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ISSUES IN BRIEF

The Minamata Convention and the Future of Mercury Abatement

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Mercury is a pollutant of global, regional, and local concern. Humans have mined mercury for millennia, and this silver-colored element is still commonly used in industrial processes and household products. An assessment by the United Nations Environment Programme (UNEP) estimated that 1,960 tonnes of mercury were released into the atmosphere from anthropogenic sources in 2010 (see Figures 1 and 2). At least another 1,000 tonnes were released by human activities into water (UNEP 2013a).

The Minamata Convention on Mercury, adopted in October 2013 in the Japanese city where a deadly mercury poisoning incident was recognized in the 1950s, sets out to "protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds" (Article 1). This new convention is a significant international legal and political milestone, as methylmercury, a potent neurotoxin, poses serious environmental and health risks to both children and adults (see Box 1).

The convention covers sources collectively responsible for 96 percent of atmospheric emissions included in the UNEP assessment, and its mandates will affect countries, firms, and consumers all over the world (see Table 1)[1]. However, initial controls will only have a limited impact on curbing global emissions and releases (Selin 2013). In light of the lack of explicit numerical reduction targets to meet its stated environmental and human health goal, the convention mandates must be strengthened and engender support from a broad set of public, private, and civil society actors.

This *Issues In Brief* focuses on the Minamata Convention and the future of mercury abatement. It outlines key treaty provisions and examines specific implementation needs, categorized into five sets of issues: supply and trade; products and processes; emissions and releases; artisanal and small-scale gold mining (ASGM); and resources and compliance (Selin, forthcoming). Further, it identifies five crucial measures needed to support improved mercury abatement and bolster the convention.

Supply and Trade

Mercury mining has declined in recent decades with closings of large mines in Europe and elsewhere (Hylander and Meili 2003). To continue this trend, the convention prohibits new mining that has not begun before the treaty enters into force for a party (Article 3), but countries with existing mining may continue for up to 15 years after becoming a party. There are limitations on how mined mercury can be used in products (Article 4) and manufacturing processes (Article 5), and such mercury must also not be re-used.

In 2009, 73 percent of all new mercury was extracted in China (1,400 out of a total world production of 1,920 tonnes), and phasing out this mining is essential to reduce primary extraction (UNEP 2013b). Continuing efforts by the UN, donor countries, and the Kyrgyzstan government to re-structure activities in the Khaidarkan mine — generating approximately 250 tonnes of mercury in 2009 — are important to address the second largest source of mined mercury (UNEP 2013b). Additional mining is spread out across a few other countries.

As mining decreases, strengthening controls on secondary sources is critical. The convention stipulates that excess mercury from the decommissioning of chlor-alkali facilities, the largest source of secondary mercury, cannot be re-used (Article 3). Parties must identify mercury supply sources generating over 10 tonnes per year as well as individual stocks exceeding 50 tonnes, but may continue to re-cycle such mercury. In addition, the Minamata Convention functions in parallel with the 1989 Basel Convention on the handling and transport of mercury wastes (Articles 10 and 11).

In conjunction with the 1998 Rotterdam Convention on trade in hazardous substances, the Minamata Convention makes faithful application of prior informed consent central to managing legal trades, and assisting parties that have banned imports to prevent mercury from entering the country (Article 3). An exporting party must receive written consent from the importing party before the shipment, and mercury may only be exported for permitted uses or environmentally sound storage. Trade with non-parties to the treaty is similarly regulated.

Products and Processes

Mercury is used in manufacturing processes and consumer products in all regions of the world. The convention targets several — but not all — of these, applying combinations of bans/phase-outs and restrictions. In particular the European Union and a few other countries have already taken important actions to reduce intentional use of mercury (Selin and VanDeveer 2006). However, reviewing and expanding controls on mercury use in products and processes will be a central part of treaty implementation for almost all countries.

Parties shall not allow the manufacturing, import, and export of nine major mercury-containing product categories — for which there exist mercury-free alternatives — after 2020 (Article 4 and Annex A, Part I).[2] Parties can, however, register a five-year exemption that the conference of the parties (COP) may extend for another five years, which could delay final phase-outs up to 2030 (Article 6). One other product, dental amalgam, is subject to restrictions where parties may voluntarily limit its use (Annex A, Part II).

The treaty covers five industrial processes for which there are mercury-free options. Mercury should be phased-out in two of these by 2018 and 2025, respectively (Article 5 and Annex B, Part I.)[3] Here too parties can apply for five-plus-five year exemptions (Article 6). Mercury-use should be reduced in the three other processes (Annex B, Part II). Of these, addressing high levels of mercury-use in vinyl chloride monomer (VCM) production — a key ingredient in polyvinyl chloride (PVC) manufacturing — in China is a key implementation issue.[4]

Box 1: The Mercury Issue

Mercury (Hg) is released from the Earth's crust through natural processes including volcanic eruptions and the weathering of rocks as well as human activities. During mining, industrial manufacturing, and the disposal of goods, mercury is released into the environment. The burning of coal also emits considerable amounts of mercury into the atmosphere. Mercury poses significant local contamination problems, but in its elemental form also travels long distances through the atmosphere before oxidizing and depositing in ecosystems. In aquatic systems, mercury from local and distant sources can convert by biological activity in anaerobic environments into methylmercury, a serious neurotoxin (Selin 2009). High-dose exposure can lead to significant neurological damage and fatalities. Low-dose exposure has been linked to developmental delays and neurological damage affecting brain and muscle capacity, especially in small children (AMAP 2011).

Table 1: Summary of Key Minamata Convention Provisions

SUPPLY AND TRADE

- New mercury mining is prohibited but existing extraction may continue for up to 15 more years after the treaty become legally binding for a party.
- Mined mercury may only be used in permitted products and manufacturing processes, and should be disposed of in ways that do not lead to continued re-use.
- Excess mercury from the decommissioning of chlor-alkali facilities cannot be re-used and parties should identify other major secondary sources and stockpiles of mercury.
- Mercury trades between parties can only take place after the importing party provides written prior informed consent.
- Parties can only export to non-parties that have measures in place to protect human health and the environment and follow treaty provisions on allowed uses, storage and disposal.
- Parties should only allow imports from non-parties proving guarantees that mercury comes from a source allowed under the treaty.

PRODUCTS AND PROCESSES

- Parties should cease manufacturing, import, and export of nine mercury-added product categories by 2020, but can ask for five plus five years of exemptions.
- Dental amalgam is subject to restrictions with a list of measures for reduced use that parties can elect to take.
- Parties should phase-out mercury use in two kinds of industrial processes by 2018 and 2025 respectively, but can ask for five plus five years of exemptions.
- Parties should reduce mercury use in three kinds of industrial processes where each process has its own requirements.
- Parties should discourage the manufacture and commercial distribution of new mercury-added products and the development of new facilities that use mercury in manufacturing processes.

EMISSIONS AND RELEASES

- Parties should apply BATs and BEPs to five categories of new point sources to control and where feasible reduce emissions no later than five years after the treaty enters into force.
- Parties should control and where feasible reduce emissions from five categories of existing point sources through emissions limit values, BAT, BEP, or other alternative measures including co-benefits strategies no later than 10 years after the treaty becomes legally binding.
- Parties should control and where feasible reduce mercury releases to land and water from point sources through BAT and BEP or alternative measures including multi-pollutant strategies.

ARTISANAL AND SMALL-SCALE GOLD MINING

- Parties should reduce and where feasible eliminate the use of mercury in, and the releases to the environment of mercury from ASGM mining and processing.
- Parties with “more than insignificant” ASGM and processing shall develop a national action plan outlining national objectives, reduction targets, and actions to eliminate whole ore amalgamation and open burning or amalgam as well as all burning of amalgam in residential areas.

RESOURCES AND COMPLIANCE

- The GEF Trust Fund shall provide financial resources to support treaty implementation, and additional financial resources for a specific international program should be provided on a voluntary basis.
- Parties shall cooperate to provide within their respective capabilities timely and appropriate capacity-building and technical assistance to developing country parties.
- A 15-member committee operating as a COP subsidiary body should promote implementation and address compliance issues.
- The COPs should no later than six years after entry into force begin periodical effectiveness evaluations of the convention.

To prevent additional mercury uses, parties must adhere to provisions discouraging the manufacturing and commercial distribution of new mercury-added products and the application of new mercury-reliant processes (Articles 4 and 5 and Annex B).

Emissions and Releases

Almost half of all global anthropogenic mercury emissions to air in 2010 originated from Asia, followed by Africa and South America (see Figure 2). One major way in which the convention addresses a large part of these atmospheric mercury emissions is by mandating the application of different forms of technical standards on five major categories of point sources, but without setting any minimum quantitative reduction targets (Article 8 and Annex D).[5]

Parties must apply Best Available Techniques (BATs) and Best Environmental Practices (BEPs) on "new" sources, to control and, where feasible, reduce emissions, no later than five years after the treaty enters into force for them. Countries are required to control and, where feasible, reduce emissions from "existing" sources within ten years of becoming a party, free to select between quantified goals, emission limit values, BAT, BEP, or multi-pollutant approaches.[6]

Because of their significance and relatively high contribution to global atmospheric mercury emissions, China and India should be the primary focus of efforts on regulating both existing and new coal-fired power plants to address current and future emissions. Developing more ambitious standards and practices and expanding the use of up-to-date control techniques for the other categories of industrial point sources in all regions of the world will also be a major part of the COP's future activities.

The convention furthermore regulates releases of mercury to land and water (Article 9). Parties are obligated to control and, where feasible, reduce releases from any significant anthropogenic point source that is not addressed in other provisions of the convention. Similar to the way in which atmospheric emissions are controlled, parties may apply BATs and BEPs or alternative measures including those capturing co-benefits from multi-pollutant strategies.

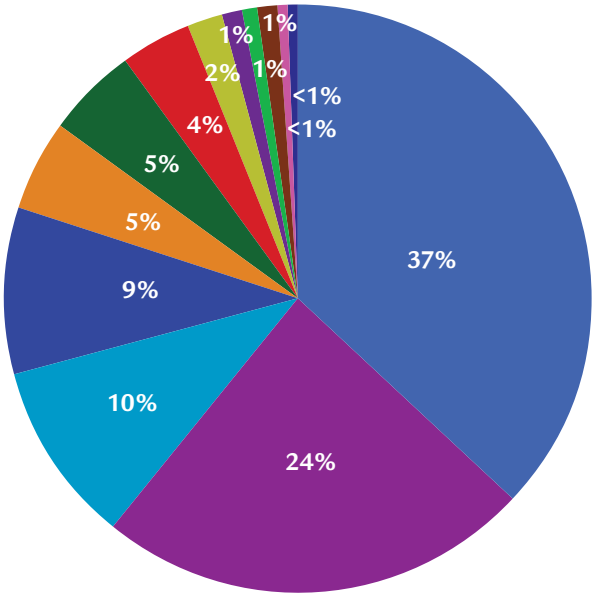
Artisanal and Small-Scale Gold Mining

ASGM was the largest source of atmospheric emissions in 2010 (see Figure 1). Combining air emission with releases into water bodies and land, ASGM discharges over 1,000 tonnes of mercury into the environment each year. Up to 30 percent of the world's mined gold comes from ASGM using mercury to separate the gold from the ore. Meeting provisions on ASGM requires engaging the more than 60 countries, mainly in Asia, South America, and Africa, where such activities take place (Sippl and Selin 2012).

Parties with ASGM shall reduce, and where feasible eliminate, the use and environmental releases of mercury from mining and processing (Article 7). Countries with "more than insignificant" ASGM and processing shall develop and implement a national action plan outlining national objectives and reduction targets, and actions to eliminate whole ore amalgamation, open burning of amalgam, as well as all burning of amalgam in residential areas where many such activities take place in processing centers (Annex C).

The ability to address ASGM-related issues also connects with the implementation of several other articles, including trade provisions. Many countries have banned mercury imports for ASGM, but mercury imported for other uses (including dental amalgam) is sometimes sold illegally to miners. Much mercury is also traded illegally. In addition, further development of provisions and technical guidelines on re-cycling and re-use will impact how mercury reaches and is used in the ASGM sector.

Figure 1: Atmospheric Mercury Emissions from Anthropogenic Sources in 2010 (1960 tonnes)



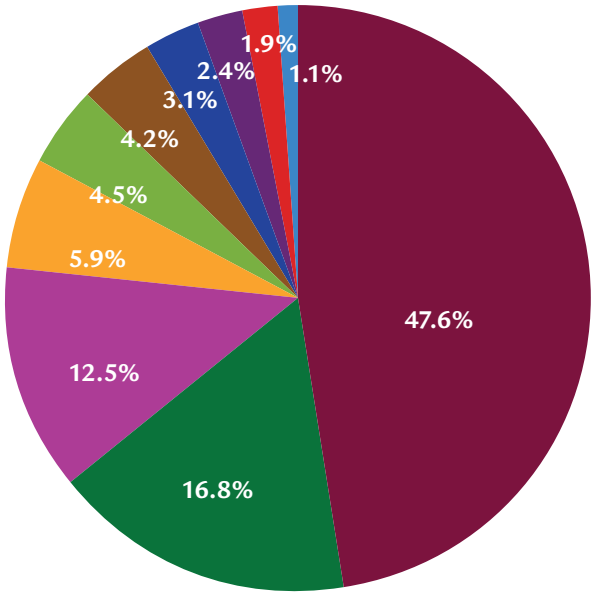
37% Artisanal and small-scale gold mining
24% Coal burning (all uses)
10% Primary production of non-ferrous metals (Al, Cu, Pb, Zn)
9% Cement production
5% Consumer product waste
5% Large-scale gold production
4% Contaminated sites
2% Primary production of ferrous metals
1% Chlor-alkali industry
1% Oil and natural gas burning
1% Oil refining
<1% Cremation (dental amalgam)
<1% Mercury mining

Source: UNEP, 2013a

Figure 2: Atmospheric Mercury Emissions from Anthropogenic Sources in 2010 By Region (1960 tonnes)

47.6% Asia
16.8% Africa
12.5% South America
5.9% CIS & other European countries
4.5% European Union (EU27)
4.2% Undefined (global total for emissions from contaminated sites)
3.1% North America
2.4% Central America and the Caribbean
1.9% Middle East
1.1% Australia, New Zealand & Oceania

Source: UNEP, 2013a



Many of the estimated 15 million people engaged in ASGM are unaware of the risks of handling mercury, creating a need for basic awareness raising (Spiegel and Veiga 2010). The convention also promotes research into non-mercury alternative practices, but the ability to switch to low-mercury or mercury-free methods is shaped by complex socio-economic factors as well as geological conditions; it is easier to transition to mercury-free mining when gold comes from particles in riverbeds rather than veins underground.

Resources and Compliance

Convention implementation is dependent on both resources and effective mechanisms for reviewing progress. The Global Environment Facility (GEF) Trust Fund is mandated to provide

"new, predictable, adequate and timely financial resources" to support implementation (Article 13). An additional international program will operate under the auspices of the COP. While developing countries argued that financial contributions to this program should be mandatory, opposition from industrialized countries resulted in an agreement that such contributions will only be voluntary.

The resource issue is closely tied to treaty provisions on capacity building and technology transfer. The convention stipulates that parties shall cooperate to provide, within their respective capabilities, timely and appropriate assistance to developing countries (Article 14). Such efforts may involve large inter-governmental organizations (IGOs) such as UNEP, the United Nations Industrial Development Organization (UNIDO), and the United Nations Institute for Training and Research (UNITAR), as well as be provided through bilateral channels.

Related to capacity and technology issues, there is a great need to assist countries instituting effective controls on emissions and releases as well as finding feasible substitutes for remaining mercury use in products and processes. To this end, convention-related activities on capacity building and technology transfer could benefit from involving the regional centers supporting implementation of the Basel Convention and the 2001 Stockholm Convention on Persistent Organic Pollutants (Selin 2012).

The convention establishes an implementation and compliance committee to promote implementation of, and review compliance with, the treaty (Article 15). The COPs should also no later than six years after entry into force begin periodic effectiveness evaluations (Article 22). The continuous and serious use of both these mechanisms is likely to be a major part of treaty implementation, as existing environmental agreements with formalized monitoring and review mechanisms have benefitted from using them to help target decision-making and expand controls.

Moving Forward

The Minamata Convention is part of a cluster of agreements on hazardous substances and wastes, together with the Rotterdam, Basel, and Stockholm Conventions. These earlier treaties were off to similarly modest beginnings as the Minamata Convention, but their respective COPs have strengthened mandates over time. This demonstrates that it is possible to make valuable progress towards better environmental and human health protection during treaty implementation (Selin 2010).

The Minamata Convention is initially more legally and politically important than environmentally significant; it creates a platform for continued cooperation, but many initial mandates are weak and do not take effect for another five, ten, or fifteen years. To achieve the goal of protecting the environment and human health from mercury emissions and releases, collaborative actions must be coordinated across global, regional, national, and local governance scales (Selin and Selin 2006; Selin 2011).

At least five broader measures will have a direct and prominent impact on the implementation of the Minamata Convention. For all of these, it is essential that the many efforts necessary to improve mercury abatement involve not only major IGOs and national governments, but also receive strong support from the large number of non-governmental organizations (NGOs), industry associations, and firms that engage mercury-related issues in many different ways.

First, it is essential that those states, IGOs, and NGOs who believe in the value of the Minamata Convention sustain the political leadership they showed during the treaty negotiations. This includes supporting timely ratification by countries as well as increasing awareness among

stakeholder groups and the public about the serious environmental and human health threats posed by mercury, and how the Minamata Convention addresses at least some of these risks.

Second, IGOs, donor countries, NGOs, and the private sector must play important roles in generating and dispersing funds and other kinds of material support for treaty implementation. From global forums down to local programs, the many efforts critical to meet provisions on reducing intentional uses, emissions, and releases of mercury are dependent on the availability of financial and human resources. Without them, abatement efforts will be severely hampered.

Third, IGOs, states, and NGOs should build on the UNEP Global Mercury Partnership program to assist countries that seek support in developing national and local administrative and management capacity to implement and enforce treaty-based standards. As part of the ratification and implementation process, this often involves first reviewing existing domestic standards followed by the formulation of implementation plans for developing domestic laws and controls.

Fourth, states, the private sector, IGOs, NGOs should support mercury abatement-relevant research and development. Because many of the main treaty provisions on emissions and releases are technology-based, it is critical to continue the development and diffusion of better and more cost-efficient control technologies. Technological developments also play important roles in phasing out mercury use in products and processes and addressing mercury use and discharges from the ASGM sector.

Fifth, efforts by states, IGOs, and research centers to expand scientific monitoring and data presentation on the global biogeochemical cycle of mercury could provide valuable information to decision-makers about the full scope of the mercury issue. Such data may assist the COPs engaging in effectiveness evaluation under Article 22, as well as national governments, to identify particular areas where there are needs for expanded controls or other political and administrative action to limit environmental and human health risks.

As mercury pollution continues to pose environmental and health risks all over the world, it is essential that concerted abatement measures are carried out in connection with the implementation of the Minamata Convention. Action — or inaction — that occurs today will have a long-lasting effect on levels of mercury exposure for generations to come.

Notes

1 Two main sources included in the UNEP assessment but not covered by the convention are primary production of ferrous metals and oil and natural gas burning.

2 The nine product categories are: Batteries; switches and relays; compact fluorescent lamps; linear fluorescent lamps; high pressure mercury vapor lamps; cold cathode fluorescent lamps and external electrode fluorescent lamps; cosmetics; pesticides, biocides and topical antiseptics; and non-electronic measuring devices including barometers, hygrometers, manometers, thermometers, and sphygmomanometers.

3 Major producers in Europe, North American, and Asia are taking steps to phase out mercury use in these two processes — acetaldehyde production by 2018 and chlor-alkali production by 2025 — but it is still unclear if the two deadlines will be met by all countries.

4 The three manufacturing processes are: VCM, sodium or potassium methylate or ethylate, and polyurethane.

5 The five categories are: coal-fired power plants; coal-fired industrial boilers; smelting and roasting processes used in the production of non-ferrous metals (e.g. lead, zinc, copper, and industrial gold); waste incineration facilities; and cement clinker production facilities.

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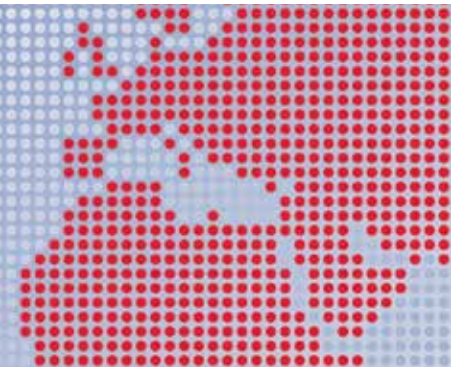

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6 A new source is defined as one where "construction or substantial modification" is started at least one year after the date of the entry into force of the convention for a party or entry into force of an amendment to Annex F for a party.

References

Arctic Monitoring and Assessment Programme. 2011. *AMAP Assessment 2011: Mercury in the Arctic.* Oslo: Arctic Monitoring and Assessment Programme.

Hylander, L.D. and M. Meili. 2003. 500 Years of Mercury Production: Global Annual Inventory By Region Until 2000 and Associated Emissions. *The Science of the Total Environment* 304(1): 13-27.

Selin, H. 2010. *Global Governance of Hazardous Chemicals: Challenges of Multilevel Management.* Cambridge, MA: MIT Press.

Selin, H. (forthcoming). Global Environmental Law and Treaty-Making on Hazardous Substances: The Minamata Convention and Mercury Abatement. *Global Environmental Politics* 14(1).

Selin, H. and S.D. VanDeveer. 2006. Raising Global Standards: Hazardous Substances and E-Waste Management in the European Union. *Environment* 48(10): 6-18.

Selin, N.E. 2009. Global Biogeochemical Cycling of Mercury: A Review. *Annual Review of Environment and Resources* 34: 43-63.

Selin, N.E. 2011. Science and Strategies to Reduce Mercury Risks: A Critical Review. *Journal of Environmental Monitoring* 13(9): 2389-2399.

Selin, N.E. 2013. Global Change and Mercury Cycling: Challenges for Implementing a Global Mercury Treaty. *Environmental Toxicology and Chemistry,* online. DOI: 10.1002/etc.2374

Selin, N.E. and H. Selin. 2006. Global Politics of Mercury Pollution: The Need for Multi-Scale Governance. *Review of European Community & International Environmental Law* 15(3): 258-269.

Sippl, K. and H. Selin. 2012. Global Policy For Local Livelihoods: Phasing Out Mercury From Artisanal and Small-Scale Gold Mining. *Environment* 54(3): 18-29.

Spiegel, S.J. and M.M. Veiga. 2010. International Guidelines on Mercury Management In Small-Scale Gold Mining. *Journal of Cleaner Production* 18(4): 375-385.

UNEP. 2013a. Global Mercury Assessment 2013: *Sources, Emissions, Releases and Environmental Transport.* Geneva: United Nations Environment Programme.

UNEP 2013b. *Global Chemicals Outlook: Towards Sound Management of Chemicals.* Geneva: United Nations Environment Programme.