

Safety First

Guidelines for Responsible Mine Tailings Management

V2.0 MAY 2022



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Report available at earthworks.org/safety-first and miningwatch.ca/safety-first

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Cover photo: Workers from the Brazilian Ministry of Environment survey the catastrophic damage after the collapse of the Vale tailings dam in Brumadinho, Brazil, in 2019. Minas Gerais, Brazil. By IBAMA from Brazil.

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Executive Summary

The 2019 mine tailings dam collapse near Brumadinho, Brazil, killed 272 people and decimated houses and buildings for kilometers before flowing into the Paraopeba River. The catastrophe stunned the world but should not have come as a surprise. Tailings facilities, which contain the processed waste materials generated from mining metals and other materials, are failing with increasing frequency and severity.

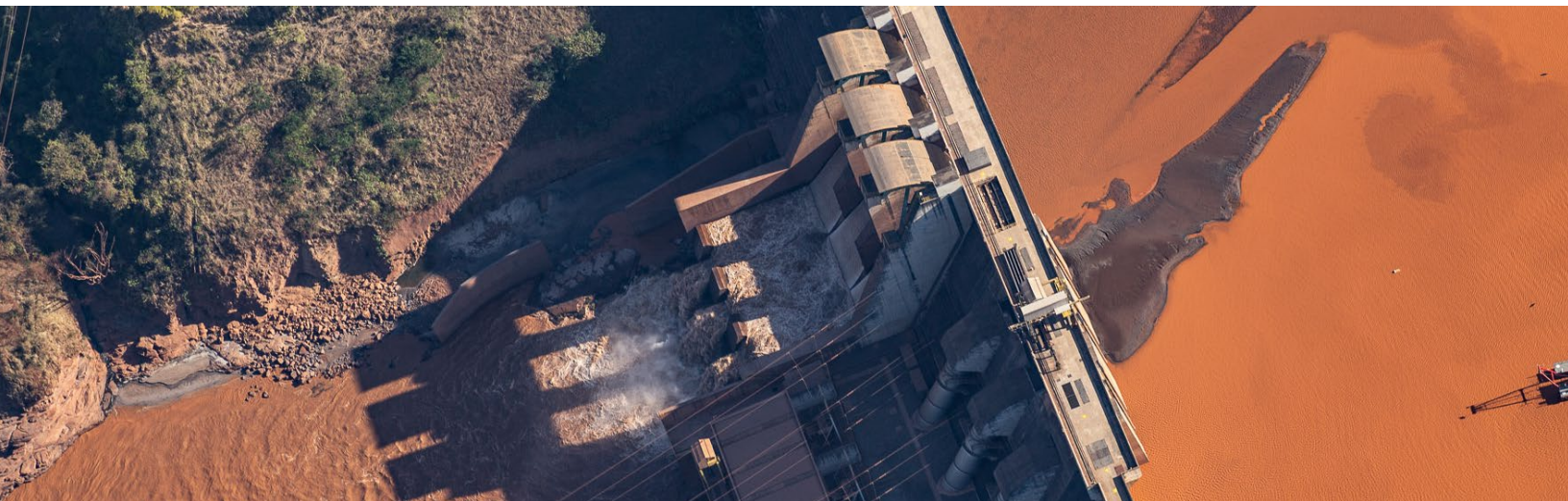
At present, industry standards and governmental regulations still do not go far enough to adequately protect communities and ecosystems from tailings failures. The design, construction, operation and closure of tailings facilities require significant changes to protect people and the environment.

Tailings facilities can fail in many ways and with varying degrees of severity. While this document outlines guidelines aimed at preventing catastrophic failures, the authors recognize that chronic contamination can sometimes be equally disastrous for communities and the environment.

The primary goals of tailings management must be to ensure that public and environmental safety are the determinative factors governing the operation of tailings disposal systems and to achieve zero tolerance for human harm or fatalities. It is important to recognize the interconnected relationship between people and the natural environment; protecting ecological resources is an extension of human safety. While operating companies must aim to minimize environmental harm everywhere, it must be the goal of every mining operation to at least limit environmental harm to within the mine site.

Operating companies must commit to making safety the primary consideration in tailings facilities and dam design, construction, operation, closure and post-closure, and the primacy of safety must be independently verified. If a regulatory agency, an operating company or another party charged with overseeing the safety of a tailings facility determine that loss of life could occur as a result of a

The Doce River, polluted from the Samarco tailings spill, runs through a hydro-electric power plant in July 2016. Minas Gerais, Brazil. Photo: Júlia Pontés.



tailings dam failure, the dam must be designed to withstand the most extreme meteorological and seismic events theoretically possible at a given location.

Prior to permit approval and over the life of the mine, operating companies must demonstrate the meaningful engagement, participation and consent of potentially affected communities for any tailings facility, including the right of communities to say 'no' to facilities. The self-determination of all affected communities must be respected, particularly for Indigenous communities, and they must be allowed to determine what consultation mechanism is used and who is allowed to participate in the consultation process.

The use of upstream dams and all tailings facilities built on uncompacted tailings must be banned. Additionally, dams must not be built in close proximity to communities or upgradient from mining infrastructure, such as other dams or where workers are likely to be present. Tailings must never be discharged into bodies of water (rivers, streams, lakes, oceans, etc.), regardless of the challenges associated with other disposal methods.

The design, construction, operation and closure of a tailings facility must be subject to the best available technologies and practices. The Best Available Technology for tailings disposal is the use of filtered tailings, which reduces the probability and consequences of failure. Nevertheless, such technologies must also be subjected to strict social and environmental licensing processes. The disposal of filtered tailings improves the safety of closed facilities.

Operating companies must document the results of a detailed characterization of the dam foundation and the tailings material properties, with special attention to clay content, liquefaction potential, and the presence of brittle tailings. An Engineer of Record must submit an annual report verifying that dam operations and construction adhere to the approved dam design.

Tailings facilities must be monitored, inspected, maintained and reviewed in perpetuity, or until there are no credible (physically possible) failure modes. Without perpetual oversight, the failure of a tailings dam is inevitable. Given that operating companies will not exist long enough to accomplish perpetual monitoring, inspection, maintenance and review, the operating companies' ability to eventually eliminate all credible failure modes must be a key consideration during the permitting process. If a tailings facility is proposed in a location where the consequences of failure are too great, the facility must not be built.

Worst-case tailings failure scenarios must consider the loss of all tailings at full tailings facility buildout, and the results must be made public prior to permitting. Modeled failure scenarios must also be annually updated. Emergency and evacuation drills related to the catastrophic failure of tailings facilities must be held on an annual basis, and their planning and execution must include participation from affected communities, workers, local authorities and emergency management personnel. Communities must have access to independent technical experts of their choosing to assist them in evaluating the potential for and consequences of a catastrophic tailings failure at the time the facility is proposed and throughout the life of the facility.

A culture of safety and responsibility must be upheld at the highest level within a corporation. The board of directors must be held accountable for its actions (or lack thereof). The board of directors must bear the primary responsibility for the safety of tailings facilities, including the consequences of dam failures, and demonstrate that the company has the necessary financial assurance to cover the implementation of closure and post-closure plans, and adequate public liability insurance to cover the full costs of all failures, including catastrophic failures.

The safest tailings facility is one that is not built. To avoid the long-term liability of mine waste facilities and their social and environmental impacts, we must reduce the volume of tailings produced and the overall demand for primary raw materials and new mining. A permanent above-ground tailings facility should be a last resort. Over the past 40 years, ore grades — the concentration of the metal or mineral of value — have declined on average by half for many commodities, effectively doubling the volume of mine waste generated for each unit of valuable material produced. Current trends suggest an additional 2- to 10-fold increase in the demand for many commodities, particularly those needed for energy transition technologies, by 2060. These trends are not sustainable. In order to transition away from fossil fuels in a way that is sustainable, just and equitable, we need to reduce the need for new mining and the amount of mine waste produced, while using the best standards and practices for any new mining activity.

SUMMARY OF GUIDELINES

- Make safety the guiding principle in design, construction, operation and closure of tailings facilities.
- Ban new tailings facilities in locations that would not allow for timely assisted evacuation of inhabited areas in the event of dam failure.
- Ban upstream dams at new mines and close existing upstream dams.
- Design dams to avoid any potential loss of life, which must be considered an extreme event.
- Mandate the use of best available technology for tailings facilities, including the use of filtered tailings, and implement rigorous controls for safety, including after mine closure.
- Demonstrate understanding of local conditions and tailings characteristics with robust monitoring systems.
- Develop appropriate emergency preparedness/response plans.
- Ensure the independence of reviewers to promote safety and transparency.
- Address financial risks, including proper financial assurance and insurance.
- Attempt to eliminate all credible failure modes to have safer facility closures.
- Establish grievance procedures, whistleblower protection, and community-based safety oversight for potentially affected communities.
- Obtain consent from potentially affected communities and guarantee the right to say 'no' to proposed or expanded tailings facilities.
- Make information regarding mine safety publicly available in relevant languages.
- Offer affected communities access to independent technical experts.
- Require corporate boards of directors assume full responsibility for the risks (including financial risks) and the consequences of tailings facility failures.

To understand how and why failures occur, we must understand the scope of the issue. A global inventory of the thousands of active and abandoned tailings disposal facilities does not exist, nor is there a complete registry of tailings dam failures. Compiling and sharing this information, publicly

and transparently, is essential. An independent international agency, such as a United Nations-endorsed agency, in collaboration with civil society, States, and operating companies, must drive the process to collect information on tailings dams and tailings dam failures worldwide, and share it with the public to reduce the risks associated with these sites and promote the protection of human health and the environment.

This international agency must be able to provide guidance and transparency on tailings management worldwide to protect the health and safety of people and the environment. It must be a well-resourced agency capable of efficiently analyzing global standards, investigating failures, collecting and disclosing site-level data, responding to grievances and making publicly available recommendations. The governance structure for this agency must be a multi-stakeholder body that includes affected communities, Indigenous Peoples, labor, and civil society organizations. It must ensure a co-equal decision making process that includes all stakeholders, without undue influence by the sector that is being monitored. It must provide secure access to a grievance mechanism for community or worker reports and whistleblower complaints.

Language

This document uses the word “must” to indicate an action or guideline that is required. The word “should” is used when the action or guideline is optional or unattainable at this time.

The authors chose to use tailings disposal instead of tailings storage throughout the document. The term storage implies that tailings are temporarily stored until another use is identified. The authors use disposal to indicate that tailings are a waste material without a guaranteed secondary use.

Aerial view of mine waste, Catalão, Goiás, Brazil. Photo: Júlia Pontés.

