



The Mining Association
of Canada | L'association minière
du Canada

Towards Sustainable Mining and Tailings Management

October 2016

The Voice of the Canadian Mining Industry



MINING.CA

- ◆ Since 1935, the Mining Association of Canada (MAC) has been the national voice of the Canadian mining industry. Working alongside our members, MAC promotes the industry nationally and internationally, works with governments on policies affecting the sector and educates the public on the value mining brings to the economy and the daily life of Canadians.
- ◆ Our members account for most of Canada's production of base and precious metals, uranium, diamonds, metallurgical coal, mined oil sands and industrial minerals, and are actively engaged in mineral exploration, mining, smelting, refining and semi-fabrication.
- ◆ **Our Mission:** To contribute to building a strong, sustainable and internationally competitive Canadian mining, minerals and metals industry with broad national support and to promote sound corporate and public policy.
- ◆ **Our Vision:** A strong, responsible and globally competitive Canadian mining and mineral processing industry that creates wealth and opportunity for all Canadians.

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TOWARDS SUSTAINABLE MINING: OUR COMMITMENT

Established in 2004, TSM's main objective is to enable mining companies to meet society's needs for minerals, metals and energy products in the most socially, economically and environmentally responsible way. The program's core strengths are:

- **Accountability** – Assessments are conducted at the facility level where mining activity takes place – the only program in the world to do this in our sector
- **Transparency** – Annual reporting against 23 indicators with independent verification
- **Credibility** – Includes ongoing consultation with a national Community of Interest Advisory panel to improve industry performance and shape TSM for continual advancement



COI Advisory Panel

Aboriginal peoples

Environmental NGO

Economic/community development

Social NGO including faith based groups

Finance/investment

International development

Labour/workplace

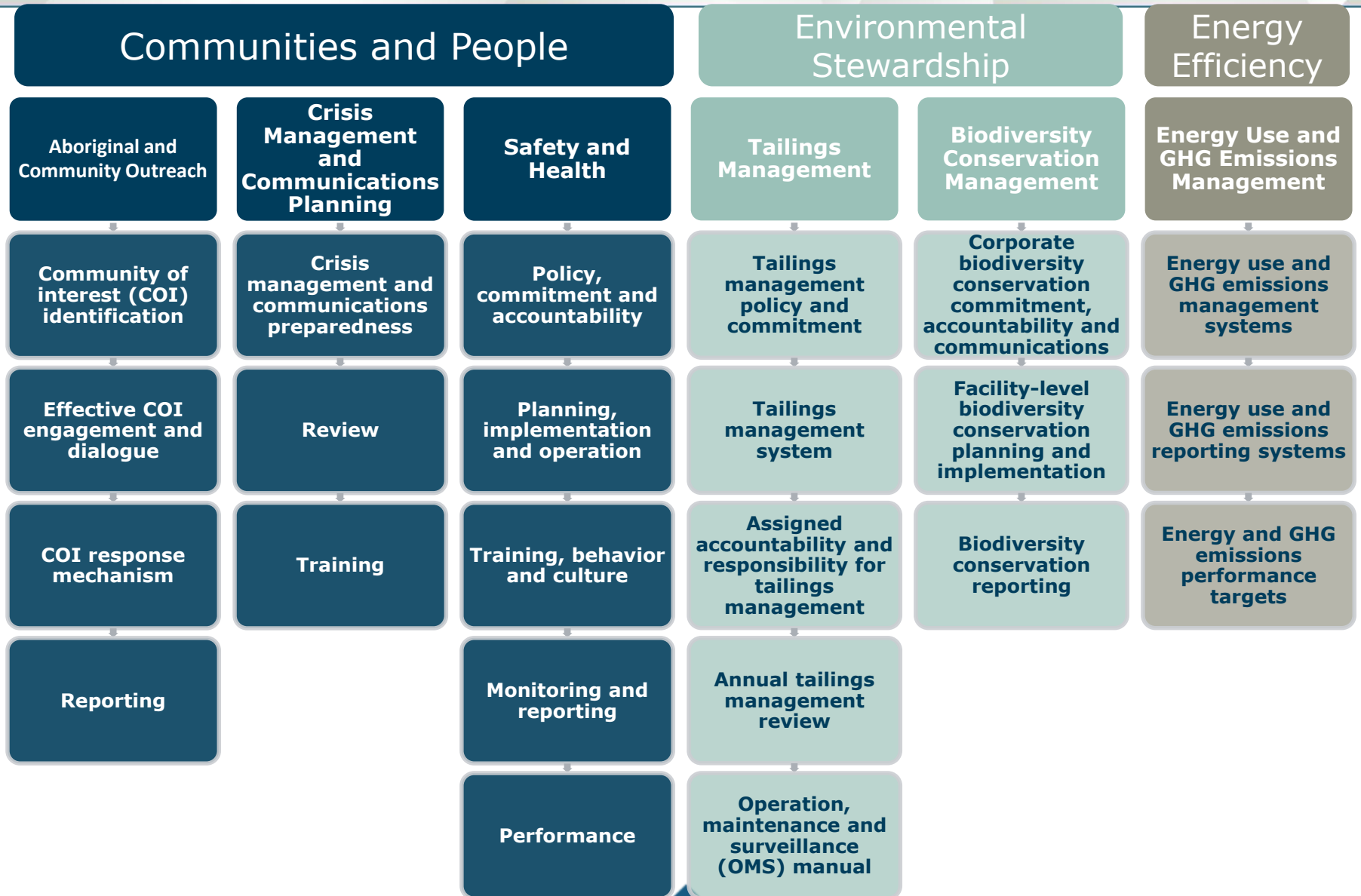
Media/communications

MAC Board of Directors

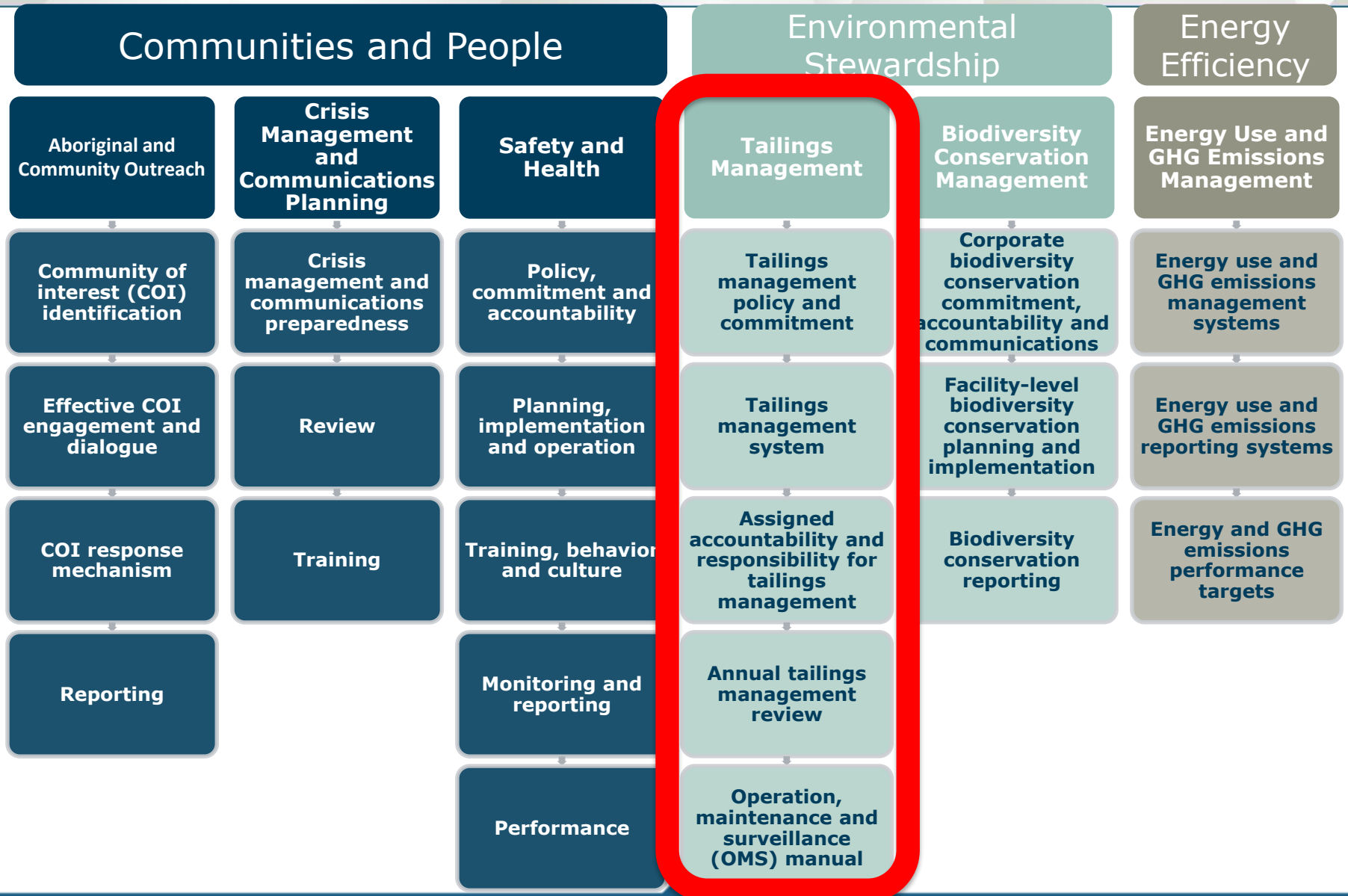
Junior Mining Company Representative

- ◆ Meets twice per year
- ◆ Work of Panel publicly available on the MAC website
- ◆ Annual COI Panel Statement published in TSM Progress Report

TSM PROTOCOLS AND INDICATORS



TSM PROTOCOLS AND INDICATORS



AAA

- Excellence and Leadership

AA

- Integration into management decisions and business functions

A

- Systems/processes are developed and implemented

B

- Procedures exist but are not fully consistent or documented; systems/processes planned and being developed

C

- No systems in place; activities tend to be reactive; procedures may exist but they are not integrated into policies and management systems

Self-assessment

- ◆ Annual

External verification

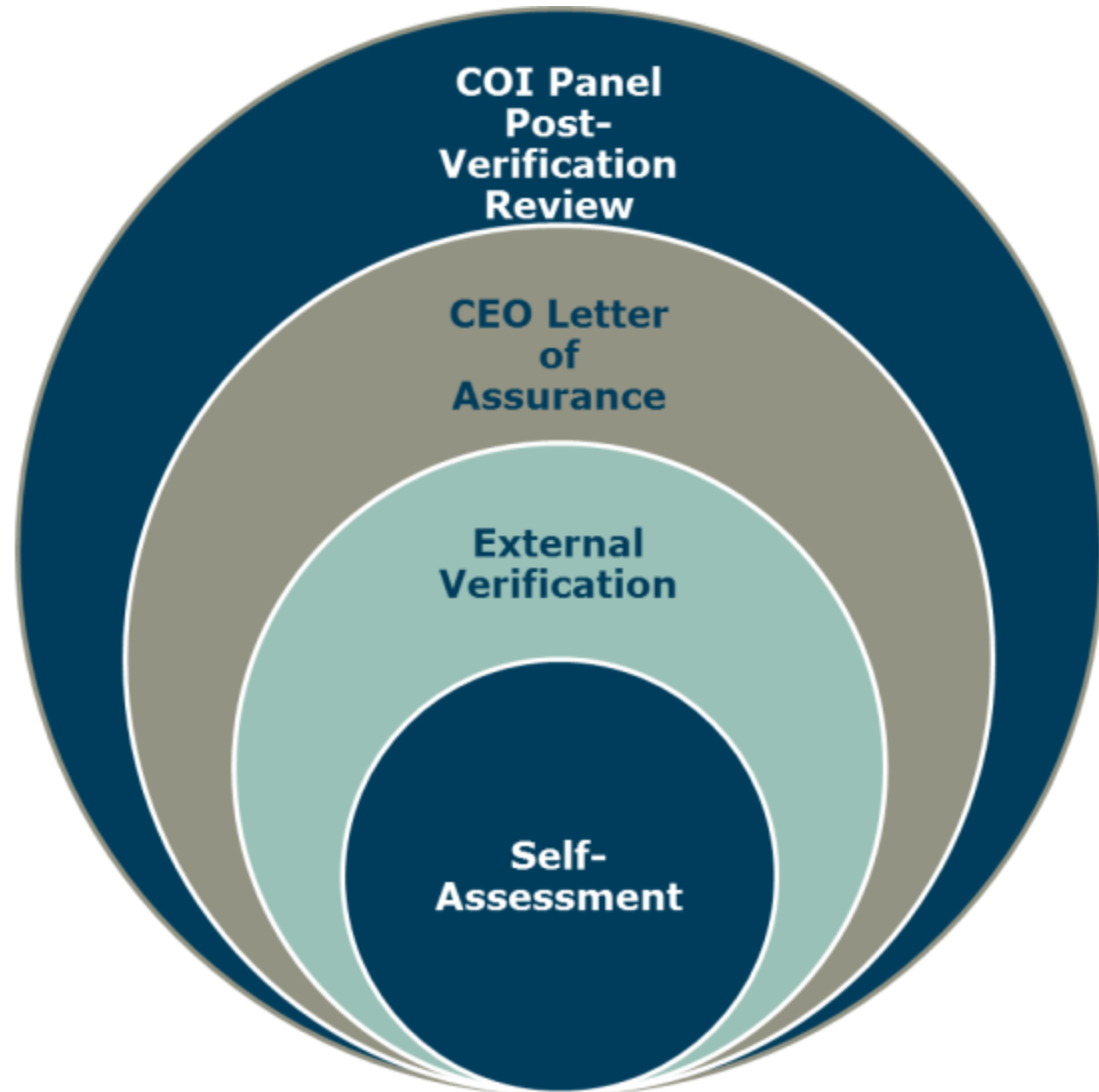
- ◆ **Every three years**

CEO letter of assurance

- ◆ Posted on MAC website in year of external verification

COI Panel Review

- ◆ 2-3 companies each year



Tailings Management

- ◆ A series of serious tailings dams failures over the last several decades have led to:
 - ◆ loss of life
 - ◆ severe environmental impacts
 - ◆ significant financial costs to mining companies, governments, and society as a whole
 - ◆ impact on the mining industry's reputation and social licence to operate
- ◆ These incidents underscore that effective tailings management is absolutely imperative
- ◆ Tailings are a business risk
- ◆ Increasing recognition that tailings management is a core business function for mining
 - ◆ tailings failures can break a company, financially

A sampling of some of the tailings incidents over the last 25 years

- ◆ Matachewan (Ontario, 1990)
- ◆ Merriespruit (South Africa, 1994) - 17 dead
- ◆ Surigao del Norte (Philippines, 1995) - 12 dead
- ◆ Omai Mine (Guyana, 1995)
- ◆ Marcopper Mine (Philippines, 1996)
- ◆ Los Frailes (Spain, 1998)
- ◆ Baia Mare (Romania, 2000)
- ◆ Kolontar (Hungary, 2010) – 9 dead
- ◆ Obed Mountain (Alberta, 2013)
- ◆ Mount Polley (British Columbia, 2014)
- ◆ Herculano Mine (Brazil, 2014) – 2 dead
- ◆ Samarco (Brazil, 2015) – at least 17 dead







- ◆ MAC established the Tailings Working Group (TWG) in 1996
 - ◆ consists of representatives of MAC members and associate members
- ◆ Driver at that time was a number of high profile tailings dam failures internationally
- ◆ First edition of *A Guide to the Management of Tailings Facilities* published in 1998
- ◆ Work on tailings pre-dates TSM, which was introduced in 2004



- ◆ TSM includes a tailings management component consisting of:
 - ◆ *TSM Tailings Management Protocol* (the Protocol)
 - ◆ launched in 2004
 - ◆ *A Guide to the Management of Tailings Facilities* (the Tailings Guide)
 - ◆ 1st edition 1998, 2nd edition 2011
 - ◆ *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities* (the OMS Guide)
 - ◆ first published in 2003
 - ◆ *A Guide to the Audit and Assessment of Tailings Facility Management* (the Audit and Assessment Guide)
 - ◆ first published in 2009



- ◆ Uses different approach from other TSM protocols
- ◆ Refers to the three Guides which provide more detailed requirements
- ◆ Contains five performance indicators designed to confirm whether a facility has implemented a system for responsible tailings management
- ◆ Facilities must conduct annual reviews of their management system and report results to the accountable executive officer
- ◆ Assessment/verification team needs to use Guides to derive the criteria

Tailings Management Indicators

Tailings management policy and commitment

Tailings management system

Assigned accountability and responsibility for tailings management

Annual tailings management review

Operation, maintenance and surveillance (OMS) manual

Indicator 1: Tailings Management Policy and Commitment

- ◆ Confirms that companies have established a policy and commitment that expresses intention, commitments and principles in relation to tailings management
- ◆ The policy and commitment must be:
 - ◆ In conformance with the Tailings Guide
 - ◆ Developed and/or reviewed in consultation with communities of interest
 - ◆ Endorsed by senior management
 - ◆ Implemented with budget allocation

Indicator 2: Tailings Management System

- ◆ Confirms that companies have a tailings management system that conforms with the tailings management to provide a formal systematic structure for the assessment of risks, setting of goals and objectives, consultation with COI, implementing activities to achieve goals, assignment of responsibilities, and assurance processes to ensure that tailings facilities are managed effectively
- ◆ The tailings management system must be:
 - ◆ In conformance with the tailings management framework in the Tailings Guide
 - ◆ Developed and/or reviewed in consultation with communities of interest
 - ◆ Implemented

Indicator 3: Assigned Accountability and Responsibility for Tailings Management

- ◆ Confirms that companies have an **executive officer (CEO or COO)** who has overall accountability to ensure that an appropriate management structure is in place to provide assurance to the company and its communities of interest that tailings are managed responsibly
- ◆ It is expected that the executive officer will delegate responsibility for tailings management, budgetary issues and other tailings-related functions to operations and/or corporate personnel, while retaining ultimate accountability for the management of tailings and its outcomes

Indicator 4: Annual Tailings Management Review

- ◆ Confirms that there is an annual corporate review of tailings management that is reported to the accountable executive officer
- ◆ Annual review must be in conformance with the tailings management framework in the Tailings Guide
- ◆ Purpose of the review is to:
 - ◆ evaluate performance of the tailings management system, considering inspection, audit and assessment reports, changing circumstances, monitoring results, spills and other incidents, recommendations, and the commitment to continual improvement
 - ◆ evaluate the continuing adequacy of, and need for changes to, policies and objectives for, performance of, and financial resources allocated to the tailings management system
 - ◆ address the need for changes to commitments to Communities of Interest

Indicator 5: OMS Manual

- ◆ Confirms that the facility has developed and implemented a tailings OMS manual
- ◆ OMS manual must be in conformance with the MAC OMS Guide
- ◆ Facilities must have documented emergency preparedness and response plans

Audit and Assessment

- ◆ For each of the 5 indicators, level AA and AAA require the facility to conduct an audit or assessment to demonstrate conformance with the Tailings Guide
- ◆ Audit or assessment should follow the standards recommended in the MAC Audit Guide
- ◆ This should not be confused with the external verification system as described in the TSM Assessment Protocols, which is largely a desk-top exercise in which the TSM rating self-assigned by a facility or company against a given indicator is verified
- ◆ Audit or assessment results remain valid for up to a maximum of three (3) years, providing the company makes a statement, signed by the executive officer accountable for tailings management, supported by annual management reviews, that the tailings management performance indicator implementation has been maintained or improved in the intervening period

Response to Mount Polley

OVERVIEW OF CURRENT MAC INITIATIVES OF TAILINGS MANAGEMENT

- ◆ Following the August, 2014 tailings dam failure at the Mt. Polley Mine, the MAC Board of Directors initiated a review of the tailings management component of TSM
- ◆ Board wanted to determine whether or not TSM requirements could be modified or strengthened to help meet the goal of zero major incidents
- ◆ Review consisted of two parts:
 - ◆ external review by an Independent Tailings Task Force (TF)
 - ◆ internal analysis by the TWG

- ◆ MAC launched TF in March, 2015
- ◆ TF asked to advise the MAC Board on potential improvements to the Protocol and three tailings management guides
- ◆ TF designed to be broad-based and seven members represented a variety of specialties and interests
 - ◆ specialists in engineering and geotechnical issues
 - ◆ First Nations representatives
 - ◆ environmental specialists
 - ◆ individuals with experience in executive management
- ◆ Report presented to MAC Board in November 2015
 - ◆ Presented 29 recommendations, including 19 priority recommendations

MAC RESPONSE TO TASK FORCE RECOMMENDATIONS

- ◆ MAC Board committed to “expeditiously identify how best to integrate the recommendations of the report into TSM for implementation”
- ◆ Board Chair stated that “It is imperative that the industry continuously improves how it works to ensure the safe operation of its tailings facilities”
- ◆ MAC Governance Team coordinating the overall process
 - ◆ TSM Initiative Leaders leading on revisions to Tailings Management Protocol
 - ◆ TWG leading on revisions to Tailings Guide and OMS Guide
- ◆ Aiming to have revisions to Protocol and Tailings Guide completed in early 2017 and OMS Guide after that

- ◆ TWG consists of representatives of MAC members and associate members
- ◆ TWG conducted review in parallel with Task Force
- ◆ Informed by Task Force recommendations and:
 - ◆ findings regarding causes and factors that contributed to Mt. Polley dam failure
 - ◆ parallel initiatives looking at tailings management



- ◆ Establishing new criteria for Levels A, AA and AAA for each of the Indicators in the Tailings Management Protocol, to increase the level of audit or assessment required to achieve each level
 - ◆ Level A = internal audit
 - ◆ Level AA = external audit
 - ◆ Level AAA = external audit and an evaluation of effectiveness
- ◆ Retaining Levels C and B, but:
 - ◆ Members that have not achieved Level A in all Indicators would be required to develop action plans to achieve Level A
 - ◆ Identify reasonable timeframe to complete action plans

- ◆ Working on enhanced criteria/guidance with respect to Aboriginal and community of interest (COI) engagement
- ◆ In response to TF recommendation to bring all aspects of community engagement from the Guides and Indicators into a new single indicator to address Aboriginal and COI engagement



- ◆ Incorporate a risk-based approach as an integral element of the Tailings Guide, with tailings facilities managed commensurate with risks (physical and chemical) that they pose
- ◆ Risks should be identified, assessed and periodically reassessed through all phases of the mine life-cycle, from planning through post-closure
- ◆ Controls critical to management of these risks should be implemented
- ◆ Performance against critical controls should be integral to the TSM audit and assessment process
- ◆ Non-conformances associated with critical controls would carry a greater weight in the TSM audit and assessment process compared to non-conformances not directly linked to risks posed by tailings facilities

- ◆ Revised Tailings Guide to address best available technologies (BAT) and best available practices (BAP) for tailings management, including:
 - ◆ alternatives to management of tailings as conventional slurry (e.g., filtered and thickened slurried tailings)
 - ◆ practices to reduce overall footprint of tailings facilities (e.g., in-pit disposal and underground backfilling)
 - ◆ co-management in a single facility of other wastes with tailings (e.g., waste rock and treatment sludge)
- ◆ Careful consideration to be given to defining terms BAT and BAP
 - ◆ recognize that selection of BAT/BAP is site-dependent
 - ◆ take into account environmental, social, closure and financial implications

PATH FORWARD BASED ON TASK FORCE AND TWG RECOMMENDATIONS

- ◆ Revised Tailings Guide to require rigorous, transparent process (e.g., multiple accounts analysis) to select tailings management technologies and tailings facility location
- ◆ Should be greater consideration of closure objectives in the initial selection of technology and facility location
- ◆ TWG developing guidance on independent review of site investigation and selection, design, construction, operation, closure and post-closure of tailings facilities
- ◆ OMS Guide to be updated after changes in Tailings Guide revisions completed

- ◆ Canadian Institute of Mining and Metallurgy
- ◆ Canadian Dam Association
- ◆ Association of Professional Engineers and Geoscientists of British Columbia
- ◆ Alberta Chamber of Mines
- ◆ International Council on Mining and Metals
- ◆ Review of the BC Mining Code
- ◆ TWG remaining apprised of there related activities and initiatives, and all have some direct involvement by TWG members
- ◆ Seeking potential opportunities for collaboration

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