.10.1	Crematoria/cremation	Releases to land/waste may take place where crematoria are equipped with Mercury filters.	

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5.10.2	Cemeteries	Cemeteries are direct releases to land.	

* Based on information aggregated for the UN Environment toolkit for identification and quantification of mercury releases. For additional details see https://www.unenvironment.org/explore-topics/chemicals-waste/what-we-do/mercury/mercury-inventory-toolkit

Structure and roadmap for the development of guidance on inventory

The following structure is proposed for the guidance on inventory, based on the existing guidance on the methodology for preparing inventories of emissions pursuant to Article 8.

- Background
- Steps to establish a releases inventory
- Initial steps: identify relevant point source categories and facilities releasing or potentially releasing mercury
- Collection of release information from individual facilities, including source and amounts of release when feasible
- Development of a release inventory database
- Making the data publicly accessible and searchable
- UNEP Inventory Toolkit

The development of guidance following this structure will not take much time. The methodologies for release estimation are basically determined already, and therefore the remaining work is to establish required releases calculation factors for relevant release scenarios for release source categories that do not already have such factors established in existing inventory tools.

Regarding the roadmap, there was a suggestion that since there will be a two-year period between COP3 and COP4, a roadmap may include the development of draft guidance on BAT/BEP for releases, as required under Article 9, paragraph 7(a). In this manner, draft guidance on both BAT/BEP and inventories could be considered at COP-4. The group briefly discussed this proposal, and other suggestions were made such as requesting the expert group to review the technologies for controlling releases from wastewater treatment facilities or to discuss which source categories may require guidance on BAT/BEP.

The following roadmap is proposed, in order to develop a draft guidance on standardized and known methodologies for preparing inventories for the sources included in the list.

Proposed roadmap for the development of release inventory guidance

Secretariat to circulate a call to parties and other stakeholders to submit existing information on factors to calculate release from the identified source categories. This will include contacts with relevant industrial associations and invitation for them to participate in the work of the group of technical experts.	January 2020
Secretariat to draft a general guidance for release inventories.	March 2020
The group of technical experts to review the submissions and draft general guidance. The group will advise the secretariat on further information collection.	April 2020
Draft general guidance to be posted on the Convention website for comments.	May 2020
Further information collection, if advised by the group of technical experts	May-August 2020
Secretariat to compile information including release calculation factors.	September 2020
The group of technical experts to finalize the draft general guidance and review the information including release calculation factors.	September 2020

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The draft general guidance, release calculation factors and other relevant information posted on the Convention website.	November 2020
Pilot use of the guidance by several parties to estimate mercury releases.	December 2020 - March 2021
The group of technical experts to review the outcome from the pilot.	April 2021~~0~~
Draft report of the intersessional work, including a proposed roadmap for the development of guidance on BAT/BEP, to be posted on the Convention website for comment	May 2021~~0~~
Report to COP 4 finalized.	July 2021~~0~~