Mercury Contaminated Sites
The urgent need for global guidance

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Why is urgent action required on mercury contaminated sites?

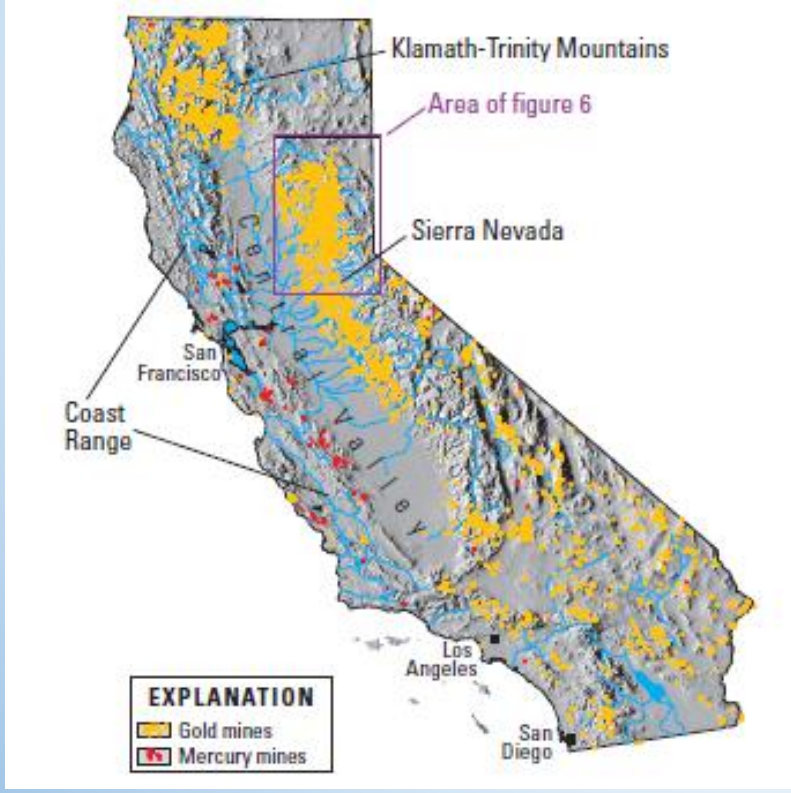
Environmental Perspective – Mercury emissions and releases from contaminated sites contributes significantly to the global mercury budget and continues to spread through atmospheric and hydrological cycles. In turn methylation processes in oceans, rivers, lakes and other waterways contaminates the aquatic food web impacting on human health. If left unaddressed the environmental impacts of these sites will continue from releases and emissions for a long time. The transboundary impacts make this aa global problem irrespective of the location of the sites.

Policy perspective – guidance is required to:

- quantify contaminated site emissions and releases in MIA inventories with standardised estimation techniques. This is a major gap in the coverage of the mercury sources under the Mercury Treaty.
- Build capacity for ID, prioritisation, risk management and remediation of CS.
- The lack of guidance on this subject is a barrier to ratification for many countries.

Mercury contaminated sites: an environmental time-bomb that is still ticking

- Mercury from mid-19th century 'gold rush' sites in California and Australia continue to release significant quantities of mercury to the atmosphere and hydrosphere where it is subject to methylation and food web magnification. Modern ASGM and industrial sites are replicating this problem and leaving a future legacy that must be addressed now.



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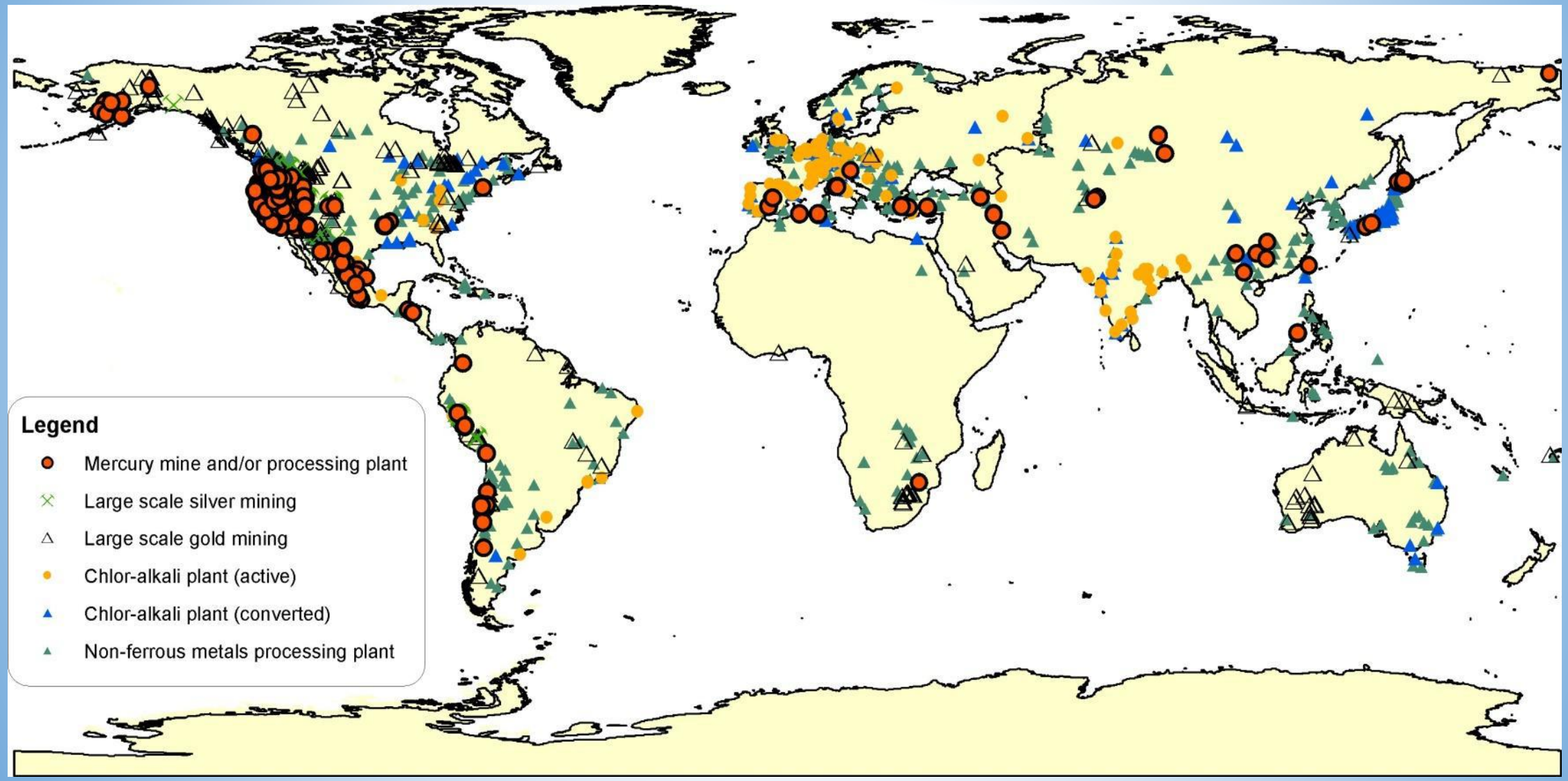
The Global Scale of the Problem



Source: Horvat et al 2011

Mercury contaminated sites require a global response

- 70% of CS concentrated in industrial regions of Europe and N America.
- Mercury amalgamation in ASGM in Asia, Africa and Latin America are leading to a proliferation of contaminated sites in non-industrial regions including sensitive bio-regions and national parks.
- As restrictions on mercury use by industry and trade exports take hold, the contribution to the global mercury budget from ASGM contaminated sites will continue to rise compared to industrial contaminated sites.
    - In Asia and India the number of mercury contaminated sites continues to grow due to increased use of mercury in products and processes.

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Contaminated Sites -The Invisible Mercury Pollution Inventory

Kocman et al (2013) notes that current mercury inventories ***"neglect the contribution of areas contaminated with mercury from historical accumulation, which surround mines or production plants associated with mercury production or use."***

- Estimated the emissions and releases from 3000 georeferenced contaminated sites: amount to 198 (137-260) tpa.
- Of that, 82 (70-95) tpa were contributed to atmospheric releases, while 116 (67-165) tpa is estimated to be transported away from these sites by hydrological processes

The study highlighted that this information must be taken into account and ***"is needed by governments and NGO's in order to re-focus resources in making decisions regarding mitigation and remediation strategies on a global level."***

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Contaminated Sites and the Mercury Treaty

Minamata Convention Article 12, paragraph 3, requires that the Conference of the Parties adopt guidance on managing contaminated sites that may include methods and approaches for the following;

(a) Site identification and characterization;
(b) Engaging the public;
(c) Human health and environmental risk assessments;
(d) Options for managing the risks posed by contaminated sites;
(e) Evaluation of benefits and costs;
(f) Validation of outcomes.

IPEN Guidance –removing barriers to ratification

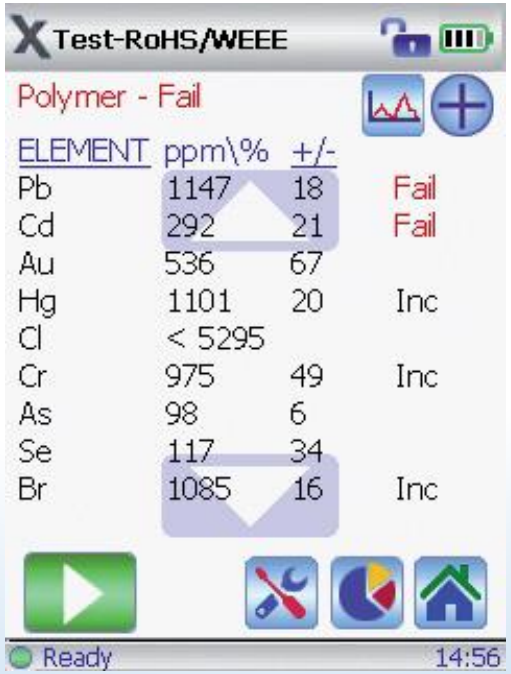
IPEN has developed detailed contaminated site guidance to help build global capacity and share information on the latest techniques to identify, investigate and remediate sites contaminated with mercury. It is available via the INC 7 intranet. The guidance covers;

Site Identification, characterisation and public engagement: Identifying contaminated sites and assisting in the Preliminary Site Investigation involve crucial roles for the public and NGOs who can provide detailed site histories, evidence of environmental and health impacts that may not be obvious to the casual observer.

Cost Effective Screening Techniques

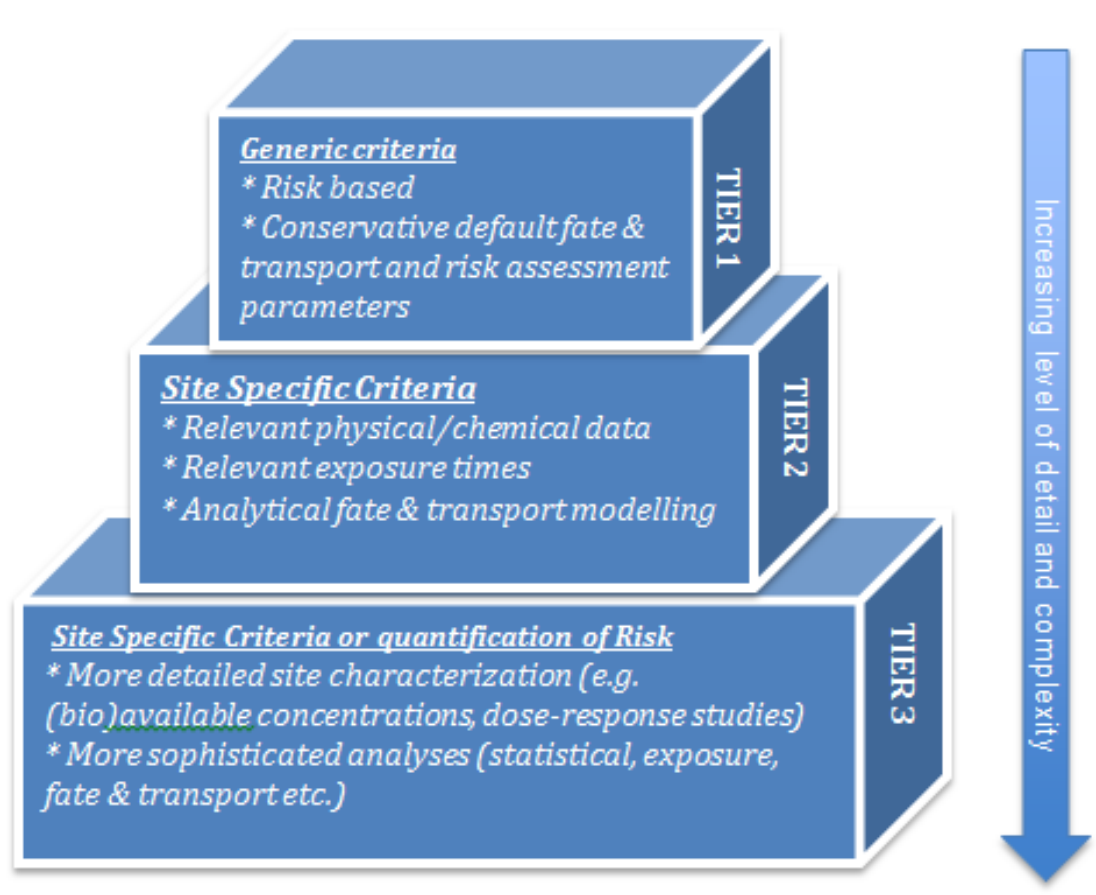
Traditional analytical techniques for screening such as lab analysis and drilling bores has been expensive and time consuming. New screening techniques using portable devices allows for rapid screening, hot spot targeting, non-intrusive analysis (which can be hazardous due to vapor release) and cost savings by avoiding unnecessary drilling and laboratory work.

The Olympus Delta portable X-Ray Fluorescence Analyser



Ohio Lumex RA915+ Portable Mercury Vapor Analyser, which can also be adapted to sample soil and water.

Human Health and Environmental Risk Assessment



Ohlsson et al 2014

The guidance includes reference to traditional risk assessment which is often incorporated in to a cost-benefit approach to cleaning up contaminated land.

It also has a clear focus on ***sustainable remediation*** which moves beyond risk assessment to incorporate principles of ecological sustainability such as

- The precautionary principle;
- Intergenerational equity and the
- Polluter pays principle.

Sustainable remediation, where soil health is restored on contaminated land, has important implications for clean up targets and associated thresholds that look beyond short term cost-benefit analysis.

Remedial Risk Mitigation – Best Practice

Best Practice – Negative pressure remediation enclosure with carbon filters to prevent Hg release impacts on the environment and public.

The guidance includes best available techniques and best environmental practices for the remediation of contaminated sites that protects the health of people in proximity to the site and prevents further releases of mercury during the remediation phase.

A key risk mitigation question for practitioners should be: How can we eliminate the mercury vapor and dust risk to the public?

It should never be: How much mercury in the air can the public tolerate?

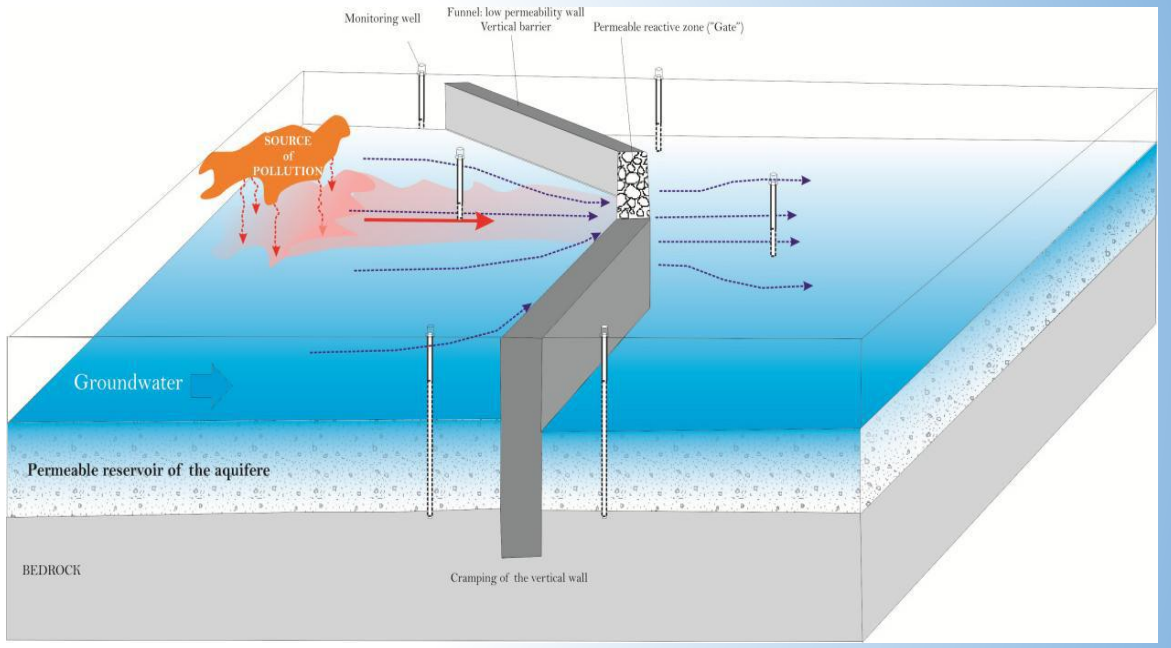
Remediation Practices to Avoid

Open 'dig and dump'. Has a high potential for mercury releases and impact on human health.

Incineration is not considered appropriate for remediation of mercury contaminated sites due to high emission potential and release through residue disposal

Techniques for addressing soil and water contamination

Indirectly heated vacuum distillation unit. Source: econ industries GmbH cited in UNEP/ISWA 2015



"Funnel and gate" principle of Permeable Reactive Barriers (Adapted from Colombano et al, 2010)

GUIDANCE FOR SITE-SPECIFIC STAKEHOLDER ENGAGEMENT

Stakeholder engagement at contaminated sites is as critical to the success of a site remediation as site characterisation and remedial technique selection. The guidance provides clear direction on effective stakeholder engagement.

- Community stakeholders have a right to information about environmental health factors that affect their lives, the lives of their children and families, and the future of their communities.

- Industries in possession of contaminated sites may also benefit from the information held by stakeholders on the historical use of the site and identification of potential hotspots where dumping may have occurred. Cost savings through targeted contamination assessment based on community information can be significant.

Guidance encourages action on contaminated sites.

Adoption of comprehensive guidance on the, identification, characterisation, management and remediation of mercury contaminated sites will accelerate action on this hazardous environmental pollutant, reduce human exposure to diffuse contamination and through the marine food web. Importantly it will play a critical role in preventing the acute health impacts first seen in Minamata Bay, Japan and which is now emerging at ASGM sites around the world.

If this Mercury Treaty is to truly live up to its formal title and honour those victims of Minamata disease, then taking action to clean up mercury contaminated sites must now be a priority. Adoption of guidance is a critical issue for INC 7 and I encourage you all to support this initiative so that further action can be taken on contaminated sites.

Thank you for your attention!

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