AUGUST 2017

MINAMATA COP 1

BRIEF ON MERCURY CONTAMINATED SITES

WHY ARE MERCURY CONTAMINATED SITES A CONCERN?

Mercury contaminated sites represent a key source of mercury exposure for human health and the environment. Sites contaminated with mercury are both a legacy issue from the gold rushes of the 1800s and historical dumpsites, but continue to be created from current artisanal small-scale gold mining activities (ASGM), industrial and domestic waste dumping, and industrial activities such as mercury-based chlor-alkali production. Moreover, mercury contaminated sites represent secondary sources of metallic mercury that can enter the global market if appropriate measures are not taken.

THOUSANDS OF MERCURY CONTAMINATED SITES – A GLOBAL BURDEN.

Some estimates suggest that there are more than 3,000 mercury contaminated sites globally causing localised contamination, but also releasing an estimated 82 tonnes of mercury to the atmosphere and another 116 tonnes that are washed into waterways and surrounding landscapes by rainfall (Kocman et al 2013), making contaminated sites a major source of global mercury releases that must be addressed.

The true number of mercury contaminated sites is expected to be much higher on the basis that most documented cases are in the US and Europe where established systems of identification and assessment have been in place for decades. Few sites in the developing world have been identified due to lack of political will, data, knowledge, resources and guidance (which is urgently needed).

THE URGENT NEED FOR CONTAMINATED SITES GUIDANCE.

The Mercury Treaty contains provisions under Article 12 for Parties to develop systems to identify and assess sites, noting that any risk reduction measures must be conducted in an environmentally sound manner. Article 12 encourages the Conference of the Parties (COP) to develop and adopt guidance on identification and assessment of contaminated sites and risk reduction methods including site management and remediation.

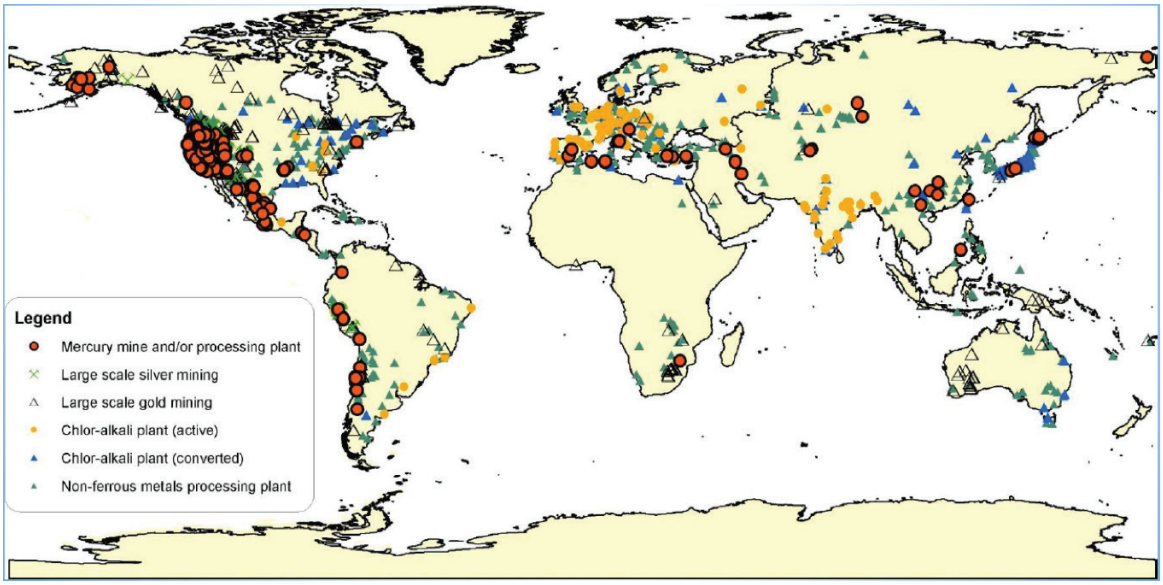

Figure 1. Global mercury contaminated sites. *Source: Kocman et al 2013.*

Specifically, the Treaty states at Article 12, paragraph 3:

> *The Conference of the Parties shall adopt guidance on managing contaminated sites that may include methods and approaches for:*
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> *(a) Site identification and characterization;*
>
> *(b) Engaging the public;*
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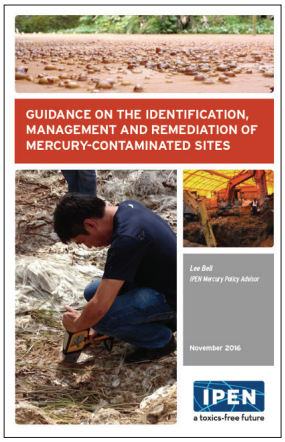
> *(c) Human health and environmental risk assessments;*
>
> *(d) Options for managing the risks posed by contaminated sites;*
>
> *(e) Evaluation of benefits and costs; and*
>
> *(f) Validation of outcomes.*

At INC 7, the African region, supported by many individual countries and the Asia-Pacific region, strongly urged all delegates to make a decision to adopt guidance on mercury contaminated sites. Eventually a decision was made for the Secretariat to compile documents provided by countries and other stakeholders for consideration as the basis for guidance at COP 1. It is expected this compilation and a draft guidance document will be presented by the Secretariat at COP 1 that may form the basis of contaminated sites guidance.

IPEN has provided a detailed mercury contaminated sites guidance document focusing on how to identify sites economically, with cooperation from civil society, and how to manage them without causing additional environmental contamination or harming human health.



The IPEN guidance, which has been submitted by a number of parties as the basis for global contaminated sites guidance development, also describes environmentally sound technologies for remediating mercury contaminated sites and excludes landfill and incineration.

REMEDIATION GOAL - CAUSE NO HARM. PROTECT COMMUNITIES DURING CLEAN-UP.

Guidance should not be solely based on risk assessment concerned with how much mercury a community can 'tolerate,' but needs to incorporate approaches and technologies that prevent community exposure to mercury. Some contaminated site clean ups have resulted in greater exposure for local inhabitants due to poor control of dust and vapours from the impacted site. Using simple transportable enclosures with negative air pressure such the one pictured below* ensures that contaminants can be controlled and exposure risks for local communities are alleviated– even during the detailed investigation stage.

Figure 2. Temporary remediation enclosure.
Source: Australian Government

MERCURY RECOVERED FROM CONTAMINATED SITES SHOULD BE RESTRICTED FROM SALE.

When mercury contaminated soil is treated, many technologies 'strip' or recover the mercury from the soil using distillation processes. This may result in tens or even hundreds of tonnes of elemental mercury being recovered from a single site depending on the extent of contamination. This is especially relevant for the mercury-based chlor-alkali plants that are subject for replacement by non-mercury-based chlorine production technology under the Minamata Convention. However, the sites of the older plants may remain contaminated after the facility has been closed or demolished. If this mercury is allowed to re-enter the global marketplace, a good deal of it is likely to be used for activities such as ASGM, creating new contaminated sites in locations that are least able to manage them.

It would be especially problematic if well-resourced developed countries remediate their mercury contam-

inated sites (at considerable expense) only to export the recovered mercury to developing countries where it may enter a new contamination cycle. In the same way that surplus mercury from shuttered chlor-alkali plants is not permitted to be traded, the recovered mercury from contaminated sites should be labelled and subject to the same restrictions. To prevent remobilisation of mercury recovered from contaminated sites through the mercury supply chain it should be rendered unable to be used as mercury.

MERCURY 'RETIREMENT'

'Retirement' of mercury from the supply chain can be achieved by changing its form to prevent its reuse. An effective method is sulphide stabilisation, where mercury and sulphur are mixed at an elevated temperature in a closed vessel to prevent vapor release. The resulting mercury sulphide is stable, unusable as elemental mercury, and can be retired from the market to longterm storage.

Another method being developed that permanently prevents mercury reuse (and in some cases assists remediation of waterways) is containing mercury within a polymer structure. Scientists are developing a range of approaches to achieve this, including one method using industrial sulphur waste and an orange peel derivative called limonene. The resulting material, sulfur-limonene polysulfide, is stable and the mercury cannot be re-used.

Figure 3. Mercury 'retired' by sulphide stabilisation.
Source: Bethlehem Apparatus Co. U.S.A.

Figure 4. A block of sulfur-limonene polysulfide.
Source: Max Worthington, Flinders University

Key issues on contaminated sites to consider at COP 1 include:

- The urgent need to adopt guidance to allow developing countries to inventory and prioritise sites immediately;
- Adoption of a 1 ppm mercury concentration threshold for soils and sediments above which these sites should be classified as contaminated with mercury. This threshold should be harmonised with the mercury waste threshold definition to ensure that soil and other materials excavated from contaminated sites are treated to recover mercury and not dumped in other locations.
- The adoption (including technology transfer) of non-incineration and non-landfill techniques to recover mercury from contaminated soil to allow land to be reused. Technologies such as vacuum distillation are currently being used to decontaminate mercury impacted soils to levels below 1 ppm.
- From a human health and environmental risk perspective, sites that exceed 1 ppm should be defined as contaminated and subject to management options to prevent human exposure.
- Ecologically sustainable remediation techniques should be applied to ensure the land is suitable for sensitive uses such as food production, residential living and biodiversity protection.
- Environmental Impact Assessment (EIA) for contaminated site remediation and for industrial projects should ensure that new contaminated sites are not created by the activity being assessed.
- Adoption of a process to ensure that mercury recovered from contaminated sites is labelled and prohibited from entering the global market where

it will most likely enter a new cycle of land contamination.

- Technology transfer mechanisms to allow transfer of environmentally sound remediation technology and training opportunities should be expedited to manage immediate threats from mercury contaminated sites in developing countries. This should include mobile and modular remediation technology and treatment techniques to 'retire mercury' from the supply chain.
- Special guidance for the remediation of sites contaminated by ASGM activities within communities that are more sensitive than industrial sites.

As these are locations where people live, raise children, produce food and raise animals, special consideration must be given to remediation practices. Residents are not easily able to relocate away from an impacted area that is also their home, making remediation much more complicated. Where possible, remediation should be conducted in-situ using techniques that do not increase the exposure of residents to mercury vapor or dust.

REFERENCES

Kocman D, Horvat M, Pirrone N, Cinnirella S. *Contribution of contaminated sites to the global mercury budget.* Environ Res. 2013 Aug;125:160-70. Epub 2013 Mar 13

Environment Agency UK (2009). *Soil Guideline Values for mercury in soil.* Science Report SC050021 /Mercury SGV. Technical note. Environment Agency, Rio House, Almondsbury, Bristol BS32 4UD.

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