Application of the GISTM and TSM to Managing Chemical Risks from Tailings

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Overview

- Two main standards for tailings management in use internationally

  - Tailings management component of *Towards Sustainable Mining* (TSM), launched in 2004

  - *Global Industry Standard on Tailings Management* (GISTM) released in August 2020

- These standards share a common objective – to minimize harm to people and the environment

- Each describes specific performance expectations for tailings management to help ensure that this objective is achieved

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Why do we need standards for tailings management?

- In short, because the global mining industry continues to have tailings facility failures that lead to fatalities, environmental impacts, damage to infrastructure, disruption of livelihoods, etc

- Many do not trust the mining industry to manage tailings responsibly

- Tailings management is challenging because tailings facilities can pose a range of risks, they are complex, and they are in a constant state of change

- Standards set expectations for standards of care for tailings management, and provide a means to measure and report on performance

- Important to help:
  - Demonstrate that tailings are being responsibly managed
  - Build trust and credibility
  - **Most importantly – help ensure that tailings are managed responsibly**

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Tailings risk management

- Tailings can pose a wide range of risks:
  - Physical risks leading to release of tailings solids and/or water (eg catastrophic dam failures, slumps, tailings line breaks)
  - Chemical risks leading to chronic impacts on water or air quality (eg ML/ARD, ammonia, cyanide, high salinity, dust from tailings, etc.)
- Achieving the goal of minimizing harm is a balancing act
- Throughout the life cycle, owners need to balance:
  - Physical versus chemical risks (eg water covers to prevent/control ARD)
  - Impacts that will occur (eg loss of habitat in footprint of tailings facility), versus impacts that might occur (eg impacts on downstream water quality), especially very low probability but potentially catastrophic events

Tailings management component of TSM

- Tailings management component of TSM can be applied to a wide range of tailings facility types with a wide range of risk profiles

  - Can also be applied to other types of facilities such as waste rock piles and spent heap leach piles although not required by TSM

- Tailings management component of TSM consists of:

  - *Tailings Management Protocol* (introduced 2004, updated 2011, 2017, 2019, and 2022)

    - Describes performance expectations

  - *A Guide to the Management of Tailings Facilities* (Tailings Guide)(introduced 1998, updated 2011, 2017, 2019, and 2021)

    - Describes management systems approach to tailings management, providing a framework to integrate people, resources, and activities related to tailings management

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Tailings management component of TSM

- *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities* (OMS Guide)(introduced 2003, updated 2019 and 2021)
  - Guidance for developing and implementing site-specific operation, maintenance, and surveillance (OMS) manuals
- Table of Conformance (introduced 2017, updated 2019 and 2022)
  - Performance expectations in Protocol are very high level, but state that elements much be implemented in accordance with either the Tailings Guide or OMS Guide
  - Table of Conformance identifies elements of Guides to be implemented to meet performance expectations
  - Provides high level of rigour and detail to support performance measurement

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Broader TSM program

- TSM is an international standard for responsible mining developed by MAC
- Helps mining companies:
  - Evaluate, manage, and improve environmental and social performance
  - Ensure risks managed responsibly
- Mandatory for companies that are members of associations (eg MAC) that have adopted TSM
- Implemented by over 200 companies globally

International adoption of TSM
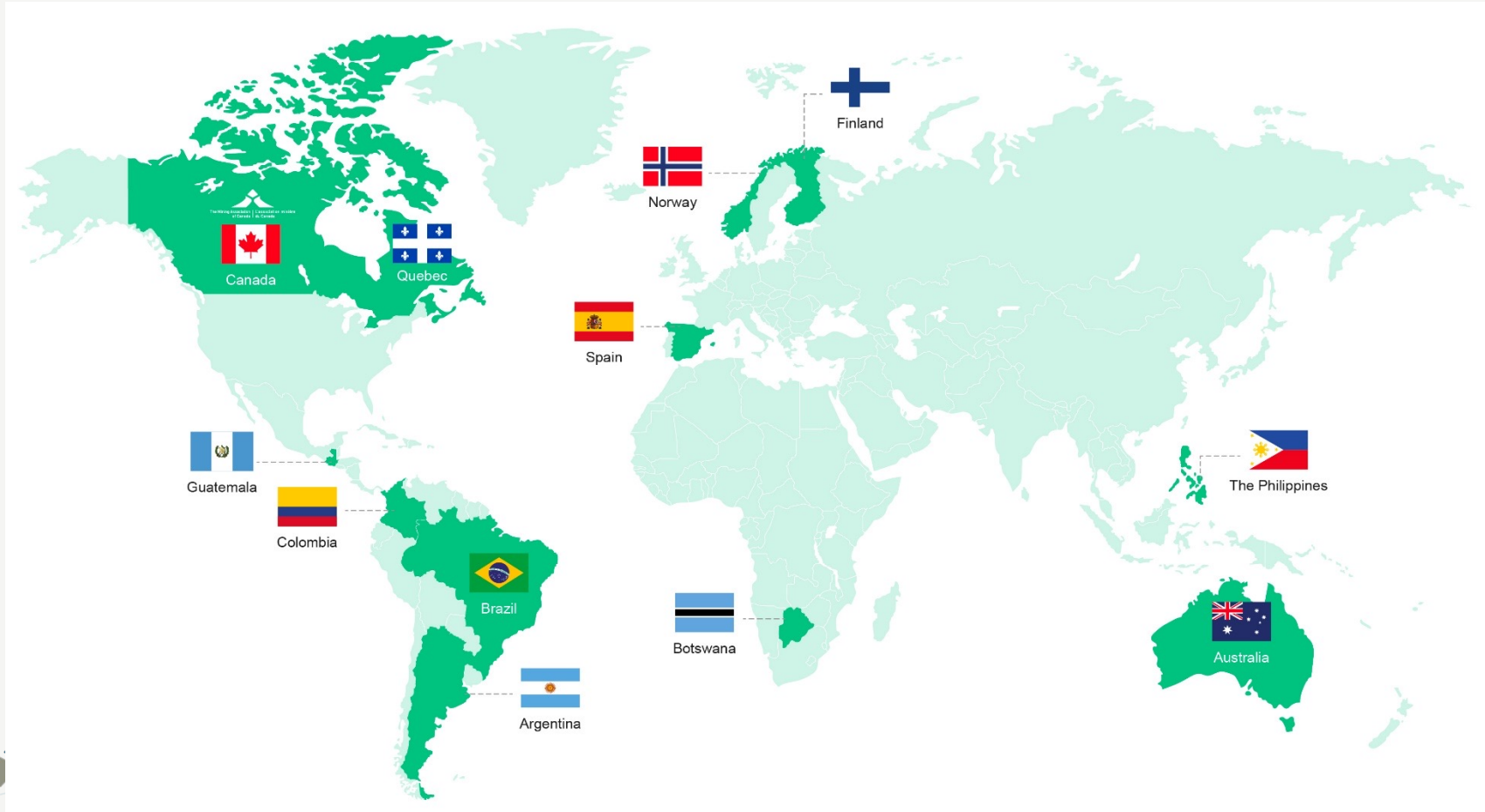
TSM performance measurement protocols

- TSM protocols used to measure performance related to:
  - Tailings management
  - Water stewardship
  - Biodiversity conservation management
  - Climate change (addresses GHG emissions and adaptation)
  - Indigenous and community relationships
  - Safety and health
  - Crisis management and communications planning
  - Preventing child and forced labour
- Performance measured at site level and in some cases (eg crisis management) also at the corporate level
- Results are independently verified and publicly reported

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GISTM

- GISTM developed in response to a call from investors for a global standard for tailings management in the wake of failure near Brumadinho Brazil in 2019

- Global Tailings Review was launched by three partners:

  - International Council on Mining and Metals (ICMM)

  - United Nations Environment Programme (UNEP)

  - Signatories to the Principles for Responsible Investment (PRI) represented by the Church of England Pensions Fund and the Swedish Council of Ethics

- Multi-stakeholder, multi-disciplinary Expert Panel was established to write a global standard

- GISTM released August 2020

GISTM

- GISTM has 77 requirements organized around six topics:

  - Affected communities
  - Integrated knowledge base
  - Design, construction, operation and monitoring

  - Management and governance
  - Emergency response and long-term recovery
  - Public disclosure and access to information

- Scope is broad but many requirements are not detailed

- Some requirements are quite detailed (eg public disclosure of information)

- Takes a very prescriptive approach for some aspects (eg specific decisions of the Accountable Executive)

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Strengths of the GISTM

- Broad focus, including engineering, governance, community engagement and other aspects important to responsible tailings management but too often overlooked
- For many mining companies, a lot of the concepts in GISTM will be new
    - Conformance by these companies should lead to improvement
    - Integration of community engagement into tailings management in particular is an important concept new to many companies
- While implementation is voluntary, GISTM is strongly supported by investors
    - Investors helping to drive increasing commitment to GISTM
- High profile of GISTM and investor support is helping to put responsible tailings management on the agenda of corporate executives and boards of directors in a way that has never happened before

GISTM and TSM - Similarities

- High degree of alignment between GISTM and TSM
  - GISTM reflects many governance concepts first introduced in TSM
- Similar objectives, focused on minimizing harm
- Similar scope, with some topics within GISTM scope (eg community engagement) addressed in other TSM protocols
- Similar topics related to both governance and technical aspects of tailings management
- Growing recognition by Church of England and others of:
  - Leadership role that MAC has played, globally
  - Strengths of TSM
  - Degree of alignment with GISTM

Strengths of TSM compared to GISTM

TSM	GISTM
• Highly integrated approach with tailings management system as the key tool to coordinate people and activities to better manage risks • Requires an annual management review which is a key step in taking action to address gaps/weaknesses and drive continual improvement	• Requires a tailings management system but does not require integration in the same manner as TSM • No equivalent requirements for a management review and lacking the forward-looking component to drive continual improvement

Strengths of TSM compared to GISTM

TSM	GISTM
• High degree of detail and rigour in performance measurement through use of the Table of Conformance • Helps ensure better outcomes and makes practitioners think carefully, helping to reduce the potential to become complacent	• Very little detail for performance measurement • Leaves it those evaluating performance to determine what is "good enough" • Potential for inconsistencies in performance measurement
• Established and mature mechanisms for performance measurement, independent verification, and public reporting • Proven path forward for continual improvement of TSM	• These aspects of GISTM have not been developed, established or implemented • There is significant uncertainty at this time • Global Tailings Management Institute being established to oversee implementation

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How do GISTM and TSM Apply to Chemical Risks?

- Objective of tailings management component of TSM: Continually work towards minimizing harm
    - Encompasses both physical and chemical risks associated with tailings, including:
        - Zero catastrophic failures of tailings facilities
        - No significant adverse effects on the environment or human health
    - Inclusion of chemical risks deliberate – did not want to lose sight of chemical risks in wake of rising emphasis on physical risks
- Objective of GISTM: Strives to achieve the ultimate goal of zero harm to people and the environment with zero tolerance for human fatality
- Thus, TSM is more explicit about chemical risk but GISTM also can be interpreted to be inclusive of chemical risk

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Application of GISTM to Chemical Risks

- GISTM requirements primarily focused on physical risks, for example:

  - Principle 4 design requirements underpinned by dam failure consequence classification and reduction of potential consequences

  - R4.7 requires implementation of measures to reduce both the probability and the consequences of a tailings facility failure

  - Principle 5 focused on development of a robust design that minimizes risk of failure

  - Accountable Executive is accountable for safety of tailings facilities and for minimizing consequences of a potential tailings facility failure

  - Failure not defined but usage implies physical failure

- Requirements to assess impacts of tailings facilities and potential failure (R3.4 & 3.5) imply consideration of chemical risks but are not explicit

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Application of GISTM to Chemical Risks

- Many GISTM requirements can be viewed and implemented through the lens of chemical risks

  - GISTM can be used as a tool to help manage chemical risks

- However, lack of specificity means there is potential that companies could be considered to be in conformance with GISTM without addressing chemical risks

- Explicit focus on minimizing risks of tailings facility failure may leave chemical risks as an afterthought

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Application of TSM to Chemical Risks

- Tailings management component of TSM takes fundamentally different approach than GISTM

- Founded on good governance of tailings management using a management systems approach

  - Governance ultimately about how decisions are made at all level in organization

- Tailings management system is:

  - Umbrella under all activities related to tailings management are planned, implemented, evaluated, and improved in an integrated manner

  - Tool to manage people and the ways in which they interact, communicate, and make decisions regarding tailings

- More integrated, holistic approach than GISTM

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Tailings Management System

- Follows Plan-Do-Check-Act cycle common to all management systems approaches

- Cycle repeated throughout the life cycle

- GISTM also requires a tailings management system but does not provide a "road map" to integrate various aspects/requirements into that management system

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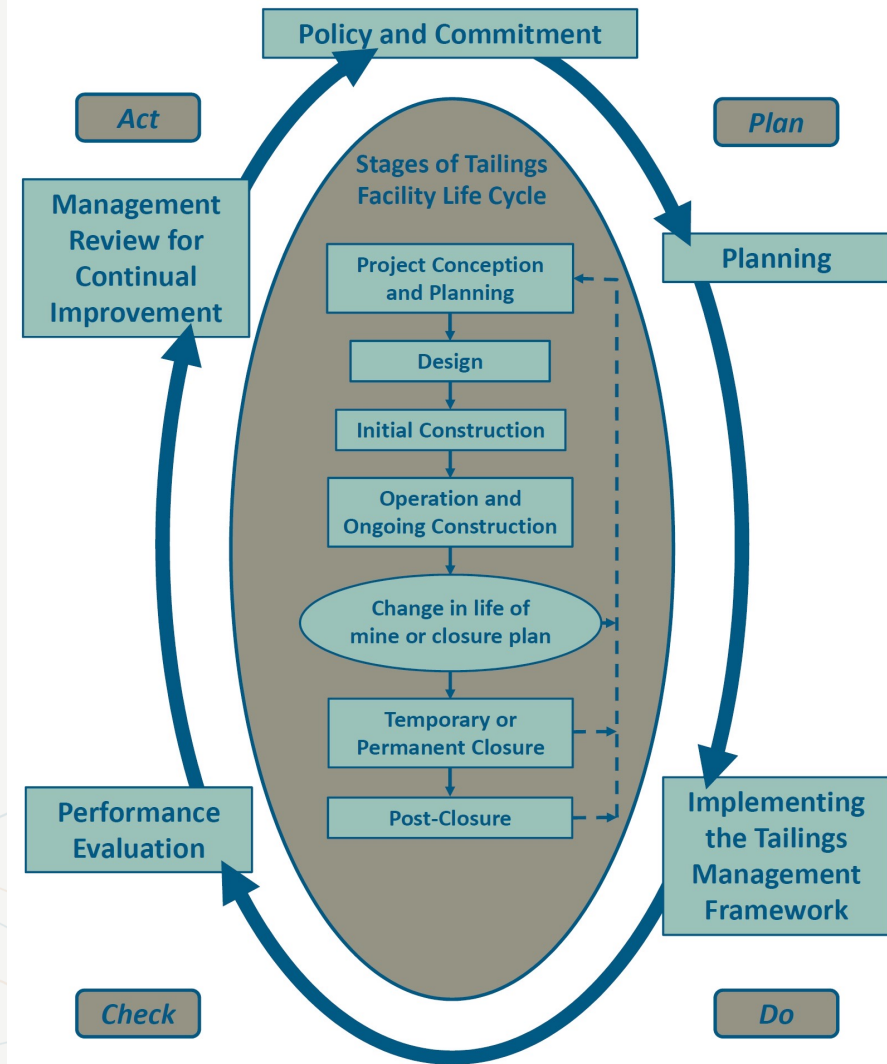
Application of TSM to Chemical Risks

- Management of physical and chemical risks are consistent thread, driven by:
  - Requirements to assess and manage both physical and chemical risks
  - Requirements to set performance objectives, indicators, and criteria that address physical and chemical risks/impacts
- Managing change: potential changes that could impact the risk profile of a tailings facility need to be carefully considered
- Operation, maintenance, and surveillance: OMS activities to be based on performance objectives and risk management plan
- Engineer-of-Record: verifies whether tailings facility as been designed, constructed, and is performing in accordance with performance objectives
- Independent review: consider risk assessment and management, with qualifications and experience of reviewers aligned with risk profile

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Application of TSM to Chemical Risks

- Check element of Plan-Do-Check-Act cycle requires:
  - Assessment of operating performance against performance objectives
  - Identification of gaps, deficiencies or potential opportunities for continual improvement
- Act element requires:
  - Development and implementation of action plans to address gaps, deficiencies or opportunities for continual improvement
- Thus, the tailings management component of TSM explicitly addresses chemical risks and provides a strong basis for the management of such risks
- For specifics of how to identify, assess, and manage chemical risks, Owners need to refer to guidance from other sources like MEND and the GARD-Guide

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Thank you

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