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**Conference of the Parties to the  
Minamata Convention on Mercury  
Fourth meeting**

Online, 1–5 November 2021 and Bali, Indonesia,  
21–25 March 2022  
Agenda item 4 (b)

**Matters for consideration or action by the Conference of  
the Parties: artisanal and small-scale gold mining**

**Article 7: Artisanal and small-scale gold mining: update to the  
guidance document for the preparation of a national action plan  
to reduce and, where feasible, eliminate mercury use in  
artisanal and small-scale gold mining**

**Note by the secretariat**

At its fourth meeting, the Conference of the Parties to the Minamata Convention on Mercury adopted, in decision MC-4/4 on artisanal and small-scale gold mining, updated guidance on developing a national action plan to reduce and, where feasible, eliminate mercury use in artisanal and small-scale gold mining, which was set out in its earlier form in annex II to document UNEP/MC/COP.1/17 and amended as set out in annexes I and II to document UNEP/MC/COP.4/6. The text updating the guidance, as adopted, is set out in the annexes to the present note. The full text of the guidance incorporating the update will be published by the secretariat in due course.

## Annex I

### Updates to sections 5.8, 5.9 and 5.10 of the guidance document on the preparation of a national action plan to reduce and, where feasible, eliminate mercury use in artisanal and small-scale gold mining

#### 5.8. Public Health Strategy

In section 5.8 of the guidance, on public health strategy, the “Other Resources” box is removed and the text below the box is replaced by the following (substantive changes are indicated with underline):

Annex C, paragraph 1 (h), further indicates that public health strategies to address these impacts “should include, inter alia, the gathering of health data, training for health-care workers and awareness-raising through health facilities”. World Health Assembly resolution WHA67.11 (2014<sup>1</sup>) calls upon the World Health Organization (WHO) Secretariat to support ministries of health in meeting their obligations under the Minamata Convention on Mercury. To this end, WHO has developed a number of guidance, tools and training materials specific to ASGM and health.

**Guidance from WHO on public health strategies for national action plans for artisanal and small-scale gold mining**

**Addressing health when developing national action plans on artisanal and small-scale gold mining under the Minamata Convention on Mercury. Geneva: WHO; 2019.**

[Arabic, Chinese, English, French, Portuguese, Russian, Spanish]

<https://apps.who.int/iris/handle/10665/329916>

**Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury. Geneva: WHO; 2021.**

[Arabic, English, French, Portuguese, Russian, Spanish]

<https://www.who.int/publications/i/item/9789240022768>

Important factors to consider when developing a public health strategy for ASGM include:

- The gathering of health data is not necessarily limited to health data related to mercury, but should evaluate the public health status of the community generally. Attention to gender-based issues is of particular importance.
- Taking an integrated public health approach may also open opportunities for harnessing shared resources (human, technical, financial) that can be used for both data collection and for any follow-up actions needed.
- Training may be necessary for health-care workers because they may not be aware of the effects of mercury and how to recognize, diagnose and treat mercury poisoning.
- Health systems should have treatment protocols in place for mercury-related health effects, including exposure to mercury in ASGM.
- Existing health-care structures that are already integrated into and trusted by communities can provide a readily available platform for raising awareness about mercury and its dangers.
- Significant mercury exposure can be assumed in many cases due to the way mercury is used and managed at these sites. Actions needed to protect public health should not necessarily be delayed because of a lack of site-specific exposure data.
- Effective intersectoral engagement between health and other relevant ministries and agencies is essential for ensuring the effective implementation of measures to address the public health impacts of exposure to mercury in ASGM. It is similarly essential for ensuring that health issues are appropriately addressed as part of measures taken in other non-health areas.

To develop an evidence-based public health strategy for ASGM, WHO recommends that national health authorities (a) consult the WHO guidance on addressing health when developing national action plans on artisanal and small-scale gold mining under the Minamata Convention on Mercury,<sup>2</sup> to obtain broad guidance on addressing health during the wider process of developing

<sup>1</sup> Resolution WHA67.11. Public health impacts of exposure to mercury and mercury compounds: the role of WHO and ministries of public health in the implementation of the Minamata Convention. In: Sixty-seventh World Health Assembly, Geneva, 19–24 May 2014. Geneva: WHO; 2014. <https://apps.who.int/iris/handle/10665/162849>

<sup>2</sup> Addressing health when developing national action plans on artisanal and small-scale gold mining under the Minamata Convention on Mercury. Geneva: WHO; 2019. <https://apps.who.int/iris/handle/10665/329916>.

the NAP; and (b) follow the WHO step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury.<sup>3</sup>

The step-by-step guide:

- Provides guidance on the overall approach, including templates and tools, for conducting a rapid health assessment and institutional capacity assessment in ASGM communities that will provide an evidence base;
- Offers guidance for translating evidence, other findings and insights gained from the assessments into a public health strategy.

## 5.9. Preventing Exposure of Vulnerable Populations to Mercury Used in Artisanal and Small-scale Gold Mining

In section 5.9 of the guidance, on preventing exposure of vulnerable populations to mercury used in artisanal and small-scale gold mining, the “Other Resources” box is removed and the last two sentences of the section, which referred to the forthcoming WHO public health strategy guidance, are replaced by the following:

WHO guidance for preventing exposure of vulnerable populations in ASGM communities refers to the important factors to consider when developing a public health strategy for ASGM, which are listed in section 5.8, and to the various strategies listed in section 5.9. For further information, see the WHO resources on ASGM referred to in section 5.8 and the section “Key Resources and References Cited” at the end of this guidance document.

## 5.10. Strategies for Providing Information to Artisanal and Small-scale Miners, Gold Processors, and Affected Communities

In section 5.10 of the guidance, on strategies for providing information to artisanal and small-scale miners, gold processors, and affected communities, the second paragraph is amended as follows (the underlining indicates the new text):

However, direct communications with miners and affected communities may require a more nuanced approach that is designed to inform people but also change behaviours. For additional information on actions to take and methods for communicating with ASGM communities, see WHO guidance documents *Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury*,<sup>4</sup> *Environmental and occupational health hazards associated with artisanal and small-scale gold mining*<sup>5</sup> and *Human biomonitoring in artisanal and small-scale gold mining: Ethical and scientific principles*.<sup>6</sup>

<sup>3</sup> Step-by-step guide for developing a public health strategy for artisanal and small-scale gold mining in the context of the Minamata Convention on Mercury. Geneva: WHO; 2021. <https://www.who.int/publications/i/item/9789240022768>.

<sup>4</sup> Ibid.

<sup>5</sup> Environmental and occupational health hazards associated with artisanal and small-scale gold mining. Geneva: WHO; 2016. <https://apps.who.int/iris/handle/10665/247195>.

<sup>6</sup> Human biomonitoring in artisanal and small-scale gold mining: Ethical and scientific principles. Geneva: WHO; 2021. <https://apps.who.int/iris/handle/10665/339848>.

## Annex II

### New chapter 8 of the guidance document on the preparation of a national action plan to reduce and, where feasible, eliminate mercury use in artisanal and small-scale gold mining

#### 8. Artisanal and Small-scale Gold Mining Tailings

Stopping ASGM worst practices and moving to mercury-free methods greatly reduces or eliminates the generation of mercury-contaminated tailings. Until these objectives are met, however, such tailings will continue to be generated in ASGM. This chapter focuses on the sound management of ASGM tailings contaminated with mercury, although many of the recommendations are also relevant for tailings generated through mercury-free methods. Further detailed information can be found in the ASGM Tailings Management Technical Document (a hyperlink will be added to document UNEP/MC/COP.4/INF/6), which forms the basis of the information and recommendations presented in this chapter.

*What are tailings?*

*Tailings are the waste material left over after the valuable components have been removed from the ore. Consisting mainly of crushed and milled rock and water, they may also contain chemical reagents, such as mercury and/or cyanide, used in extracting gold. Due to inefficiencies in initial processing, some ASGM tailings contain significant amounts of unrecovered gold, and may subsequently be reprocessed to recover it. Cyanide leaching in tailings to which mercury has been added without first removing the mercury is identified in annex C to the Minamata Convention as an action to eliminate, because it leads to the generation of bioavailable mercury-cyanide complexes that are highly mobile in the environment.*

Sound management of tailings is often neglected in ASGM settings. Tailings may be left behind without proper stabilization or containment measures when the operations move to new locations. This poses a risk to the environment and human health, especially if tailings contain residual mercury or other toxic materials that can leach into surface and ground water and contaminate soils. The impacts include water and sediments contaminated with mercury (including the formation of methylmercury), other metals associated with the ore, and cyanide; acid rock drainage; and dust emissions. Moreover, physical failure of ASGM tailings ponds and dams can greatly damage the surrounding environment and pose a risk to human health.

Sound management of tailings in ASGM is important in the development and implementation of several of the NAP strategies, in particular “strategies for promoting the reduction of emissions and releases of, and exposure to, mercury in artisanal and small-scale gold mining and processing, including mercury-free methods” and “strategies to prevent the exposure of vulnerable populations, particularly children and women of child-bearing age, especially pregnant women, to mercury used in artisanal and small-scale gold mining”. As such, countries developing NAPs may consider including measures on ASGM tailings linked to the above-mentioned strategies or in a stand-alone strategy.

The following is a summary of the most important principles for ASGM tailings management. Key recommendations are presented in more detail in the subsequent section.

- The best way to manage mercury-contaminated ASGM tailings is to avoid generating them in the first place, or to generate much less of them.
- If mercury is used, limiting amalgamation to concentrates (rather than the whole ore) will greatly reduce the volume of mercury-contaminated tailings and facilitate tailings management.
- Mercury-contaminated tailings that still contain economically viable quantities of gold are commonly generated in ASGM settings. In addition, legacy stockpiles of such tailings exist in ASGM areas throughout the world, some dating back decades or more. **Cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury is a worst practice and should under no circumstance be practised.**
- Basic best practices of sound tailings management should be followed, especially for tailings containing mercury or other contaminants. Figures 1 and 2 provide examples of ASGM workflows showing poor tailings management and sound tailings management, respectively.

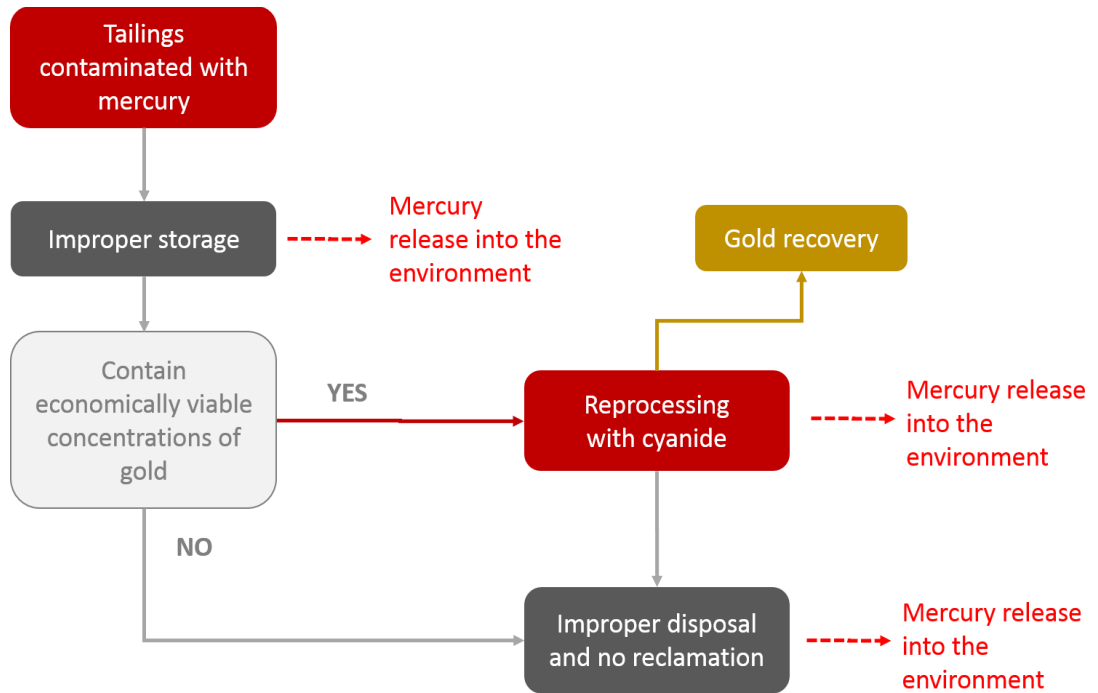


Figure 1  
**ASGM workflow showing poor tailings management practices, including improper tailings storage and disposal and reprocessing of mercury-contaminated tailings without first removing the mercury**

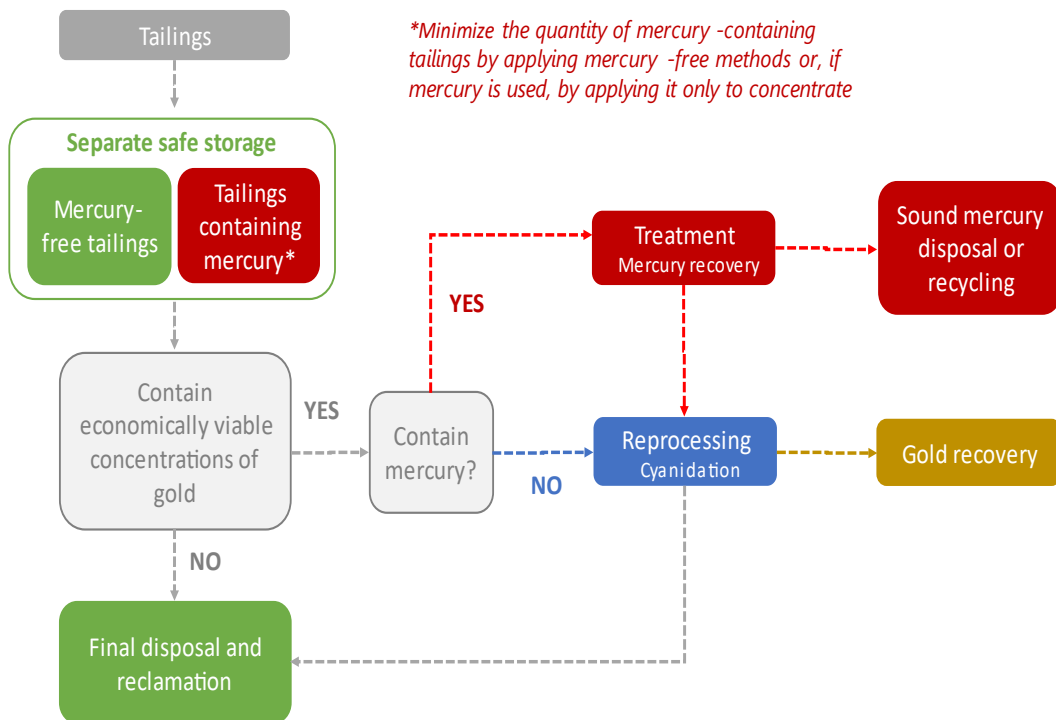


Figure 2  
**ASGM workflow showing best practices in tailings management, including separation of mercury-contaminated tailings, mercury recovery before reprocessing, and sound storage and disposal.**

### **Key recommendations**

#### **OVERALL CONSIDERATIONS FOR ASGM TAILINGS MANAGEMENT**

- As with any intervention in ASGM, it is vital to understand the local political, socioeconomic and environmental context of the ASGM, including formal status and organization, power dynamics and roles of stakeholders along the tailings value chain.

#### **BEST PRACTICES FOR MINIMIZING THE GENERATION OF MERCURY-CONTAMINATED TAILINGS**

- Avoid the generation of mercury-rich tailings by switching to mercury-free technologies. Utilizing mercury-free ore processing methods (see section 5.5 of this document) will ensure that tailings do not contain added mercury. Applying sound management practices to mercury-free tailings is less challenging than with mercury-contaminated tailings.
- If amalgamation is used, avoid adding mercury to the whole ore (a worst practice) and instead concentrate the gold in the ore before amalgamation. Properly applied, concentrating the ore can also increase gold recovery.
- Keep mercury-contaminated tailings separate from other tailings throughout the entire process, including during generation, storage, transport and reprocessing of tailings.

#### **MERCURY AND GOLD RECOVERY FROM TAILINGS**

##### **Characterization of potential contaminants in the tailings and their risks**

- In order to plan for treatment, disposal or reprocessing of ASGM tailings, it is necessary to first determine some of their key characteristics. For instance:
  - Are they contaminated with mercury?
    - If the tailings were generated from amalgamation operations without specific tailings separation practices, they should be assumed to contain mercury, as amalgamation results in residual mercury in the tailings. Mercury flour can also sometimes be observed by inspecting tailings closely or using a hand lens.
    - If the origin of the tailings is unknown, sampling and analysis can be used to determine whether they are contaminated with mercury. Field screening for mercury in tailings can also be conducted using a portable atomic absorption spectrometer, X-ray fluorescence device or gas detector tubes. Samples of tailings can be collected and sent to a lab for total content analysis for mercury and other constituents.
  - Other important tailings characteristics are grain size, mineralogy, presence of cyanide or other hazardous substances (such as arsenic, lead or cadmium) and residual gold content.

##### **Options for mercury recovery from tailings, including prior to reprocessing for gold recovery**

- Mercury-contaminated tailings should never be reprocessed for gold recovery using cyanide leaching. This can lead to severe harm to human health and the environment and hence is considered a worst practice under the Minamata Convention.
- Wastewater should be separated from solids in tailings in order to apply the most suitable treatment to each phase.
- Prior to reprocessing mercury-contaminated tailings, mercury must first be removed.<sup>1</sup> Due to the variable nature of ASGM tailings, there is no single procedure for recovering mercury from tailings that fits all circumstances. Instead, it is necessary to examine the most

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<sup>1</sup> The trace residual amount of mercury that may remain in the tailings should be defined by the relevant authorities, taking into account the subsequent reprocessing methods and control measures, so that there are no adverse impacts to human health and the environment.

economically, technically and socially acceptable method for the conditions at each ASGM site. Potential methodologies that miners can consider for removing mercury from tailings include:

- Adsorption on metal plates (e.g. copper, silver or tin);
  - Thermal treatment that volatilizes elemental mercury, which can then be condensed and recovered;
  - Gravimetric methods that take advantage of the high density of mercury relative to other minerals in the tailings;
  - Other methods, including foam flotation, distillation and combined use of activated carbon and electrodeposition.
- Extreme care should be taken in any subsequent use of cyanide, which is best done by organized and trained miners that can comply with chemical management protocols.
  - ASGM miners and local and national authorities should collaborate to allow for the collection, storage and safe disposal of the mercury recovered.
  - Implement occupational exposure monitoring for people involved in the mercury recovery process.

#### **Gold recovery: considerations for safe use of cyanide**

- **Never apply cyanide to mercury-contaminated tailings. This is considered an action to be eliminated under the Minamata Convention.**
- Cyanide leaching can be used to extract residual gold from tailings generated by mercury-free operations or tailings from which the mercury has been removed.
- The improper use of cyanide is extremely dangerous to human health and the environment, with risks of serious injury or death.
- Cyanide should only be used by organized and trained miners that can comply with chemical management protocols to ensure occupational health and safety and protect the environment.
- Where cyanide is a lawful alternative processing method, inclusion in the NAP of strategies for training ASGM miners (and other relevant stakeholders) on the sound management and use of cyanide can be considered.

#### **STORAGE, DISPOSAL AND ECOLOGICAL RESTORATION OF ASGM TAILINGS**

##### **Considerations for the design and construction of ASGM tailings storage facilities and disposal of final ASGM tailings**

- In the processing area, install concrete walls or chemically resistant liners in the tailings containment ponds to stabilize the small volume of mercury-contaminated tailings and prevent mercury leaks.
- Promote the use of impermeable lining systems or concrete to avoid leaching into groundwater. Cover tailings structures with impermeable material to prevent rainwater infiltration and dust emissions.
- Ensure that inert materials, and not the mercury-contaminated tailings themselves, are used for the construction of physical barriers for tailings storage.
- Ensure that tailings structures are constructed well away from rivers and other waterbodies and outside of flood plains.
- Choose a location away from community settlements and grazing and farming areas.
- Ensure that tailings structures are clearly marked and fenced so that local people know to stay away (and to keep animals away).

- Inclusion of tailings structures (data on location, land deed, size, type of tailings, land and contaminants) in a national database is recommended as it can help monitoring and land use planning.
- If possible, select a centralized site for disposal in collaboration with local and national authorities, who can provide the relevant environmental, hydrological, and geotechnical information to ensure safe and secure disposal.
- If transport of tailings is necessary, care must be taken to avoid spilling mercury-contaminated materials (e.g. using lining and covers on trucks).
- In alluvial mining, tailings are commonly generated directly adjacent to waterbodies. Special care must be taken not to dump the tailings back into streams or in flood-prone areas. Tailings should be transported to a secure area away from riverbanks for treatment and disposal.

#### **Options for ecological restoration**

- Once tailings structures and other ASGM works are no longer in use, restore the surface by grading and revegetate the land to reduce erosion. Ideally, revegetation would also restore lost habitat or productive use to the site.
- Consult with the ASGM community and apply knowledge and local experiences to succeed in the restoration approach. The most sustainable approach will be the one that best serves the needs of the local community.
- Stimulate ASGM community commitment to restoration plans by engaging them actively in the restoration activities (ideally community engagement should be already taking place during operation of the ASGM site) and organizing educational sessions focused on the benefits of restoration and future restored land use possibilities.
- While designing a restoration strategy for the specific site and tailings material, elaborate plans based on the information obtained through the site and tailings characterization study, if one was conducted.
- In line with article 12 of the Minamata Convention, parties/countries should develop appropriate strategies for identifying and assessing sites contaminated by mercury-contaminated tailings for future risk reduction and remedial actions.

#### **LEGAL ASPECTS AND GOVERNANCE**

- Involve and consult ASGM miners in all steps of tailings management planning.
- Formalization or regulation of the sector are key to ensuring good governance of tailings management. Especially in small-scale hard-rock mining contexts, where responsibility for tailings management is passed from one actor to another (from miner to processing plant owner), it is essential to agree on a common approach when designing tailings management solutions.
- Allocate financial mechanisms and responsibilities to ensure the sound management of tailings along the value chain, through mine closure, restoration, and monitoring.
- Review legal and regulatory frameworks, identify gaps and propose improvements directly related to the governance of tailings management in ASGM, such as:
  - Define the responsibility of mining permit owners to dispose of mine tailings, and to do so in an environmentally sound manner.
  - Facilitate collaborative approaches among miners and investors to create financial mechanisms that support environmentally sound gold recovery from ASGM tailings and effective application of regulations.



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**PROVIDING INFORMATION AND ENGAGING COMMUNITIES**

- Inform the public about the presence of mercury-contaminated tailings and the associated risk through signs, meetings and other means of communication.
  - Engage all relevant actors and affected communities in the planning and execution of mercury-contaminated tailings management (ensuring a participatory process).
  - Disseminate information about mercury pollution and restoration programmes in affected communities.
  - Design and conduct educational programmes, facilitating ASGM miners' opportunities to present ideas and models for the implementation of acceptable tailings management practices by their organizations.
  - Ensure the engagement of indigenous populations, including from territories in conflict, in the decision-making process for sound tailings management aimed at protecting human health and the environment.
-