GlobalTailings Review.org

# GLOBAL TAILINGS STANDARD

## Draft for Public Consultation

November 2019



UN environment

ICMM International Council on Mining & Metals

PRI Principles for Responsible Investment

# Contents

# Acronyms

| | |
|---|---|
| CDIV | Construction vs Design Intent Verification |
| DBR | Design Basis Report |
| DSR | Dam Safety Review |
| EoR | Engineer of Record |
| EPRP | Emergency Preparedness and Response Plan |
| ERP | Emergency Response Plan |
| ESMS | Environmental and Social Management System |
| FPIC | Free prior and informed consent |
| GTR | Global Tailings Review |
| IAIA | International Association of Impact Assessment |
| ICMM | International Council on Mining and Metals |
| ICOLD | International Commission on Large Dams |
| IFC | International Finance Corporation |
| ILO | International Labor Organization |
| ITRB | Independent Tailings Review Board |
| MAC | Mining Association of Canada |
| OECD | Organization for Economic Cooperation and Development |
| OMS | Operations, Maintenance and Surveillance Manual |
| PAP | Project-affected People |
| PRI | Principles for Responsible Investment |
| RTFE | Responsible Tailings Facility Engineer |
| TARPs | Trigger response actions plans |
| TMS | Tailings Management System |
| UNDRIP | United Nations Declaration on Rights of Indigenous Peoples |
| UNEP | United Nations Environment Program |
| UNGP | United Nations Guiding Principles on Business and Human Rights |

# Foreword

*Catastrophic tailings facility failures devastate the environment and destroy lives and livelihoods. The severity of recent failures spurred the United Nations Environment Program (UNEP), the Principles for Responsible Investment (PRI) and the International Council on Mining and Metals (ICMM) to co-convene the Global Tailings Review. In April 2019, I was invited to chair the Review and tasked with preparing a global standard for the safe and secure management of mine tailings facilities. There is an urgency associated with this task as the first anniversary of the Brumadinho tragedy approaches.*

*To prepare the Standard, I selected a team of seven experts to work with me, and I engaged a multi-stakeholder group to advise us. We have collaborated intensively over the past four months to prepare this draft for public consultation. The public consultation is an intermediate step to allow for critique, feedback and suggestions from others. It will be on the basis of this input that I will work with the Expert Panel and our Advisory Group to finalise this Standard, and submit it to the Co-conveners, along with an accompanying report. I hope that the Standard is accepted immediately by mining companies and endorsed by other stakeholders globally.*

*The problem that the Co-convenors asked me to address is clear. When a tailings facility fails, slurry and wet sand breach the containment structure, escape, and cause destruction. Finding a solution to this problem, however, is far more complex. I have learned that tailings facilities are in fact an intricate construction, realised over years and decades, managed by a cadre of specialists, influenced by the natural environment and subject to many socio-political and economic factors. These interactions form a dynamic, complex and interconnected system. An integrated approach is therefore needed – bringing together mine Operators, technical specialists, stakeholders, and technologies, all in the context of environmental conditions, and the lived experience of local populations. It is for this reason that I selected a multidisciplinary team of experts to work with me to prepare the Standard.*

*Our effort of synthesis and knowledge integration has been – and will continue to be – a challenge. We are still working towards balancing and streamlining certain requirements and ensuring that the Standard supports an integrated approach, across the lifecycle of a tailings facility. In addition, we are considering the level of detail that is appropriate for the scope of the Standard. We also acknowledge that there will be variations in the application of the Standard for new and existing facilities. I continue to work with the Expert Panel on these important matters.*

*Undoubtedly, ongoing work on the Standard will need to be grounded in stakeholder engagement, incorporating visits to mine sites and consultation with communities affected by tailings facilities. It will also require ongoing engagement with the three co-conveners – UNEP, ICMM and PRI – who have not endorsed the current consultation draft. It is vital that we continue to learn and understand what must be done to eliminate tailings facility failures. By continuing to integrate diverse insights and points of view, we will drive the change process forward.*

*There are many reasons for mining companies to welcome a global standard for the safe and secure management of tailings facilities. Leading companies will want to demonstrate to States, investors, insurers and local communities that they are committed to managing tailings facilities with integrity. Ultimately, Operators are required to strive towards zero*

*harm to people and the environment – with zero tolerance for any human fatality. The mining industry is encouraged to invest in new technologies and safer mining methods to achieve this goal.*

*To create a step change, many other actors will need to be involved. Investors can insist that the Standard be embedded in corporate practice, and insurers can encourage adoption by linking implementation to the availability and cost of insurance. Consumers can choose to buy or use mining and metal products that are responsibly sourced, and local communities can demand that a company complies with the Standard. Finally, local, regional and central authorities of the State each have a critical role to play in embedding aspects of the Standard into their laws, their mining permits and other authorizations.*

*The online consultation for this draft is open for six weeks from November 15 to December 31. During this period, I will be visiting different countries and communities to ensure that local voices are heard and taken into consideration in the preparation of the Standard. All feedback will be carefully gathered, collated and provided to the team of experts for consideration and integration. I hope that this process will create awareness and trust in the Standard and help it to become influential. I invite you to read our draft, and to share your opinion. You can participate in the process by visiting www.globaltailingsreview.org and completing a questionnaire, by commenting on specific requirements, or by freely expressing your views in a submitted statement. The consultation schedule is also available on the website.*

*Every day, quality of life around the world is improving as more and more States commit to achieving the United Nations Sustainable Development Goals. The achievement of these goals needs a material basis and will be supported by the extraction and consumption of natural resources. Better technology will help us reduce consumption – but the overall needs of humanity will nonetheless continue to grow. To become safer, resource efficient, and contribute to sustainable development, we must better manage waste, including the residual material from mining, metal extraction and processing. This is not an option, but an obligation and I strongly believe this Standard can become a positive step in this direction.*

*Dr. Bruno Oberle*
*Chair of the Global Tailings Review*

# THE GLOBAL TAILINGS STANDARD

## Introduction

The Global Tailings Standard (the 'Standard') aims to achieve the safe and secure management of mine tailings facilities globally. The Standard compels Operators[1] to use specified measures to prevent the catastrophic failure of tailings facilities and to implement best practices[2] in the planning, design, construction, operation, maintenance, monitoring, and closure of tailings facilities. An independent Expert Panel is working to develop the Standard, taking into account multiple stakeholder perspectives, including those of local communities, civil society groups, regulators, investors, insurers, and the mining industry. Acknowledging these diverse perspectives requires a standard that extends beyond the facility itself to encompass the social, economic and environmental context, human rights, stakeholder engagement, corporate governance, and public disclosure.

The Standard makes clear that extreme consequences to people and the environment from catastrophic tailings facility failures are unacceptable. Operators must have zero tolerance for human fatalities and must strive for 'zero harm' to people and the environment from the inception of project planning. Operators are also expected to innovate and apply new technologies and mining methods that reduce risks and minimize consequences should problems arise.

Once a tailings facility moves from concept to reality, it becomes a hazard that must be managed to minimize risk. The Standard anticipates that individuals in the highest positions of authority within the organizational hierarchy will be accountable for the Operator's decisions and will insist on actions that reduce the risk of tailings facility failure to the fullest extent possible. In addition, the Standard expects Operators to adopt best management practices and to apply rigorous technical controls. Zero harm is the goal at all stages of a tailings facility lifecycle.

## Overview of the Standard

The Standard is organised around six Topic Areas, 17 Principles and 77 specific Requirements. This section provides a brief orientation to the Standard.

Topic Area 1 requires Operators to develop knowledge about the social, economic and environmental context of a proposed or existing tailings facility, and to conduct a detailed site characterization. Inundation studies build an understanding of inundation areas, associated impacts, and the identification of groups most at risk from tailings facility failures. A multi-disciplinary knowledge base developed and used by the Operator and key stakeholders, in an iterative way, will enable all parties to make informed decisions throughout the tailings facility lifecycle. These decisions will arise in the context of the alternatives analyses, the choice of technologies and facility designs, emergency response

[1] In this Standard, 'Operator' means any person, corporation, partnership, owner, affiliate, subsidiary, joint venture, or other entity, including any State agency, that operates, or controls a tailings facility.

[2] The Standard recognizes that there is no one "best practice" that can be viewed as applying to every tailing facility. Instead, there are a range of "best practices" that can apply to safely manage tailing facilities.

plans, and closure and post-closure plans, amongst others.

Topic Area 2 focuses on project-affected people. In order to appropriately respect human rights, a human rights due diligence process is required to identify and address those rights that are most at risk from potential failures of tailings facilities. Topic Area 2 also requires respect for individual rights and the collective rights of local, indigenous and tribal peoples who may own, occupy or use land or natural resources at or near a tailings facility site, or downstream areas that may be affected by a failure. To demonstrate this respect, project-affected people must be afforded opportunities for meaningful engagement in decisions that affect them. The requirements outlined in Topic Area 2 are intended to be cross-cutting and ongoing throughout the tailings facility lifecycle.

Topic Area 3 aims to lift the performance bar for designing, constructing, operating, maintaining, monitoring, and closing tailings facilities. For new tailings facilities, the Standard requires designers to presume an 'Extreme' consequence of failure classification. Operators can rebut this presumption only when specific conditions are met. Where upgrading an existing facility is not feasible, the Operator must reduce the consequences of a potential failure to the greatest extent possible. Recognizing that tailings facilities are dynamic engineered structures, Topic Area 3 requires the ongoing use of an updated knowledge base, consideration of alternative tailings technologies, robust designs, and well managed construction and operation processes to minimize the risk of failure. It also specifies the development and implementation of an Operations, Maintenance and Surveillance (OMS) Manual that supports effective risk management of the tailings facility. A comprehensive monitoring system must support the full implementation of the Observational Method and the use of a performance-based approach for the design, construction and operation of tailings facilities.

Topic Area 4 focuses on the ongoing management and governance of a tailings facility. This section elevates the accountability for tailings facilities that would result in 'Very High' or 'Extreme' consequences in the event of failure, to the upper level of an organization's hierarchy – the Board of Directors or a member of senior management (as appropriate to the Operator's organizational structure). It also provides for the designation and assignment of responsibility to key roles in tailings facility management, including an Accountable Executive, an Engineer of Record, and a Responsible Tailings Facility Engineer. Further, it sets standards for critical systems and processes, such as the Tailings Management System and independent reviews, which are essential to upholding the integrity of a tailings facility during its entire lifecycle. Cross-functional collaboration and the development of a learning organizational culture that welcomes the identification of problems and protects whistleblowers are also included.

Topic Area 5 covers emergency preparedness and response in the event of a tailings facility failure. Operators must avoid complacency about the demands that would be placed on them and on public sector agencies in the event of a catastrophic failure. The Standard requires that Operators consider their own capacity, in conjunction with that of other parties, and to plan ahead, build capacity, and work collaboratively with other parties to prepare for the unlikely case of a failure. Topic Area 5 also outlines the fundamental obligations of the Operator in supporting the re-establishment of ecosystems, and the long-term recovery of affected communities in the event of a failure.

Topic Area 6 requires public access to information about tailings facilities to fairly inform internal and external stakeholders about risks and potential impacts, management and mitigation plans, and performance monitoring. Operators must respond in a systematic and timely manner to all reasonable stakeholder requests for information. The Standard concludes by requiring that Operators commit to transparency, and participate in global initiatives to create standardized, independent, industry-wide and publicly accessible databases, inventories, and information about tailings facilities. This reflects the Co-convenors' commitment to increased public accountability.

## A Systems Approach

The Standard is underpinned by a deep systems logic, reflecting and extending the well-established 'Plan, Do, Check, Act' cycle to enhance cross-functional collaboration. This does not mean, however, that the Standard seeks to build a single, overarching, management system. Instead, the Standard supports the effective interaction of multiple systems, each built on a strong disciplinary base. Some systems will sit within the organization. Others will cross the organizational boundary and interact with broader social, political, cultural, economic, environmental and climatic systems. This reflects the fact that a tailings facility is situated within a complex and dynamic local and global environment.

At the core of the Standard sits the tailings management system (TMS). This system is focused on the safe operation and management of the tailings facility itself. The TMS, and its various elements, must interact with other systems, such as the environmental and social management system (ESMS), the mine-wide management system, and the regulatory system. It is at the point of interface among these systems that data collection and accessibility, documentation, procedures, processes, resources and people must interact. This enables multidisciplinary teams to plan, implement, monitor and adapt to meet the requirements of this Standard. This systems interaction is fundamental to the effective implementation of the Standard.

## The Role of the State

The Standard guides the conduct of Operators but it also informs States about best practices for tailings facilities and it affords them a framework for designing rules for managing such facilities where required. This is a critical point because States are uniquely situated to provide independent oversight of the permitting, construction, operation, maintenance, monitoring, and closure of tailings facilities. They are likewise the most appropriate entity to set up an independent inspection and enforcement program capable of identifying problems early and making sure those problems are corrected promptly before they increase the risk of catastrophic failures. The Standard is not intended to displace or pre-empt any requirement of applicable law, and where conflicting, applicable law shall prevail.

Not all States currently have the capacity to carry out these tasks. Good oversight requires a comprehensive understanding of the planning and engineering necessary to build, operate, maintain, and ultimately close tailings facilities. Inspectors with the credibility and authority to issue citations and to mandate appropriate corrective actions must share an understanding of these issues and possess the capacity to identify solutions to reported problems. Moreover, developing a reliable and professional staff where one does not currently

exist will require time and resources and these may be scarce. All States with tailings facilities should aspire to develop and implement an effective and well-staffed regulatory program.

The best standards in the world will not prevent catastrophic tailings facility failures unless those standards are scrupulously followed and unless an effective third-party enforcement program exists that mandates corrective action where an Operator falls short. Only States have a mandate to carry out oversight and enforcement. States should embrace this responsibility and use this Standard as a guide for building capacity and a regulatory framework that will ultimately fulfil a critical role in the safe management of tailings facilities.

## The Role of Other Stakeholders

While an effective State regulatory and enforcement regime is an essential element for the long-term success of tailings facility management, other stakeholders such as investors, insurers, and communities also have important roles to play. Investors can limit their financial support to only those projects that follow strict standards for tailings facility management such as the Standard proposed here. Investors can further demonstrate their commitment to strict standards by insisting on regular reporting, public disclosure of relevant documents, and third-party audits that ensure compliance.

Insurance companies that indemnify against damages to people and the environment from tailings facility failures will benefit by insisting that Operators minimize the risk of failure to the fullest extent possible. This would limit their exposure to significant claims, which can sometimes be in the billions of dollars. The risk of significant liability also incentivizes insurance companies to closely monitor tailings facilities and demand immediate correction of problems that are identified.

Local communities and civil society organizations have a strong interest in ensuring that tailings facilities are managed so as to protect public safety and the environment. These stakeholders can best protect this interest if they are given a meaningful role in key decisions that affect them as proposed in this Standard. They are also in a strong position to demand transparency from Operators regarding tailings facility plans, management plans, and other data and information relating to the tailings facility. Insisting on strict compliance with the Standard can also support positive relationships and help foster trust.

## Implementation

Once the Standard has been approved by the three Co-conveners, a process will be needed for both implementation and ongoing development. The implementation process will require the following elements:

- a guarantee of independence;
- access to a multi-disciplinary team of experts to review implementation of the Standard;
- protocols for determining compliance and non-compliance with the Standard;
- procedures for seeking further information or agreeing an action plan should an Operator fail to meet requirements in the Standard;
- resources to conduct compliance monitoring;

- a framework against which to assess the competency of reviewers;
- a process for approving or conditionally approving assurance;
- the power to revoke or suspend assurance where necessary;
- procedures for ensuring transparency and public reporting; and
- opportunities for meaningful public engagement in the process.

An accompanying report (the 'Report') will be issued along with the release of the Standard. In addition to proposing an implementation method, the Report will address matters relating to further refinement of the Standard, development of verification protocols, harmonization with existing assurance schemes, and good governance.

# GLOBAL TAILINGS STANDARD

## Preamble

This Standard strives towards the ultimate goal of zero harm to people and the environment and zero tolerance for human fatality. It requires Operators to take responsibility for the safe and secure management of their tailings facilities, through all phases of the project lifecycle, including closure and post-closure. For the purposes of this Standard, the term 'Operator' is broadly defined to encompass the people or organizations with responsibility for the tailings facility as set forth in Annex 1. Operators that are seeking to lead, innovate and pursue best practice will be well placed to meet the requirements set out henceforth.

All terms that appear in *italics* are defined in Annex 1: Glossary and Notes.

## TOPIC I: KNOWLEDGE BASE

### PRINCIPLE 1: Develop and maintain an updated knowledge base to support safe tailings management across the *tailings facility lifecycle*.[3]

REQUIREMENT 1.1: Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with international *best practice*.[4,5]

REQUIREMENT 1.2: Prepare and regularly update detailed *site characterization* of the tailings facility site(s) that includes geomorphology, geology, geochemistry, hydrogeology, geotechnical, seismicity and hydrology. The physical and chemical properties of the *tailings* shall be determined and regularly updated.

REQUIREMENT 1.3: Where there is a potential for flow failure, conduct and regularly update an *inundation study* for the tailings facility using a methodology that considers credible hypothetical failure modes, site conditions, *tailings facility* conditions, hydraulic routing models of the slurry, and the amount of *tailings* and downstream materials entrained in the outflow. The results of the study should include estimates of the inundation area, flow arrival times, depth and velocities, duration of flooding, and depth of material deposition.

[3] Updates should be carried out whenever there is a material change to the tailings facility, the social or environmental context or conditions, or at a minimum every 3 years for 'Very High' and 'Extreme' Consequence Classifications, and every 5 years for others.

[4] This knowledge should capture the uncertainties associated with variations due to climate change.

[5] This information may already exist in whole-of-operations studies (e.g. baselines, impact assessments and specialist studies) and/or may subsequently be incorporated into other studies.

REQUIREMENT 1.4: Identify stakeholders and how they are related to the *tailings facility* site, inundation area and impacted area[6]; collect land, livelihood and demographic data[7] for groups most at risk[8] from a *tailings facility* failure.

## PRINCIPLE 2: Integrate the social, economic, environmental and technical information to select the site and the technologies[9] to minimize the risk of tailings facility failure.

REQUIREMENT 2.1: Undertake a formal, multi-criteria *alternatives analysis* of all feasible sites and technologies for tailings management with the goal of minimizing risk to people and the environment. Use the knowledge base to inform this analysis and to develop facility designs, *inundation studies*, a monitoring program, *Emergency Preparedness and Response Plans* (EPRP), and closure and post-closure plans.

REQUIREMENT 2.2: Engage an *Independent Tailings Review Board* (ITRB) or an independent *senior technical reviewer* with no conflicts of interest to assess and review the *alternatives analysis* for site and technology selection.

REQUIREMENT 2.3: Use the knowledge base to assess the social, economic and environmental impacts of the tailings facility and its potential failure.[10] Develop impact mitigation and management plans[11], and *meaningfully engage* potentially affected communities in the process.

REQUIREMENT 2.4: Update the assessment of the social, economic and environmental impact and update stakeholder identification and information for any material change to the *tailings facility*, the social or environmental context or conditions. If new data indicates that the impacts from the *tailings facility* differ from those assumed in the original assessments, the management of the facility shall be adjusted to reflect the new data using *adaptive management best practices*.

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[6] The area of potential impact may be larger than the inundation area.

[7] Data collection should include participatory processes, follow established ethical research protocols, and consider matters of privacy and data sovereignty. A comprehensive approach would include data and information relating to: the physical environment within which people live and work, natural resources and built infrastructure; social, economic, legal, cultural and political systems, norms and rules that govern how people interact with the environment and with each other; the population within the study area, demographic patterns and human activities or issues in the area; boundaries that demarcate rights over the ownership, and use of land and territory.

[8] Groups that are most at risk include people who risk loss of life in the event of a tailings facility failure and people who would experience significant impacts to livelihoods, cultural heritage, health or other aspects of their lives. Special attention must be given to gender, diversity and vulnerability when identifying groups at risk.

[9] The Standard does not ban any specific design technology, such as upstream tailings facilities. Banning particular technologies was outside the Expert Panel's scope of work, available here: *https://globaltailingsreview.org/about/scope/*

[10] Given the long-term nature of a tailings facility, the Operator is encouraged to address uncertainties around climate change and its potential impacts on environmental and social conditions and trends.

[11] This Requirement applies the mitigation hierarchy to consequences or impacts and where avoidance is not feasible, to first minimize the impacts and then include measures to allow future compensation for remaining impacts to the extent they occur. See International Finance Corporation's (IFC) 2012 Performance Standards on Environmental and Social Sustainability, Performance Standard 1 Assessment and Management of Environmental and Social Risks and Impacts (p.6), and Performance Standard 6 Biodiversity Conservation and the Sustainable Management of Living Natural Resources requirement 7.

REQUIREMENT 2.5: The amount of financial assurance shall be reviewed periodically and updated based on estimated closure and post-closure costs.

REQUIREMENT 2.6: Taking into account actions to mitigate risks, the Operator will consider obtaining appropriate insurance to the extent commercially reasonable or providing other forms of financial assurance if appropriate to address risks relating to the construction, operation, maintenance, and/or closure of a *tailings facility*.

# TOPIC II: AFFECTED COMMUNITIES

## PRINCIPLE 3: Respect the rights[12] of project-affected people and meaningfully engage them at all stages of the *tailings facility lifecycle*.

REQUIREMENT 3.1: Demonstrate *respect for human rights* by conducting *human rights due diligence*[13] to understand how a *tailings facility* failure may cause or contribute to adverse *human rights* impacts, including impacts on the individual and collective rights of indigenous peoples[14] and tribal peoples[15].

REQUIREMENT 3.2: *Meaningfully engage project-affected people* (PAP) throughout the *tailings facility lifecycle* regarding the matters that affect them.[16,17]

REQUIREMENT 3.3: Where the risks of a potential *tailings facility* failure could result in loss of life or sudden *physical and/or economic displacement* of people, the Operator shall consider in good faith additional measures to minimize those risks or implement resettlement following international standards[18]. The Operator shall communicate these decisions to those affected.

REQUIREMENT 3.4: Establish an effective operational-level, non-judicial *grievance mechanism* that addresses the concerns, complaints and grievances of *project-affected people* that relate to the *tailings facility*[19].



[12] As defined in the United Nations Guiding Principles on Business and Human Rights (UNGP). Demonstrating respect for indigenous peoples rights may involve obtaining their 'free prior and informed consent' (FPIC), as outlined in the ICMM Indigenous Peoples and Mining Position Statement.

[13] While human rights due diligence should be conducted for all aspects of a mining business, this Standard requires a specific focus on the tailings facility. Human rights due diligence should be conducted for potential failure modes, and in the event of a failure.

[14] The Universal Declaration on the Rights of Indigenous Peoples (UNDRIP), 2007, delineates and defines the individual and collective rights of indigenous peoples.

[15] The International Labor Organization (ILO) Convention 169, the Indigenous and Tribal Peoples Convention, 1989 is the major binding international instrument concerning indigenous peoples and tribal peoples and was a pre-cursor to UNDRIP.

[16] Operators shall also engage on those matters referred to in Requirements 1.3, 2.1, 2.3, 3.1, 3.3, 3.4, 5.6, 7.7, 7.8, 15.2, 15.4 and in case of a tailings facility failure, in Requirements 16.2-16.4. These activities may be documented in a mine-wide Stakeholder Engagement Plan.

[17] Meaningful engagement, participation and consultation are related processes that are included in key instruments of the United Nations (UN); in the policy frameworks of international finance institutions, such as the IFC's Social and Environmental Performance Standards; and in performance expectations of industry associations, including the ICMM, and leading companies.

[18] International standards include the IFC's (2012) Environmental and Social Performance Standard (PS) 5 Land Acquisition and Involuntary Resettlement and IFC (PS) 7 Indigenous Peoples.

[19] This process may be part of an existing operational-level grievance mechanism, which may in turn form part of the mine-wide ESMS.

## TOPIC III: DESIGN, CONSTRUCTION, OPERATION AND MONITORING OF THE TAILINGS FACILITY

### PRINCIPLE 4: Design, construct, operate and manage the *tailings facility* on the presumption that the consequence of failure classification is 'Extreme', unless this presumption can be rebutted.

REQUIREMENT 4.1: Presume the consequence of failure classification of all new tailings facilities as being 'Extreme' (see Annex 2, Table 1: Consequence Classification Matrix) and design, construct, operate and manage the facility accordingly. This presumption can be rebutted if the following three conditions are met:

a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and
b) A design of the upgrade of the facility to meet the requirements of an 'Extreme' consequence of failure classification in the future, if required, is prepared and the upgrade is demonstrated to be feasible; and
c) The consequence of failure classification is reviewed every 3 years, or sooner if there is a material change in any of the categories in the Consequence Classification Matrix, and the *tailings facility* is upgraded to the new classification within 3 years. This review should proceed until the facility has been safely closed[20] and achieved a confirmed 'landform' status or similar permanent non-credible flow failure state.

REQUIREMENT 4.2: The decision to rebut the requirement to design for 'Extreme' Consequence Classification, shall be taken by the *Accountable Executive* or the *Board of Directors* (the *'Board'*), with input from an independent *senior technical reviewer* or the *ITRB*. The *Accountable Executive* or *Board* shall give written reasons for their decision.

REQUIREMENT 4.3: *Existing facilities* shall comply with Requirements 4.1 and 4.2. Where the required upgrade is not feasible, the *Board*, or senior management (as appropriate based on the Operator's organizational structure), with input from the *ITRB*, shall approve the implementation of measures to reduce the risks of a potential failure to the greatest extent possible.

### PRINCIPLE 5: Develop a robust design that integrates the knowledge base and minimizes the risk of failure for all stages of the *tailings facility lifecycle*.

REQUIREMENT 5.1Consider implementation of alternative options, including but not limited to in-pit disposal and underground tailings placement, and application of the technologies selected according to Requirement 2.1, to minimize the amount of tailings and water placed in external[21] tailings facilities.

[20] Safe closure is achievement of a confirmed 'landform' status or similar status that also has a permanent non-credible flow failure state.
[21] External or out-of-pit tailings facilities are tailings disposal areas that are not located in mined-out open pits or underground mine workings.

REQUIREMENT 5.2: Develop and implement water balance and water management plans for the *tailings facility*, taking into account the knowledge base, upstream and downstream hydrological basins, the overall mine site, mine planning and operations and the integrity of the *tailings facility* for all stages of its lifecycle.

REQUIREMENT 5.3: Develop a *robust design* that considers the social, economic and environmental context, the *tailings facility* Consequence Classification, site conditions, water management, mine plant operations, tailings operational issues, and the construction, operation and closure of the *tailings facility*.

REQUIREMENT 5.4: Address all credible failure modes of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures to minimize risk. Risk assessments must be used to inform the design.

REQUIREMENT 5.5: Develop a design for all stages of the facility, including but not limited to start-up, partial raises and interim configurations, final raise, and all closure stages. The design should be reviewed and updated as performance and site data become available and in response to material changes to the risk assessment.

REQUIREMENT 5.6: Design the closure stage in a manner that meets all the Requirements of the Standard with sufficient detail to demonstrate the feasibility of the closure scenario and allows immediate implementation of elements of the design, as required. The design should include, where possible, progressive closure and *reclamation* during operations.

## PRINCIPLE 6: Adopt design criteria that minimize risk[22].

REQUIREMENT 6.1: Select and clearly identify design criteria that are appropriate to reduce risk for the adopted Consequence Classification for all stages of the *tailings facility lifecycle* and for all credible failure modes.

REQUIREMENT 6.2: Apply factors of safety that consider the variability and uncertainty of geologic and construction materials and of the data on their properties, the parameters selection approach, the mobilized shear strength with time and loading conditions, the sensitivity of the failure modes and the strain compatibility issues, and the quality of the implementation of risk management systems.

REQUIREMENT 6.3: Identify and address brittle failure mechanisms with conservative design criteria and factors of safety to minimize the likelihood of their occurrence, independent of trigger mechanisms.

REQUIREMENT 6.4: The EOR shall prepare a *Design Basis Report* (DBR) that details the design criteria, including operating constraints, and that provides the basis for the design of all stages of the *tailings facility lifecycle*. The *DBR* must be reviewed by the *ITRB* or senior independent technical reviewer.

[22] In all cases, minimizing risk means minimizing risk to people, environment and the Operator.

## PRINCIPLE 7: Build and operate the *tailings facility* to minimize risk.

REQUIREMENT 7.1: Build, raise, operate, monitor and close the tailings facility according to the design intent of all stages of the *tailings facility lifecycle*, using qualified personnel and appropriate methodology, equipment, procedures, data acquisition, the *TMS* and the *environmental and social management system (ESMS).*

REQUIREMENT 7.2: Manage the quality and adequacy of the construction and operation process by implementing *Quality Control, Quality Assurance* and *Construction vs Design Intent Verification (CDIV)*. CDIV shall be used to ensure that the design intent is implemented and is still being met if the site conditions vary from the design assumptions.

REQUIREMENT 7.3: Prepare a detailed *Construction Records Report* at least annually or whenever there is any change to the *tailings facility*, its infrastructure or its monitoring system. The *EOR* shall sign this report.

REQUIREMENT 7.4: Develop, implement and annually update an *Operations, Maintenance and Surveillance (OMS) Manual* that supports effective risk management as part of the *TMS*. The *OMS Manual* should follow *best practices*, clearly provide the context and *critical controls* for safe operations, and be reviewed for effectiveness. The *EOR* and *RTFE* shall provide access to the *OMS Manual* and training to all personnel involved in the *TMS*.

REQUIREMENT 7.5: Implement a formal *change management system* that triggers the evaluation, review, approval and documentation of all changes to design, construction, operation and monitoring during the *tailings facility lifecycle*. *The change management system* shall also include the requirement for a periodic *Deviance Accountability Report* (DAR), prepared by the *EOR,* that provides an assessment of the cumulative impact of the changes on the risk level of as-constructed facility. The *DAR* shall provide any resulting requirements for updates to the design, *DBR, OMS* and the monitoring program.

REQUIREMENT 7.6: Refine the design, construction and operation throughout the tailings facility lifecycle by considering the lessons learned from ongoing work and the evolving knowledge base, and by using opportunities for the inclusion of new and emerging technologies and techniques.

REQUIREMENT 7.7: Ensure that the *ESMS* is designed and implemented to align decisions about the tailings facility with the changing environmental and social context as identified in the knowledge base, in accordance with the principles of *adaptive management*.

REQUIREMENT 7.8: Independent *senior technical reviewers*, with qualifications and expertise in social and environmental sciences and performance management, shall carry out a full review of the *ESMS* and monitoring results every 3 years, with annual summary reports provided to relevant stakeholders.

## PRINCIPLE 8: Design, implement and operate monitoring systems.

REQUIREMENT 8.1: Design, implement and operate a comprehensive performance monitoring program for the *tailings facility* that allows full implementation of the *Observational Method* and covers all potential failure modes.

REQUIREMENT 8.2: Establish performance objectives, indicators, criteria, and performance parameters and include them in the design a monitoring program that measures performance at all stages of the *tailings facility lifecycle*. Record, evaluate and publish the results at appropriate frequencies. Based on the data obtained, update the monitoring program throughout the *tailings facility lifecycle* to confirm that it remains effective.

REQUIREMENT 8.3: Analyze monitoring data at the frequency recommended by the *EOR*, and assess the performance of the facility, clearly identifying and presenting evidence on any deviations from the expected performance and any deterioration of the performance over time. Promptly submit evidence to the *EOR* for review and update the risk assessment and design, if required. Performance outside the expected ranges shall be addressed swiftly through *critical controls* or *trigger response action plans* (TARPs).

REQUIREMENT 8.4: Report the results of the monitoring program at the frequency required to meet company, regulatory and public disclosure requirements, and as a minimum on a quarterly basis. The *RTFE* and the *EOR* shall review and approve these reports.

# TOPIC IV: MANAGEMENT AND GOVERNANCE

## PRINCIPLE 9: Elevate decision-making responsibility for *tailings facilities* with a 'Very High' or 'Extreme' Consequence Classification[23].

REQUIREMENT 9.1: For a proposed *new facility* where a potential credible failure could have 'Very High' or 'Extreme' consequences, the *Board* or senior management (as appropriate based on the Operator's organizational structure) shall be responsible for approving the proposal, after deciding what additional steps shall be taken to minimize the consequences.

REQUIREMENT 9.2: For an *existing facility*, where a potential credible failure could have 'Very High' or 'Extreme' consequences, the *Board* or senior management (as appropriate based on the Operator's organizational structure) shall mandate additional steps to minimize the consequences and publish reasons for its decision. This process is to be repeated at the time of every *Dam Safety Review* (DSR).

## PRINCIPLE 10: Establish roles, functions, accountabilities and remuneration systems to support the integrity of the tailings facility.[24]

REQUIREMENT 10.1: The *Board* of the *parent corporation* shall adopt and publish a policy on or commitment to the safe management of tailings facilities, to emergency preparedness and response, and to recovery after failure that is mandatory for all its subsidiaries and joint ventures. The commitment shall require the Operator to establish a *Tailings Management System* (TMS), and a governance framework to assure the effective implementation and continuous improvement of the *TMS*.

REQUIREMENT 10.2: A member of senior management shall be accountable for the safety of *tailings facilities* and for minimizing the social and environmental consequences of a *tailings facility* failure. This *Accountable Executive* will also be accountable for a program of tailings management training, for emergency preparedness and response, and for recovery after failure. The *Accountable Executive* or delegate must have regular scheduled communication with the *Engineer of Record* (EOR).[25]

REQUIREMENT 10.3: Appoint a site-specific *Responsible Tailings Facility Engineer* (RTFE) who is accountable for the integrity of the *tailings facility*, liaises with the *EOR,* the Operations and the Planning teams and who either reports directly to the *Accountable Executive*, or via a reporting line that culminates with the *Accountable Executive*. The *RTFE* will have a dotted reporting line to mine management to represent the delivery of services to the site.

REQUIREMENT 10.4: For employees who have a role in the *TMS*, consider implementing a performance incentive program to include a component linked to the integrity of *tailings facilities*.

[23] See Annex 2, Table 1: Consequence Classification Matrix.
[24] See Annex 3: Outline of the Organizational Structure referred to in the Standard
[25] In the case of joint ventures, all venture partners shall appoint an Accountable Executive and it shall be the responsibility of the partners to jointly implement this Requirement.

REQUIREMENT 10.5: Identify appropriate qualifications and experience requirements for all personnel who play safety-critical roles in the operation of a *tailings facility*, in particular, for the *RTFE*, the *EOR* and the *Accountable Executive*. Ensure that occupants of these roles have the identified qualifications and experience, and develop succession plans for these personnel.

## PRINCIPLE 11: Establish and implement levels of review as part of a strong quality and risk management system for all stages of the *tailings facility lifecycle*.

REQUIREMENT 11.1: Conduct and regularly update risk assessments with a qualified multi-disciplinary team using best practice methodologies. Transmit risk assessments to the *ITRB* for review, and address with urgency all risks considered as unacceptable.

REQUIREMENT 11.2: Conduct internal audits to verify consistent implementation of company procedures, guidelines and corporate governance requirements consistent with the *TMS* and the *ESMS* developed to manage risks.

REQUIREMENT 11.3: The EOR or a senior independent technical reviewer shall conduct annual tailings facility construction and performance reviews.

REQUIREMENT 11.4: A senior independent technical reviewer shall conduct an independent *DSR* periodically (every 3 to 10 years, depending on performance and complexity, and the Consequence Classification of the tailings facility). The *DSR* shall include technical, operational and governance aspects of the tailings facility and shall be done according to *best practices*. The *DSR* contractor cannot conduct a subsequent *DSR* on the same facility.

REQUIREMENT 11.5: For *tailings facilities* with 'Very High' or 'Extreme' Consequence Classification, the *ITRB*, reporting to the *Accountable Executive* and/or the *Board*, shall provide ongoing senior independent review of the planning, siting, design, construction, operation, maintenance, monitoring, performance and risk management at appropriate intervals across all stages of the *tailings facility lifecycle*. For facilities with other consequence classifications, the ongoing senior independent review can be done by a single person.

## PRINCIPLE 12: Appoint and empower an *Engineer of Record*.

REQUIREMENT 12.1: Engage an engineering firm with expertise and experience in design and construction of tailings facilities of comparable complexity to provide *EOR* services for the tailings facility. Require that the firm nominate an individual to represent the firm as the *EOR*, in concurrence with the *Operator*, and verify that the individual has the necessary experience, skills and time to fulfil this role. Alternatively, the *Operator* may appoint an employee with expertise and experience in comparable facilities as the *EOR*. In this instance, the *EOR* may delegate the design to a firm ('*Designer of Record*') but shall remain thoroughly familiar with the design in executing their responsibilities as *EOR*.

REQUIREMENT 12.2: Empower the EOR through a written agreement that clearly describes their authority, role and responsibilities throughout the lifecycle of all facilities, including closed facilities, and during transfer of ownership of mining properties.

REQUIREMENT 12.3: Establish and implement a system to manage the quality of all engineering work, the interactions between the *EOR,* the *RTFE* and the *Accountable Executive,* and their involvement in the *tailings facility lifecycle* as necessary to confirm that both the implementation of the design and the design intent are met in all cases.

REQUIREMENT 12.4: Given its potential impact on the risks associated with a *tailings facility*, the selection of the *EOR* shall be decided by the *Accountable Executive* and not influenced or decided by procurement personnel.

REQUIREMENT 12.5: Where it becomes necessary to change the *EOR* firm, develop a detailed plan for the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials.

## PRINCIPLE 13: Develop an organizational culture that promotes learning and early problem recognition.

REQUIREMENT 13.1: Educate personnel who have a role in the *TMS* about the reason for and importance of their job procedures for the prevention of a *tailings facility* failure.

REQUIREMENT 13.2: Incorporate workers' experience-based knowledge into planning for all stages of the *tailings facility lifecycle*.

REQUIREMENT 13.3: Establish mechanisms that promote *cross-functional* collaboration to ensure data and knowledge integration and communication across the *TMS* and the *ESMS*.

REQUIREMENT 13.4: Identify and implement lessons from internal incident investigations and relevant external accident reports, paying particular attention to human and organizational factors.[26]

REQUIREMENT 13.5: Develop procedures to recognize and reward employees and contractors who speak up about problems or identify opportunities for improvement. Respond in a timely manner and communicate actions taken and their outcomes.

## PRINCIPLE 14: Respond promptly to concerns, complaints and grievances.

REQUIREMENT 14.1: Establish a formal written complaint process that provides the *Operator* and the appropriate regulatory authority with information about possible permit violations or other conditions relating to the *tailings facility* that pose a risk to public health, safety, or the environment.

REQUIREMENT 14.2: Establish an effective pathway that guarantees anonymity for employees and contractors to express concerns about *tailings facility* safety.

REQUIREMENT 14.3: Initiate prompt investigations of all credible employee and stakeholder complaints and grievances, swiftly resolve concerns and complaints and provide remedy as required.

REQUIREMENT 14.4: In accordance with international *best practices* for *whistleblower* protection[27], the Operator shall not discharge, discriminate against, or otherwise retaliate in any way against a *whistleblower*, or any employee or person who, in good faith, has reported a possible violation or unsafe condition.



[26] International Association of Oil and Gas Producers, Demystifying human factors: Building Confidence in Human Factors Investigation, October 2018.

[27] See Study on Whistleblower Protection Frameworks, Compendium of best practices and Guiding Principles for Legislation, (OECD, 2010), available at, *https://www.oecd.org/g20/topics/anti-corruption/48972967.pdf*. Among other things, best practices require that the whistleblower be allowed to maintain their anonymity.

## TOPIC V: EMERGENCY RESPONSE AND LONG-TERM RECOVERY

### PRINCIPLE 15: Prepare for emergency response to *tailings facility* failures and support local level emergency preparedness and response using *best practice* methodologies.

REQUIREMENT 15.1: Prepare[28] and implement a site-specific *Emergency Response Plan* (ERP)[29] based on credible *tailings facility* failure scenarios and the assessment of potential consequences[30], using the knowledge base. Update regularly, including during closure.

REQUIREMENT 15.2: *Meaningfully engage*[31] employees and/or employee representatives, site contractors, *public sector agencies*, first responders and at-risk communities to participate in emergency planning and implementation, including development of specific *ERPs* for at-risk communities.

REQUIREMENT 15.3: Meaningfully engage with *public sector agencies* and first responders, and other organizations involved in emergency response for the purpose of developing and implementing a site-specific *Emergency Preparedness and Response Plan* (EPRP). The plan shall assess the capacity and capability of emergency response services[32] and the Operator shall act accordingly.

REQUIREMENT 15.4: Maintain a state of readiness at the mine site and within at-risk communities by training all appropriate personnel, *public sector agencies*, first responders and at-risk communities and by testing *emergency response plans* and procedures with all involved stakeholders.[33]

### PRINCIPLE 16: Prepare for long term recovery in the event of catastrophic failure.

REQUIREMENT 16.1: Meaningfully engage with *public sector agencies* and other organizations that would participate in medium- and long-term social and environmental post-failure response strategies.

[28] Both the ERP and the EPRP should be developed by experts trained in emergency response planning.
[29] The ERP for the tailings facility may form part of the mine-wide ERP. The tailings facility ERP is disclosed publicly and forms the basis for the collaborative planning of the EPRP as well as ERPs for at-risk communities.
[30] The consequences to be addressed in the EPRP will be based on the findings of inundation studies and will include public and worker safety, health risks associated with the chemical composition of the tailings, and address how environmental damage and loss of infrastructure may influence emergency scenarios.
[31] ERPs and EPRPs for tailings facility emergencies require engagement and participation of stakeholders due to the risk of loss of life and to support the internal safety culture (see Principle 13).
[32] Where gaps remain in the capacity of public sector agencies to provide required emergency response services for credible failure scenarios, the Operator will provide them.
[33] The frequency of training and testing will be based on the regular assessment by a trained emergency response professional as to what is required to achieve and maintain readiness with the distinct stakeholders involved. Training and testing performance results will be disclosed.

REQUIREMENT 16.2: In the event of *tailings facility disaster*, assess social, economic and environmental *disaster* impacts as soon as possible after people are safe and short-term survival needs have been met.[34]

REQUIREMENT 16.3: Work with *public sector agencies* and other stakeholders to facilitate the development of a *Reconstruction and Recovery Plan* that addresses medium- and long-term social, economic and environmental impacts of a *tailings facility disaster*.

REQUIREMENT 16.4: Enable the participation of affected people in restoration, *disaster* recovery works and ongoing monitoring activities. Design and implement plans that take an integrated approach to *remediation, reclamation* and the re-establishment of functional ecosystems.

REQUIREMENT 16.5: Facilitate the monitoring and public reporting of post-failure outcomes that are aligned with the thresholds and indicators outlined in the plans and adapt recovery activities in response to findings and feedback.



[34] Disaster impact assessments ascertain the nature and extent of damages and losses, who has been affected and the support that they need, and the potential pathways to transition from emergency to recovery. Multiple aspects of human development should be considered, including the physical environment, economic, social, cultural, psychological, environmental, health, and gender, among others.

# TOPIC VI: PUBLIC DISCLOSURE AND ACCESS TO INFORMATION

## PRINCIPLE 17: Provide public access to information on *tailings facility* decisions, risks and impacts, management and mitigation plans, and performance monitoring.[35]

REQUIREMENT 17.1: Publicly disclose[36] relevant data and information[37] about the *tailings facility* and its consequence classification in order to fairly inform interested stakeholders.[38]

REQUIREMENT 17.2: Respond in a systematic and timely manner to all reasonable stakeholder requests for information about the *tailings facility*, to the fullest extent possible and to fairly inform the interested party making the request.[38]

REQUIREMENT 17.3: Commit to transparency and participate in credible global initiatives led by qualified independent organizations to create standardized, independent, industry-wide and publicly accessible databases, inventories or other information repositories about *tailings facilities*.



[35] Disclosure activities relevant to the tailings facility may be included in a site-wide Communication Plan or Stakeholder Engagement Plan.

[36] A fundamental principle that underlies the Standard is that the public is entitled to timely access to information relating to the tailings facility. This information must be made available at no charge, as soon as possible, and in one or more languages as necessary to afford adequate access to interested stakeholders.

[37] Relevant information to be disclosed shall at a minimum include those items referred to in Requirements 1.3, 2.3, 2.4, 3.1, 4.2, 4.3, 5.5, 5.6, 7.8, 8.2, 8.4, 9.1, 9.2, 10.1, 10.2, 11.1, 11.4, 11.5, 12.1, 13.5, 14.3, 15.1, 15.3, 15.4, 16.1, and in case of a tailings failure 16.2-16.5, provided that such disclosure: (i) is subject to applicable law; (ii) may be complied with through relevant regulatory agencies in accordance with applicable legal requirements; and (iii) will in some cases be subject to the consent of external parties (for example where third party reports and external stakeholder information are involved).

[38] Public disclosure should exclude confidential financial and business information or where disclosure would present a risk to operational or physical security.

## Annex 1: Glossary and Notes

Terms shown throughout the Standard appear in *italics* and are explained below.

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| Accountable Executive | A member of senior management who is accountable for the safety of tailings facilities and for minimizing the social and environmental consequences of a tailings facility failure. |
| Adaptive Management | A systematic (robust and iterative) process for continually improving management policies, practices and decision-making for environmental and social management, by learning from the outcomes of previously employed policies, practices and decisions based on experience and actual changes.<br><br>*Adapted from: from IPBES (Global Assessment on Biodiversity and Ecosystem Services 2019) and Encyclopaedia of the Anthropocene 2018 citing Stankey et al., 2005, available at, https://www.sciencedirect.com/science/article/pii/B9780128096659093654#bib0310I)* |
| Alternatives Analysis | An analysis that should objectively and rigorously consider all available options and sites for mine waste disposal. It should assess all aspects of each mine waste disposal alternative throughout the project life cycle (i.e. from construction through operation, closure and ultimately long-term monitoring and maintenance). The alternatives assessment should also include all aspects of the project, direct or indirect, that may contribute to the predicted impacts associated with each potential alternative.<br><br>*https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter-2.html* |
| Best Practices | A procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption. *Merriam-Webster Unabridged Dictionary, available at, https://www.merriam-webster.com/dictionary/best%20practice* |
| Board of Directors | The ultimate governing body of the Operator typically elected by the shareholders of the Operator firm. The Board is the entity with the final decision-making authority for the Operator and holds the authority to, among other things, set the firm's policies, objectives, and overall direction and oversee firm's executives. Where the State serves as the Operator, the Board of Directors shall be understood to mean the government official with ultimate direct responsibility for the final decisions of the Operator. |
| Change Management System | Changes in projects are inevitable even if there had been detailed studies during the design development, and prior to the construction stage. The changes need to be managed to reduce the negative impacts to quality and stability. The impact and consequences of changes vary according to the type and nature of changes, but most importantly according to how they are managed. Managing changes effectively is crucial to the success of a project. A change management system has the objective of disciplining and coordinating the process, and should |

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| | include an evaluation of the change, a review and formal approval of the change followed by detailed documentation including drawings, and in some cases changes to equipment, process, flow, information, cost, schedule or personnel. |
| Critical Controls | A control that is crucial to preventing the event or mitigating the consequences of the event. The absence or failure of a critical control would significantly increase the risk despite the existence of the other controls. In addition, a control that prevents more than one unwanted event or mitigates more than one consequence is normally classified as critical. See: ICMM Health and Safety Critical Control Management Good Practice Guide. |
| Cross-functional | A system or a practice whereby people from different areas of an organization share information and work together effectively as a team. |
| Construction Records Report | Describes all aspects of the 'as-built' product, including all geometrical information, materials, laboratory and field test results, construction equipment and procedures, changes, non-conformances and their resolution, and construction photographs, amongst others. |
| Design Basis Report | A report that provides the basis for the design, operation, construction monitoring and risk management of a tailings facility. |
| Designer of Record | Another professional engineer designated by the Engineer of Record to design the tailings facility. |
| Deviance Accountability Report | A report that provides an assessment of the cumulative impact of changes to the tailings facility on the risk level of the achieved product and that defines the potential requirement for updates to the design, DBR, OMS or the monitoring program |
| Disaster | A serious disruption to the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts. The effect of the disaster can be immediate and localized, but is often widespread and could last for a long period of time. The effect may test or exceed the capacity of a community or society to cope using its own resources, and therefore may require assistance from external sources, which could include neighbouring jurisdictions, or those at the national or international levels. See: UN Office for Disaster Risk Reduction terminology: *https://www.unisdr.org/we/inform/terminology*. In this Standard, the word 'catastrophic' is used interchangeably with the word 'disaster'. |
| Displacement (physical and economic) | 'Physical displacement' of people refers to the loss of dwellings or other assets resulting from project-related land acquisitions and/or land uses that require affected persons to move to another location.<br><br>'Economic displacement' refers to loss of assets or access to assets and the resulting loss of income sources or other means of a livelihood as a result of project-related land acquisition or land use. |
| Emergency Preparedness and Response Plan | A community-focused tool for strategizing with relevant stakeholders in the context of emergency preparedness and disaster risk management. It includes measures to identify hazards faced by stakeholders and communities from different sources, assess capacity and capability |

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| | of public sector agencies and first responders, identify gaps in preparedness and strategies to close the gaps. It includes measures to help at-risk communities to safeguard lives and assets by improving knowledge of hazards, how to respond, and to strengthen local response and remediation capacities. Adapted from APELL *Awareness and Preparedness for Emergencies at Local Level* (2015) and ICMM/UNEP *Good Practice emergency preparedness and response (2005).* |
| Emergency Response Plan | A detailed, site-specific plan developed to identify hazards, assess and prepare for an emergency and to respond if it occurs. Best practice mine ERPs are internal plans to prepare for onsite response to identified hazards across the entire mine operation and to prepare detailed response activities for a range of credible emergencies. Such plans also identify any necessary coordination with off-site emergency responders and communities and state agencies should consequences extend off the mine property. The tailings facility ERP may be part of the mine-wide ERP. |
| Engineer of Record | The qualified engineer who responsible for confirming that the tailings facility is designed, constructed, operated, and decommissioned with appropriate concern for health, safety and the environment, and that it aligns with and meets applicable regulations, statutes, guidelines, codes, and standards (*after Site Characterization for Dam Foundations in BC, EGBC, 2016*)<br><br>For more information, please refer to PRINCIPLE 12: Appoint and empower an Engineer of Record. |
| Environmental and Social Management System | Scaled to the nature and size of an operation, an ESMS helps companies integrate the rules and objectives for the management and mitigation of environmental and social impacts into core business operations, through a set of clearly defined, repeatable processes. An effective ESMS is a dynamic and continuous process initiated and supported by management, and involves engagement between the Operator, its employees and contractors, project affected people and, where appropriate, other stakeholders. |
| Existing Facility | A mine tailings facility that meets any of the following criteria: (1) the facility is accepting new mine tailings on the date that the Standard takes effect; (2) the facility is closed or is not currently accepting new mine tailings but is still being actively managed by an Operator on the date that the Standard takes effect; or (3) a facility has been proposed for construction as evidenced by the filing of a complete application for a license or permit to build the facility before the date that the Standard takes effect. For an application to be deemed 'complete' under this definition, the Operator must have completed all necessary processes for site selection and technology design and the application must contain all of the information necessary for the approving agency to make a final decision on the application without significant amendments. |

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| Grievance Mechanism | A non-judicial grievance mechanism is 'effective' when it is: legitimate; accessible; predictable; equitable; transparent; rights compatible and a continuous source of learning. In addition, operational-level mechanisms should be based on engagement and dialogue. See: *https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf*<br><br>A grievance is a perceived injustice evoking an individual's or a group's sense of entitlement, which may be based on law, contract, explicit or implicit promises, customary practice, or general notions of fairness of aggrieved communities. |
| Hazard | A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. It may be a natural or a technological (human built) hazard. Adapted from UNEP program *APELL.* |
| Human Rights Due Diligence | Involves an ongoing management process that a reasonable and prudent Operator would undertake to meet its responsibility to respect human rights under the UN Guiding Principles on Business and Human Rights. This process should identify, prevent, mitigate and account for how the Operator addresses their impacts on human rights. See: *https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf* |
| Impact Assessment | A decision-making support instrument which aims to identify, predict, evaluate and mitigate social, biophysical and other relevant environmental effects of development proposals, prior to major decisions and throughout the lifecycle of a project. Assessments should consider impacts that are chronic and cumulative, and those that are sudden and acute. While studies typically focus on a single project, impact assessments can be scoped at the landscape level, and consider strategic environmental, economic and social matters. Depending on the context, the circumstances, and the issues at hand, impact assessment studies can be stand-alone, or may be conducted as an integrated set of studies. This Standard encourages two types of impact assessment: (i) regular and scheduled impact assessments; and (ii) impact assessments that are triggered by a change to either the facility or the external context. In addition to describing the overall aims and objectives, agreed principles for the application of impact assessments are defined by the International Association of Impact Assessment (IAIA). See: *www.iaia.org* and see also *https://www.ipbes.net/glossary.* |
| Incremental Loss | This is the loss over and above that which would be caused by the hypothesised flood or earthquake where no tailings facility exists.<br><br>For a more detailed discussion of the meaning of incremental loss, see *British Columbia Ministry of Forests, Lands and Natural Resource Operations, Downstream Consequence of Failure Classification Interpretation Guideline, March 2017*<br>*https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/dam-safety/con_class_guidelines_for_owners-2017.pdf*<br>*NSW Dam Safety Committee, Consequence Categories For Dams, June 2010, updated November 2015* |

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| | *https://www.damsafety.nsw.gov.au/DSC/Download/Info_Sheets_PDF/Dam/DSC3A.pdf*<br>*The preceding references are free of charge. See also guidelines produced by ICOLD, https://www.icold-cigb.org/, ANCOLD, https://www.ancold.org.au/, and CDA, https://www.cda.ca/* |
| Independent Tailings Review Board | Provides independent technical review of the design, construction, operation and closure of tailings facilities. The expertise of the ITRB members relates to the specific technical aspects of the tailings facility site, material and design characteristics. |
| Inundation Study | A study that assumes a hypothetical failure of the tailings facility and estimates the inundation area, flow arrival times, depth and velocities, duration of flooding, and depth of material deposition. It is based on hypothetical scenarios not connected to probability of occurrence. It is primarily used to inform the emergency preparedness and response planning and the dam classification. The dam classification is then used to inform the design criteria. Refinements are ongoing to make these more realistic and applicable to tailings facilities. |
| Major Hazard Risk | Safety can be divided into two types: occupational safety and safety with respect to major hazards. Major hazards in the mining industry include tailings facility failure, pitwall failure and underground coal mine explosion amongst others. The indicators of how well major hazard risk is managed are necessarily quite different from the indicators used for occupational safety. Major hazard risk management focuses on low probability, high consequence events. |
| Meaningful Engagement | Described by the United Nations (UN), The World Bank, the International Finance Corporation (IFC), the Organization for Economic Cooperation and Development (OCED), the Inter-American Bank, amongst other international and multilateral organizations and agencies, as a process whereby project proponents not only have an obligation to consult and listen to stakeholder perspectives, but also have an obligation to take their perspectives into account i. Meaningful engagement involves understanding and addressing structural and practical barriers to the active participation of diverse groups of people, for example: women, ethnic minorities, people who live in remote areas, and/or different language groups. Access to relevant information that can be reasonably understood by the external party is a precondition of meaningful engagement. |
| New Facility | A mine tailings facility proposed for construction by an Operator who has not yet filed a complete application for a license or permit to build the facility before the date that the Standard takes effect. |
| Observational Method | A continuous, managed, integrated, process of design, construction control, monitoring and review that enables previously defined modifications to be incorporated during or after construction as appropriate. All of these aspects must be demonstrably robust. The objective is to achieve greater overall safety.<br>See *Peck, R.B. (1969) 'Advantages and Limitations of the Observational Method in Applied Soil Mechanics' Ninth Rankine Lecture, Geotechnique, Vol.19, No.2, 171-187.* |

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| Operator | Any person, corporation, partnership, owner, affiliate, subsidiary, joint venture, or other entity, including any State agency, that operates or controls a tailings facility. |
| Parent Corporation | The ultimate owning company usually listed on a stock exchange. Where the ultimate owner is an arm of government or a government-owned entity, the reference is to that arm or entity. |
| Project-affected People | For the purposes of this Standard, project-affected people are those people experiencing impacts of any kind, either positive or negative, from a tailings facility either directly or indirectly. Impacts may include economic and/or physical displacement, disruption of ecosystem services, changes to cultural or social well-being, or a decline in the determinants of mental or physical health, amongst others. People affected by a tailings facility may include, for example, people who live nearby; people who hear, smell or see the project; or people who might own, reside on, or use the land on which the project is to be located or may potentially inundate. International standards require developers to identify the inherent and potential vulnerability of different PAPs, as this can influence a person or group's experience of impacts and corresponding responses. See: *IFC Environmental and Social Performance Standard 1 Assessment and Management of Environmental and Social Risks and Impacts.* |
| Public Sector Agencies | Refers to all governmental agencies at the State, regional, and/or local level with some responsibility or authority for regulating mining activities that occur within or impact their jurisdictions. |
| Reclamation | Refers to the process of restoring land to a useable state. Further measures are required to restore land to the state prior to exploitation including the restoration of functional ecosystems. |
| Remediation | Refers to the immediate approach to neutralize hazards after a tailings failure incident (of any scale). |
| Respect for Human Rights | The business responsibility to 'respect' human rights is a global standard of expected conduct, defined by the UN Guiding Principles on Business and Human Rights. Respect means that businesses should avoid infringing on the human rights of others and address adverse human rights impacts with which they are involved. The Guiding Principles make clear that efforts to promote or support human rights cannot be used to offset negative human rights impacts elsewhere in a company's operations. See: *https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf* |
| Responsible Tailings Facility Engineer | An engineer appointed by the Operator to be responsible for the tailings facility. The RTFE must be available at all times during construction, operations and closure. The RTFE has clearly defined, delegated responsibility for management of the tailings facility and has appropriate qualifications compatible with the level of complexity of the tailings facility. The RTFE is responsible for the scope of work and budget requirements for the tailings facility, including risk management. The RTFE may delegate specific tasks and responsibilities for aspects of tailings management to qualified personnel. |
| Robust Design | The robustness of a tailings facility depends on each particular situation and it may be associated with various aspects, for example, the |

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| | factor of safety against each of the potential failure modes, the presence or absence of materials with brittle behaviour, the degree of brittleness of these materials, the degree of variability of the materials, the potential for thresholds of deformation that significantly affect the facility performance. The degree of robustness is related to the facility maintaining its overall integrity despite less than ideal performance of one or more of its components. |
| Senior Technical Reviewer | A professional with in-depth knowledge and at least 15 years' experience in the specific area of the review requirements, e.g. tailings design, operations and closure; environmental and social aspects or any other specific topic of concern. |
| State | A term used broadly in the context of this Standard to encompass all relevant public sector agencies |
| Tailings | A by-product of mining, consisting of the processed rock or soil left over from the separation of the commodities of value from the rock or soil within which they occur. |
| Tailings Facility | A facility that is designed and managed to contain the tailings produced by the mine. Tailings can be placed in mined-out underground mines, in open pit mines and on external surface facilities. Tailings can be produced and managed as slurry-based (a mixture of solids and water) at various moisture contents ranging in appearance from a watery mixture to a less watery mixture to paste and to a dryer material that has been filtered. Tailings slurry in a surface facility is contained by dams constructed of borrow materials including soil and rock as well as tailings. Dryer materials, like filtered tailings, can be contained by rock piles. |
| Tailings Facility Lifecycle | The succession of phases in the life of a facility consisting of:<br>• project conception, planning and design<br>• initial construction<br>• operation and ongoing construction<br>• closure (including temporary closure, care & maintenance)<br>• post-closure (including relinquishment, reprocessing, relocation, removal)<br>*Adapted from MAC Guide to the Management of Tailings Facilities 2017 Mining Association of Canada*). |
| Tailings Management System | An overarching system to support the safe operation and management of a tailings facility throughout its lifecycle to meet the Requirements of the Standard. The TMS should follow the well-established Deming cycle (Plan, Do, Check and Act). Each Operator should develop a TMS that best suits their organization and tailings facilities. A TMS includes elements such as: establishing policies, planning, designing and establishing performance objectives, managing change, identifying and securing adequate resources (qualified personnel, equipment, scheduling, data, documentation and financial resources), conducting performance evaluations and risk assessments, establishing and implementing controls for risk management, auditing and reviewing for continual improvement, implementing a management system with clear accountabilities and responsibilities, preparing and Implementing OMS, EPP, and ERP. |

| | |
|---|---|
| | Components of the TMS may overlap or link with site-wide management systems. In this case, these systems should be integrated. |
| Trigger Action Response Plan | A planning tool used for managing or responding to critical situations caused by specific events. |

## Annex 2: Consequence Classification

Tailings facilities are classified according to the potential severity of the consequences of a worst-case failure assuming no mitigative measures are in place. This Standard adopts the Consequence Classification Matrix set out in Table 1 (below), which is a slightly modified version of a draft matrix proposed in 2019 by the International Commission on Large Dams (ICOLD). The Matrix involves five levels of severity (at the left side of Table), ranging from 'Low' to 'Extreme', and a number of loss categories (across the top): potential population at risk, loss of life, environment, health social and cultural, infrastructure and economics, and livelihoods. The Consequence Classification of a tailings facility is assigned based on the most severe consequence among these loss categories. For example, if the hypothesized failure could cause catastrophic loss of critical habitat or rare and endangered species, the consequence classification of the tailings facility will be 'Extreme', even though no loss of life was expected. The types of losses described above do not include the consideration of economic and reputational losses to the mining company itself.

The descriptions of potential loss in the Matrix do not mean acceptance of those losses. They are identified as impact levels that trigger specific or additional requirements for planning, design and implementation of remedial measures to reduce the likelihood of those losses to negligible.

This classification has at least five uses:

- Assist tailings facility designers in establishing design criteria, in particular the external loading applied by floods and earthquakes;
- Trigger an escalation of decision-making to the *Board*;
- Define some of the *TMS* requirements;
- Allow comparison across a portfolio of facilities, either within an *Operator*'s inventory or within a given jurisdiction; and
- Communicate with the public and regulators about the potential *hazard* levels and support the development and implementation of realistic *EPRP*.

Where the consequence of failure includes loss of life, tailings facilities must be designed, built and operated so that there is a negligible likelihood of failure. Table 2 (below) sets the criteria for external loading, applied by floods and earthquakes. These criteria mean the tailings facility will be designed to withstand floods and earthquakes very much greater than any known previous flood or earthquake in the region where the tailings facility is or will be located, making the likelihood of failure due to floods and earthquakes negligible. The Standard also includes a number of requirements across all stages of the tailings facility lifecycle to achieve the goal of negligible likelihood of failure.

It is reasonable for designers to choose less restrictive designs for tailings facilities with a Consequence Classification of 'Low' or 'Significant'. These are the facilities where the potential consequences of a hypothetical failure do not include loss of life (or other loss categories, see Table 1). However, it is noted that the criteria set out in Table 2 for 'Low' or 'Significant' Consequence Classifications also involve designing to withstand floods and earthquakes very

much greater than any known previous flood or earthquake in the region of the tailings facility. Moreover, the Standard also requires that any less rigorous tailings facility design allows for the possibly of a later upgrade to a more rigorous level, should the consequence level increase, for instance as a result of people settling in downstream areas.

The likelihood of a tailings facility failure cannot be rendered negligible by the use of stringent design criteria alone. This needs to be complemented by other measures such as the correct implementation of the design, quality construction and good management practices. In particular, inappropriate management decisions years or decades later (e.g., enlarging tailings facilities without following proper procedures) can dramatically increase the likelihood of failure in ways that are beyond the control of tailings facility designers. For this reason, the Standard endorses a number of other Requirements for reducing the likelihood of failure and it adds a further line of defence, which is to minimize the potential consequences of failure.

Possible ways to minimize consequences include: negotiating to resettle downstream populations, negotiating with local authorities to prevent future occupancy of land in the inundation area, changing the location of the tailings facilities, changing the technology used or the design to non-flowable facilities, or by some other means. Some of these measures may be beyond the authority of *Operators* and may require the participation of the State. The Consequence Classification can provide the trigger to escalate decisions about 'Very High' to 'Extreme' consequence tailings facilities to the *Board* so that it is aware of the material risks to which it is exposed and is able to take informed decisions. These include go/ no go decisions or approval of capital investments.

This Standard requires that tailings facilities be designed for the most severe level in the Consequence Classification Matrix, unless it can be demonstrated that a lower classification is appropriate. If this is demonstrated, it is also required that the design and construction be such that a future upgrade of the facility to a higher classification remains feasible. This approach recognizes that, given the longevity of tailings facilities, and the potential for population growth, in-migration and economic development downstream of a tailings facility, the consequences of a potential failure are likely to increase over time. Downstream development is not within the exclusive control of *Operators*, and in some cases is accelerated by the economic opportunities that the mine brings. The Standard addresses the fact that an adequate design and construction at one point in time may be rendered inappropriate and it could be difficult and/or costly to upgrade later if that is not considered during initial planning and design.

Finally, it is important that the Consequence Classification is not interpreted as a 'risk level'. Risk is a factor of both the consequences and the probability of the event occurring. By contrast, the consequence classification of a tailings facility is assessed independently of its probability of failure for the reasons discussed above. As noted earlier, the design of a tailings facility is intended to reduce the probability of failure to negligible levels.

## Table 1: Consequence Classification Matrix

| Dam Failure Consequence Classification | *Incremental Losses* | | | | | |
|---|---|---|---|---|---|---|
| | Potential Population at Risk | Potential Loss of Life | Environment | Health, Social & Cultural | Infrastructure & Economics | Livelihoods |
| **Low** | None | None expected | Minimal short-term loss or deterioration of habitat or rare and endangered species. | Minimal effects and disruption of business. No measurable effect on human health. No disruption of heritage, recreation, community or cultural assets. | Low economic losses; area contains limited infrastructure or services. <US$1M | Up to 10 household livelihood systems disrupted and recoverable in the short term. No long-term non-recoverable loss of livelihoods. |
| **Significant** | Temporary only | None expected | No significant loss or deterioration of habitat. Potential contamination of livestock/fauna water supply with no health effects. Process water low potential toxicity. Tailings not potentially acid generating and have low neutral leaching potential. Restoration possible within 1 to 5 years. | Significant disruption of business, service or social dislocation. Low likelihood of loss of regional heritage, recreation, community or cultural assets. Low likelihood of health effects. | Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes. <US$10M | Up to 10 household livelihood systems disrupted and recoverable in the longer-term; or Up to 100 household livelihood systems disrupted and recoverable in the short-term. No long-term non-recoverable loss of livelihoods |
| **High** | 10-100 | 1 - 10 | Significant loss or deterioration of critical habitat or rare and endangered species. Potential contamination of livestock/fauna water supply with no health effects. Process water moderately toxic. Low potential for acid rock drainage or metal leaching effects of released tailings. Potential area of impact 10 $km^2$ - 20 $km^2$. Restoration possible but difficult and could take > 5 years | 500-1,000 people affected by disruption of business, services or social dislocation. Disruption of regional heritage, recreation, community or cultural assets. Potential for short term human health effects. | High economic losses affecting infrastructure, public transportation, and commercial facilities, or employment. Moderate relocation/compensation to communities. <US$100M | Up to 10 household livelihood systems lost and non-recoverable; or Up to 50 household livelihood systems disrupted and recoverable over the longer-term; or Up to 200 household livelihood systems disrupted and recoverable in the short term. |
| **Very High** | 100-1000 | 10 to 100 | Major loss or deterioration of critical habitat or rare and endangered species. Process water highly toxic. High potential for acid rock drainage or metal leaching effects from released tailings. Potential area of impact >20 $km^2$. Restoration or compensation possible but very difficult and requires a long time (5 years to 20 years). | >1,000 people affected by disruption of business, services or social dislocation for more than one year. Significant loss of national heritage, community or cultural assets. Potential for significant longer-term human health effects. | Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities, for dangerous substances), or employment. High relocation/compensation to communities. <US$1B | Up to 50 household livelihood systems lost and non-recoverable; or Up to 200 household livelihood systems disrupted and recoverable over the longer-term; or Up to 500 household livelihood systems disrupted and recoverable in the short term. |
| **Extreme** | > 1000 | More than 100 | Catastrophic loss of critical habitat or rare and endangered species. Process water highly toxic. Very high potential for acid rock drainage or metal leaching effects from released tailings. Potential area of impact > 20 $km^2$. Restoration or compensation in kind impossible or requires a very long time (>20 years). | >5,000 people affected by disruption of business, services or social dislocation for years. Significant national heritage or community facilities or cultural asset destroyed. Potential for severe and/or longer-term human health effects. | Extreme economic losses affecting critical infrastructure or services, (e.g., hospital, major industrial complex, major storage facilities for dangerous substances) or employment. Very high relocation/compensation to communities and very high social readjustment costs. >US1B | More than 50 household livelihood systems lost and non-recoverable; or More than 200 household livelihood systems disrupted and recoverable in the longer-term; or More than 500 household livelihood systems disrupted and recoverable in the short term. |

## Table 2: External loading criteria required by the Standard

| Dam Failure Consequence Classification | Design Flood Annual Exceedance Probability | Design Ground Motion Annual Exceedance Probability |
|---|---|---|
| Low | 1/2500 | 1/2500 |
| Significant | | |
| High | 1/5000 | 1/5000 |
| Very High | | |
| Extreme | 1/10000 or PMF* | 1/10000 or MCE** |

* PMF Probable Maximum Flood
** MCE Maximum Credible Earthquake

# Annex 3: Outline of the Organizational Structure referred to in the Standard