Tailings Management and Towards Sustainable Mining

12th BC MEND ML/ARD Workshop

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Presentation by: Elizabeth Gardiner

The Mining Association of Canada
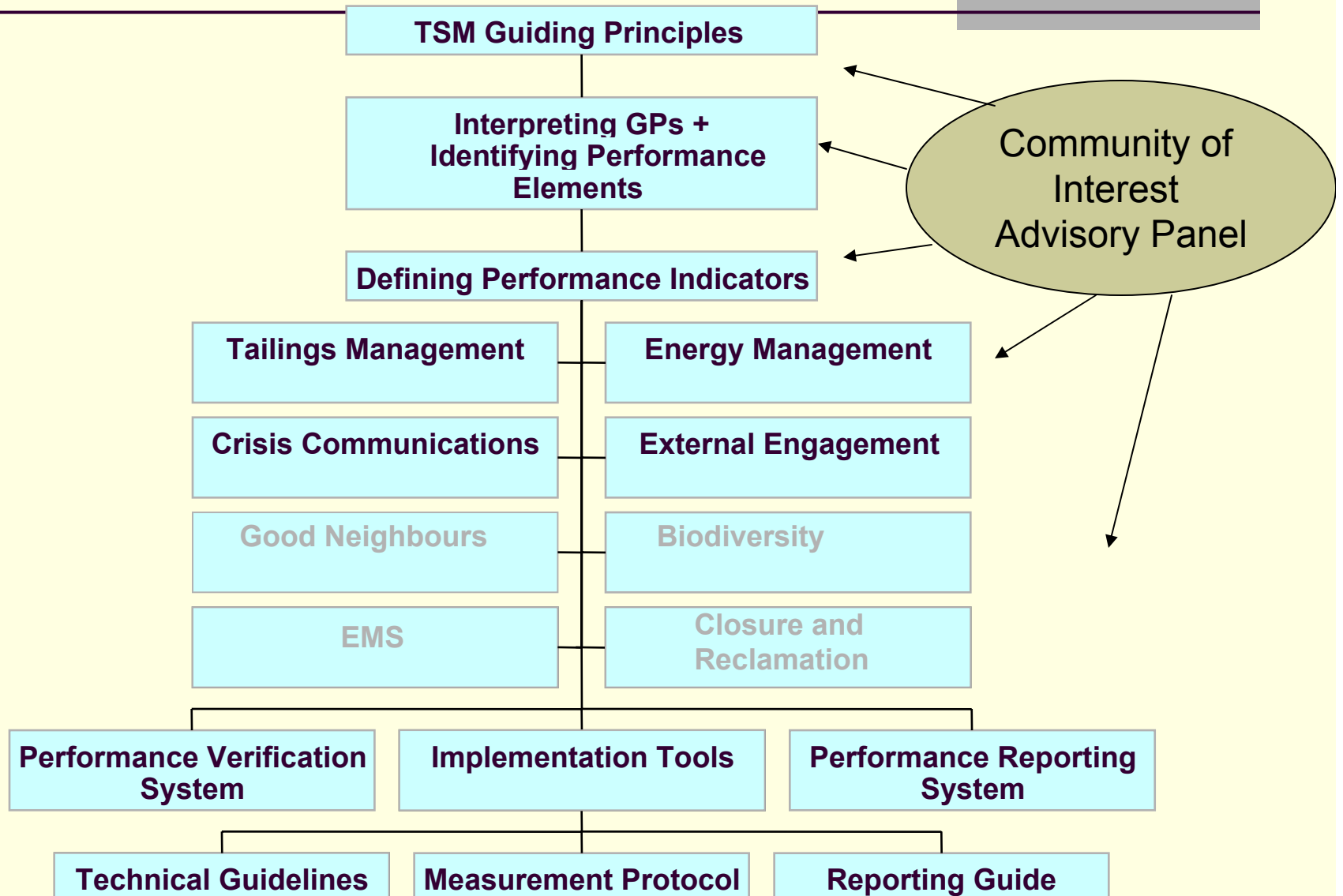
So why are we here?

The Beginning

Why Towards Sustainable Mining?

- The status quo simply wasn't sustainable
- Our social license was at risk
- The bar keeps rising
  - We must improve our performance, both operational and social
  - We must improve stakeholder judgment of our industry by taking action collectively

TSM – Building the Architecture

TSM Guiding Principles

Interpreting GPs + Identifying Performance Elements

Defining Performance Indicators

Community of Interest Advisory Panel

Tailings Management	Energy Management
Crisis Communications	External Engagement
Good Neighbours	Biodiversity
EMS	Closure and Reclamation

Performance Verification System

Implementation Tools

Performance Reporting System

Technical Guidelines

Measurement Protocol

Reporting Guide

Implementing TSM 2004

- TSM Guiding Principles
- Performance Elements and Indicators
  - Tailings management
  - Energy management
  - Crisis communications
  - External outreach
- Performance manuals, guides
- Reporting
- Communities of Interest Advisory Panel

TSM Guiding Principles

- Involving communities

- Engaging in dialogue

- Leadership for responsible resource stewardship

- Conduct operations with excellence, transparency, accountability

- Environmentally responsible metal prod'n, use, recycle.

- Min. impact on env+biod at all stages (exploration to closure)

- Continuous improvement

- Health & Safety of Employees & Communities

- Work to address legacy issues (e.g abandoned mines)

- Respect human rights + treat fairly

- Respect cultures, customs

- Recognize and respect aboriginal peoples

- Ethical conduct

- Comply w/ laws + adhere to GP standards and best practices

- Support community capabilities

- Responsive to community priorities at all stages

- Provide lasting benefits

TSM Indicators

- In addressing the TSM Guiding Principles, MAC developed performance indicators to:

- respond to critical performance areas
- demonstrate performance;
- facilitate continuous improvement toward recognized best practices; and,
- build credibility and trust with communities of interest.

TSM Elements and Indicators

- **Corporate Crisis Communications (Yes/No)**
  - Corporate crisis management preparedness
  - Annual review
  - Training
- **Corporate External Outreach**
  - COI identification process
  - Effective COI communications and engagement process
  - COI response mechanisms
  - Reporting on external outreach

TSM Elements and Indicators *(cont.)*

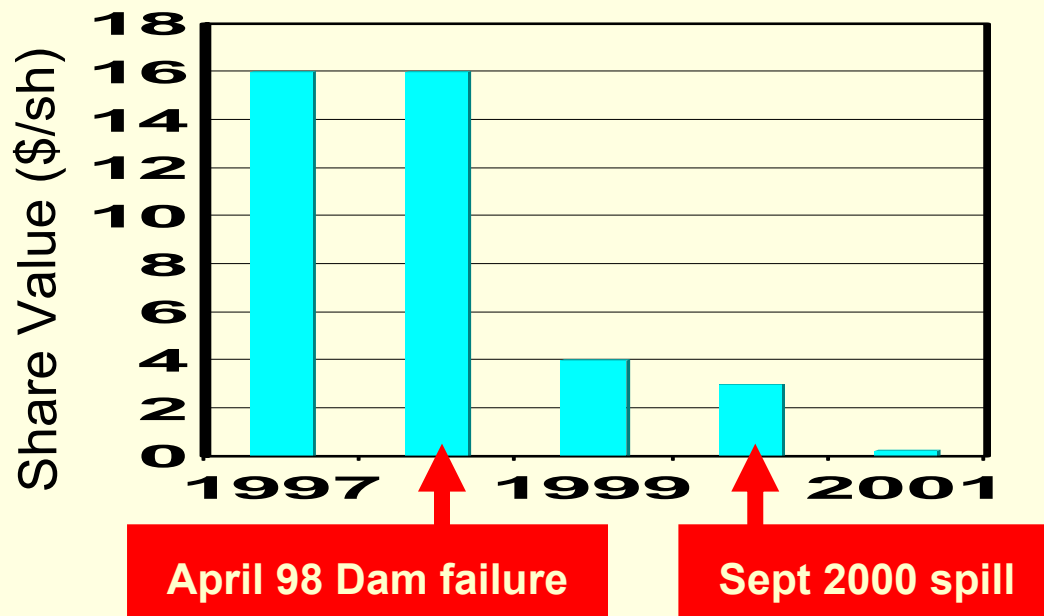- **Energy and GHG Management**

  - Energy use and GHG management systems

  - Energy use and GHG emissions reporting systems

  - Energy intensity performance
  - GHG intensity performance

- **Tailings Management**

  - Tailings management policy and statement of commitments

  - Tailings management system

  - Responsibility for tailings management

  - Annual senior management review

  - OMS manual

Tailings are a business risk

- Tailings are a business risk which needs to be managed

- Failures cost money. Direct cost of a tailings dam failure averages $70 to $150 Million USD

- Overall cost to company & shareholders can be many times more than the direct costs

Notes from international incidents mid-1990's

- **Merriespnuit**, South Africa death of 17 people, no management framework to ensure safe operation of tailings dams in the long term
- **OMAI** tailings dam, Guyana $11M cleanup + $10M lost production, failure preventable if existing design and construction technology applied
- **MarCopper**, Philippines $70M cleanup, unclear identification of roles and inadequate inspection procedures
- **Las Frailes**, Spain $100 M+ cleanup, foundation failure

The MAC Guides

- *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities (2003)*
  - "How to" Guides – for managing and operating tailings and water management facilities safely and responsibly
    - Practice continual improvement
    - Demonstrate due diligence
- *A Guide to the Management of Tailings Facilities (1998)*
    - Implement effective management controls and oversight

Tailings Management

Indicator 1 – Tailings Policy and Statement of Commitments

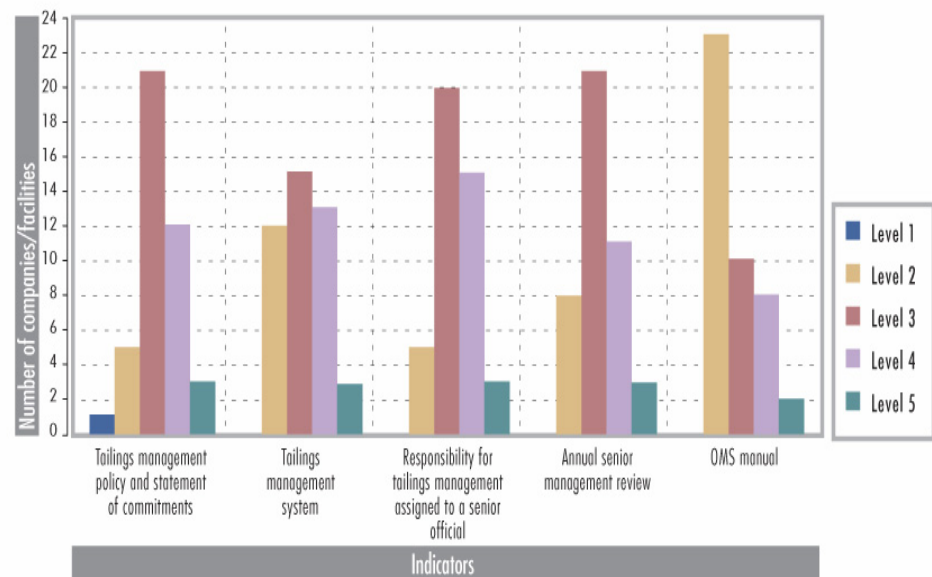| Tailings Management Policy And Statement Of Commitments Rating Criteria	
Level	**Criteria**
1	**Recognition, but little or no action**: no formal policy; perhaps addressed by overall site management policies, but which do not specifically address requirements for tailings.
2	**Documentation prepared, or in preparation**: need identified; guiding policy and commitments prepared; or formal plans to develop such made, funded and in progress.
3	**Effective implementation**: formal documentation of corporate policy and commitments, developed in consultation with COI and consistent with the MAC tailings management framework as presented in *A Guide to the Management of Tailings Facilities*, endorsed by senior management and effectively implemented with budget allocation.
4	**Formal verification**: company has implemented an audit and management system assessment protocol consistent with the MAC *Guide to Verification of Tailings Facility Management* and can demonstrate implementation of corporate policy and commitments consistent with the MAC tailings management framework.
5	**Validation by external verification**: company has implemented formal external verification of corporate policy and commitments as consistent with the MAC tailings management framework.

MAC TSM Public Reporting

- Public reporting of MAC member responses on tailings and other performance indicators
  - Began in 2004
  - Through MAC's TSM report (formerly the MAC Environmental Progress Report), released in January 2005

- Audit protocols developed for each indicator

- External verification to start in 2006

The Results -- Tailings

- Most members level 3 or better except for OMS

- Area of focused activity for 9 years (since Omai)

- Serious impacts of tailings failure means highest standards required

Tailings Management Assessments

Number of companies/facilities

Indicators: Tailings management policy and statement of commitments, Tailings management system, Responsibility for tailings management assigned to a senior official, Annual senior management review, OMS manual

Legend: Level 1, Level 2, Level 3, Level 4, Level 5

Company-Level Reports: 5 companies
Facility-Level Reports: 38 facilities (37 for tailings management policy and statement of commitments) (13 companies)
Total Reports: 43 reports (18 companies)

TSM Verification System

- Key Characteristics
  - Building on the internal audit and verification systems that MAC members already have in place,
  - Using a phased approach that recognizes it takes time for TSM to be fully implemented
  - Needs to evolve into an effective and comprehensive approach that will meet the full range of MAC members' needs and stakeholders' expectations

Work in Progress

- Completion of TSM Verification Program
  - Framework completed
  - Audit protocols completed

- Additional performance indicators
  - Community Development and Aboriginal Relations
  - Biodiversity Guidelines
  - Environmental Management Systems
  - Closure and Reclamation

Tailings Verification Protocol

- MAC Tailings Working Group has developed a Tailings Management Verification Protocol
  - Builds on
    - The Tailings Management Framework
    - The *Guide to the Management of Tailings Facilities*
    - *Developing an OMS Manual for Tailings and Water Management Facilities*
  - To measure the tailings management performance against the best practices contained in the *Guides*
    - Site specific
    - Step-by-step process
  - Initially targeted to internal verification and benchmarking
  - Ultimately will provide for external verification

COI Advisory Panel

- ToR
  - Help MAC members, COIs improve industry performance
  - Two-way dialogue
  - Input to and support for TSM goals
- Report on issues, recommendations to MAC Board and COI's
- Participation
  - 14 external interests
  - 5 MAC Board Members
  - 1 junior mining industry representative
- Meets twice per year (March, September)
- Work of panel posted on MAC web site (summary minutes, etc.)

Benefits of TSM Performance Measurement

- Driving performance
- Refocusing and stimulating activity on performance gaps
- Drawing attention to goals and targets
- Creating a culture of achievement
- Identifying trends and comparing with others (peer pressure)
- Transparency
- Earning our social license

For more information...

www.mining.ca

ICMM

International Council on Mining and Metals

Tailings
Good Practice Website

Good Practice Website - Tailings Section

www.goodpracticemining.com/tailings

- Jointly developed by

- Part of the Good Practice website

- Provides access to a library of good practice references on tailings including guidelines, standards, case studies, and other relevant material which provide leading examples.

Tailings:
Good Practice

Sustainable Development And Tailings Management

ICMM
International Council on Mining & Metals

CIGB ICOLD

This website has been jointly developed by the International Council on Mining and Metals (ICMM) and the International Commission on Large Dams (ICOLD) to provide access to a library of good practice references on tailings. The site is a subset of the **Good Practice website** and provides guidelines, standards, case studies, legislation and other relevant material, which are specifically relevant to tailings, and leading examples of their kind globally.

Quick Search

[ ] go

Enter keywords, separated by spaces to perform a quick search of the Tailings: Good Practice library.

Browse The Library

To browse the document library using a more advanced search criteria, please use our Search Library page.

What's New

The Tailings Good Practice website was launched in October 2005 by the International Council on Mining and Metals (ICMM) and the International Commission on Large Dams (ICOLD). The website was developed to provide a resource on all aspects of tailings in the context of good practice in the mining and metals sector. The Tailings Good Practice site is a part of the broader Good Practice one.

The references on the site are not meant to represent a definitve framework for tailings management. They provide a comprehensive number of references on tailings which will be reviewed following the launch, and updated on a regular basis.

⊡ Browse The Library

Enter the keyword(s) you wish to search for. You may also filter search results by the relevant lifecycle, topics, organisation types and regions.

Keywords: [   ] Sorted By: [Relevancy ▾] In: [Ascending Order ▾]
[search]

And/Or, Refine search results by selecting the required attributes below:

Life Cycle:

☐ Exploration & Planning   ☐ Mining

☐ Recycling & Disposal   ☐ Materials & Minerals in Use

☐ Processing & Fabricating   ☐ Rehabilitation & Post Closure

Topics - Management References:

☐ Overarching principles and policies   ☐ Operations, Maintenance and Surveillance

☐ External Communications/ Reporting   ☐ Training

☐ Emergency Preparedness & Response   ☐ Reviews/Audits

☐ Financial Assurance

Topics - Technical References:

☐ Risk Assessment   ☐ Site Selection

☐ Tailings characterisation   ☐ Disposal techniques

☐ Conceptual design - Dam & Appurtenant structures   ☐ Waste Minimisation & Recycling

☐ Water Management   ☐ Acid and poor quality drainage from tailings

☐ Contaminant Migration   ☐ Monitoring

☐ Cyanide Management   ☐ Decommissioning, Closure & Aftercare

☐ Re-treatment of wastes   ☐ Wildlife management and ecosystem indicators

www.goodpracticemining.com/tailings

Please e-mail comments to:

goodpractice@icmm.com