

# Consultation response

## Part 1: Your details

**Original language of response:** English

**Name:** Heather Narynski

**Country of residence:** Canada

**Are you willing to let us publish your response publicly on the Global Tailings Review website?** Yes

**Please select which stakeholder group you are representing:** Government

**If 'Other', please specify below:**

**Are you responding on behalf of an organization?** Yes

**Please give the name of the organization:** BC Ministry of Energy, Mines and Petroleum Resources

**Your level within the organisation:** Management

## Part 2: Your views on each of the Principles and Requirements in the Standard Topic 1: Knowledge Base

### Principle 1

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 1 do your comments relate to?**

Requirement 1.3, Requirement 1.2

**Your comments on Principle 1**

REQUIREMENT 1.2

- Consider specifying that site characterization applies to the final (ultimate) facility configuration.
- Consider adding geohazards to the listed items.
- Consider clarifying that tailings properties should be validated through testing of the produced/deposited tailings

REQUIREMENT 1.3

- Consider including failure run-out assessment for non-liquefiable facilities including filtered (dry-stack) tailings. This should consider where failure run-out extent could become channelized.
- Note that this Requirement appears to contradict the definition of inundation study provided in the Glossary (i.e. 'hypothetical scenarios not connected to probability of occurrence' vs. 'credible hypothetical failure mode').

### Principle 2

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 2 do your comments relate to?**

Requirement 2.4, Requirement 2.3, Requirement 2.1, Requirement 2.6, Requirement 2.5

**Your comments on Principle 2**

REQUIREMENT 2.1

- Consider including Metal Leachate and Acid Rock Drainage management.
- Consider adding discussion of the role of economics in alternatives assessment and associated decision-making.
- Consider splitting this Requirement into two parts as it seems to cover two topics.

REQUIREMENT 2.3

- Consider adding clarification of when to begin engaging communities. Suggest that this should be at the conceptual/alternatives assessment/site selection phase of works or earlier.

REQUIREMENT 2.4

- Consider adding that the 'design' of the facility shall also be adjusted to reflect new data.

REQUIREMENT 2.5

- Consider specifying a minimum frequency for financial assurance reviews.

REQUIREMENT 2.6

- Consider specifying if this includes financial assurance in the event of a failure of the facility or whether this is specifically based on anticipated performance of the facility.
- Consider clarifying who is to hold the financial assurance and under what conditions it could be released.

## Topic II: Affected Communities

### Principle 3

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 3 do your comments relate to?**

Requirement 3.2

**Your comments on Principle 3**

REQUIREMENT 3.2

- Consider providing examples of the types of engagement (and frequency) that would be expected to satisfy this requirement.

## Topic III: Design, Construction, Operation and Monitoring of the Tailings Facility

### Principle 4

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 4 do your comments relate to?**

Requirement 4.1, Requirement 4.2, Requirement 4.3

**Your comments on Principle 4**

REQUIREMENT 4.1

- Consider providing greater clarity around the definition of a "new" facility to either clearly include or exclude existing facilities that go through a regular process of permit amendment (particularly where these permit amendments are significant in nature such as multiple dam raises or configuration changes over time) as well as facilities that have been closed for an extended period of time that re-start
- Consider how this applies to small scale TSFs and pilot projects/tailings. Does the "knowledge base" need to include a formal dam break and inundation study to demonstrate a lower consequence classification, if not, what work is required to support the determination of consequence classification? Working backwards from "Extreme" consequence could prove to

be impractical for small scale facilities with low consequence classification.

a) Requires greater clarity around what constitutes “knowledge base”, “near future” and “impactful”.

b) Requires additional clarity as it was difficult to understand the intent of this bullet. Assuming this bullet intends that a lower consequence can be accepted and designed to (when demonstrated to be the case) provided an “Extreme” consequence design is prepared and can feasibly be implemented in the future should the consequence classification of the facility change to “Extreme”? It could also be read that for a consequence of failure classification determined to be “Extreme” this design does not need to be implemented until sometime in the future provided the “Extreme” consequence design is prepared and can feasibly be implemented.

c) Requires additional clarity. Lots of concepts blended into one bullet.

#### REQUIREMENT 4.2

- What measures would be required if there was a change in the Board and a new Accountable Executive transitioned into the role? Would there be indemnity for the past Accountable Executive? Would it initiate a requirement to review the operator's portfolio and issue new documented reasons for decision?

- Consider including input from the EOR as well as the ITRB.

#### REQUIREMENT 4.3

- Consider including guidance on the expectation to reduce risk of a potential failure of an existing facility when the consequence is limited to environment (i.e. no loss of life or infrastructure). The value of environmental damage varies greatly amongst different groups and cultures. This speaks to the acceptable level of effort expected by the mine to protect the environment. A zero-harm policy may not be realistic (and will be left to interpretation).

- Consider including input from the EOR as well as the ITRB.

- Consider clarifying that the measures to reduce risk shall be ‘implemented’ (rather than just approved).

### **Principle 5**

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 5 do your comments relate to?**

Requirement 5.3, Requirement 5.1, Requirement 5.2, Requirement 5.6, Requirement 5.5, Requirement 5.4

**Your comments on Principle 5**

#### REQUIREMENT 5.1

- Consider adding discussion of the role of economic considerations in decision making.

#### REQUIREMENT 5.2

- Suggest requirement for annual reconciliation of water balance and update of water management plans.

- Consider specifying that the TSF water balance should be reconciled with the site-wide water balance (often these are carried out by different professionals and not appropriately linked)

- Consider adding a requirement for Mines to track tailings levels and pond levels against the design water balance projections. This may include procedures for proactively preventing and managing accumulations of water, which may include revision to the TSF design or raising schedule

- Consider adding requirement for assessment of climate variability, continuous reassessment of

site conditions, and forecast climate change.

#### REQUIREMENT 5.3

- Consider including an understanding of previous TSF failures and failure modes to assess and address the potential for similar conditions at the specified TSF(not sure the best place to locate this in the document i.e. "lessons learned")

#### REQUIREMENT 5.4

- Consider providing guidance on how to establish, prove, and document that a failure mode is not credible. Also consider requiring re-assessment of credibility of failure modes at a regular interval to capture future improvements in understanding.

#### REQUIREMENT 5.5

- Consider adding that design should also be updated in response to operational/mine planning changes and relevant regulatory changes.
- Consider clarifying that the design for all stages of the facility lifecycle is required at the initial phase of planning.

#### REQUIREMENT 5.6

- Consider including "phased" closure concepts similar to the CDA Mining Dams Bulletin which outlines various phases of closure (transition, active and passive care)

### *Principle 6*

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 6 do your comments relate to?**

Requirement 6.1,Requirement 6.2,Requirement 6.4

**Your comments on Principle 6:**

#### REQUIREMENT 6.1

- Consider clarifying the intent and phrasing of this Requirement.

#### REQUIREMENT 6.2

- Consider revising the Requirement to a) discuss appropriate conservatism, b)selection considerations for input parameters and c) stability analysis sce

### *Principle 7*

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 7 do your comments relate to?**

Requirement 7.4,Requirement 7.8,Requirement 7.6

**Your comments on Principle 7**

#### REQUIREMENT 7.4

- Consider providing a minimum frequency for OMS update.

#### REQUIREMENT 7.6

- Consider adding refinement of reclamation and closure planning to this Requirement.

#### REQUIREMENT 7.8

- Consider adjusting the frequency of this requirement to integrate with completion of DSRs

### *Principle 8*

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

## **Which aspects of Principle 8 do your comments relate to?**

Requirement 8.1, Requirement 8.2

### **Your comments on Principle 8**

REQUIREMENT 8.1

• Consider separating discussion of requirements for monitoring programs from the use of the Observational Method. Monitoring programs are good practice even if the Observational method is not being applied.

REQUIREMENT 8.2

• Consider including quantifiable performance objectives

## **Topic IV: Management and Governance**

### **Principle 9**

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 9 do your comments relate to?**

**Your comments on Principle 9**

### **Principle 10**

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 10 do your comments relate to?**

Requirement 10.2, Requirement 10.3

**Your comments on Principle 10:**

REQUIREMENT 10.2

• Should this refer to the 'Accountable Executive'?

REQUIREMENT 10.3

• Clarify the Role and Responsibility of the Responsible Tailings Facility Engineer. Is the RTFE required to be an Engineer (or is a Qualified Person sufficient)?

• Consider requiring the RTFE and EOR to be registered and in good standing with the relevant engineering regulatory body (where applicable).

• Consider clarifying the relationship and authority represented by the "dotted reporting line to mine management to represent the delivery of services to the site".

### **Principle 11**

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 11 do your comments relate to?**

Requirement 11.3, Requirement 11.4, Requirement 11.5

**Your comments on Principle 11:**

REQUIREMENT 11.3

• Consider removing the option for a senior independent technical reviewer to conduct the DSI, perhaps replace with "The EOR or their designate shall conduct...". It is understood that the senior independent technical reviewer is

## ***Principle 12***

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 12 do your comments relate to?**

Requirement 12.3, Requirement 12.1, Requirement 12.5

**Your comments on Principle 12:**

REQUIREMENT 12.1

- Consider adding that an employee appointed EOR must also have experience in design and construction of tailings facilities of comparable complexity. As written, it implies that an employee EOR can have less

## ***Principle 13***

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 13 do your comments relate to?**

**Your comments on Principle 13:**

## ***Principle 14***

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 14 do your comments relate to?**

**Your comments on Principle 14:**

## ***Topic V: Emergency Response and Long-Term Recovery***

### ***Principle 15***

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 15 do your comments relate to?**

Requirement 15.1, Requirement 15.4

**Your comments on Principle 15:**

REQUIREMENT 15.1

- Consider requiring the TSF ERP to be integrated with the Mine ERP.

REQUIREMENT 15.4

- Suggest adding frequency for testing of Emergency Response Plans.

### ***Principle 16***

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 16 do your comments relate to?**

Requirement 16.3, Requirement 16.2

**Your comments on Principle 16:**

REQUIREMENT 16.2:

•Consider clarifying that actions to prevent further environmental impacts is also expected in the immediate wake of a disaster, after human safety is established.

REQUIREMENT 16.3

•Clarify when this should be developed.

**Topic VI: Public Disclosure and Access to Information**

**Principle 17**

**In your view, will compliance with this Principle and its Requirements contribute to the prevention of catastrophic failure of tailings facilities?**

**Which aspects of Principle 17 do your comments relate to?**

**Your comments on Principle 17:**

**Part 3: Your views on the Standard**

*Your view as to whether the content of the Standard meets your expectations*

**Your view as to whether the content of the Standard meets your expectations (closed question):**

**Please summarize why you chose this option:**

*Your view on whether the Standard will create a step change for the industry in the safety and security of tailings facilities*

**Your view on whether the Standard will create a step change for the industry in the safety and security of tailings facilities (closed question):**

**Please summarize why you chose this option:**

*Does the content of the Standard address all aspects of tailings facility management adequately?*

**Does the content of the Standard address all aspects of tailings facility management adequately (closed question)?**

**Please explain why and/or what is missing:**

**Part 4: Suggestions for topics to be included in the accompanying Recommendations Report**

**On which topics would you expect to have further clarification or guidance in this document?**

**Other information**

**Non-fitting response text (text submitted which did was not in response to one of the questions above)**

**Attachment 1 reference (if applicable)**

ref:0000000941:Q83

**Attachment 2 reference (if applicable)**

ref:0000000941:Q84





Ref: 108864 (CLIFF Number)

December 18, 2019

Dr. Bruno Oberle  
252B Gray's Inn Road  
London, England  
WC1X 8XG  
[consultation@globaltailingsreview.org](mailto:consultation@globaltailingsreview.org)

Dear Dr. Oberle,

The Ministry of Energy, Mines and Petroleum Resources (EMPR), British Columbia, Canada, has reviewed the November 2019 Draft Global Tailings Standard (the “Standard”). EMPR supports the development of the Standard and appreciates the significant efforts of the Global Tailings Review (GTR) committee in developing this draft Standard. We are pleased to have the opportunity to provide feedback through the consultation process that has been established.

This feedback encompasses commentary from geotechnical, geoscience and reclamation professionals involved in regulation of the BC mining industry and is informed by EMPR’s experience developing, implementing, and enforcing Tailings Storage Facility (TSF)-specific regulations<sup>1</sup>. It is EMPR’s understanding that the scope of the GTR will also include development of Guidance Documents to complement the Standard, and as such, some of the comments herein may be more appropriately addressed in the proposed Guidance Documents.

Feedback is provided in two parts:

- General comments, organized by select themes (provided below)
- Specific comments on individual Standard Requirements (attached table)

### **General Comments:**

#### *Role of the State (Regulator)*

- The preface to the Standard discusses the role of the State and notes that States are “the most appropriate entity to set up an independent inspection and enforcement program” and should “use this Standard as a guide for building...a regulatory framework”. Further, the Standard describes various elements of enforcement, compliance monitoring, and

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<sup>1</sup> EMPR, 2017. Health, Safety and Reclamation Code for Mines in British Columbia, 2017.

regulation. The proposed relationship/interaction between the Standard, the Standard's "implementation process" and individual States (Regulators) should be clarified.

- The Standard (in some sections) is not written in auditable and enforceable language and therefore would prove challenging for direct integration with Legislation. If the objective is for States (Regulators) to adopt or integrate the Standard, the language used in the Standard should undergo review to ensure each requirement is specific, measurable, and time-based (where possible) to ensure consistent application.

### Scope and Purpose

- The Standard would benefit from greater clarity in either the "Introduction" or "Overview of the Standard" related to the purpose, scope, audience, and desired use/implementation.
- The Standard appears to apply primarily to slurry TSFs (e.g. third paragraph of foreword). Consideration should be given to ensuring that the Standard is clear in its applicability to a wide range of tailings technologies, deposition and storage methodologies. This should include consideration of in-pit, underground, co-disposal and filtered tailings (i.e. does each Requirement apply equally to all tailings technologies, deposition and storage methodologies?).
- The Standard appears to apply primarily to TSFs that are owned and operated by Organizations of significant size and financial resources (e.g. reference to organizational structure in Annex 3). Consideration should be given to ensuring that the Standard is applicable to a wide range of Owner/Operator sizes, financial position, and levels of sophistication.
- Consideration should be given to ensuring that the Standard is applicable to a wide range of TSF scale and consequence (with particular consideration of how the Standard, and associated Requirements, apply to small scale, low consequence TSFs).
- The text indicates an accompanying report (the 'Report') will be issued with the release of the Standard. Consideration should be given to issuing the Report in draft for consultation prior to being finalized.
- It is EMPR's understanding that a number of "Guidance" documents will eventually support the Standard. Consideration should be given to what aspects of the Standard may be more suitable as "Guidance".

### Implementation and Enforcement

- Consideration should be given to how each Requirement could be implemented in a practical way for a range of TSF scales, organization sophistication, and tailings technologies, deposition and storage methodologies (discussed in the above bullets.)
- The implementation and enforcement regime envisioned by the Standard should be clarified and explained. It is currently unclear who or what body would be responsible for evaluation, assessment and enforcement of compliance, which the Standard describes as including, but not limited to, the following:
  - 'protocols for determining compliance and non-compliance with the Standard';
  - 'resources to conduct compliance monitoring';
  - 'a process for approving or conditionally approving assurance'; and
  - 'the power to revoke or suspend assurance where necessary'.

- Consideration should be given to adding a requirement for an anonymous reporting process directly to the bodies responsible for evaluation and assessment of compliance.

#### Applicability to Existing Facilities

With respect to Requirement 4.3 of the Standard (which discusses the application of Requirements 4.1 and 4.2 to existing TSFs – related to ‘Extreme’ consequence classification), consideration should be given to the following:

- Implementation requirements for orphaned and abandoned sites;
- Implementation requirements for small operators without significant financial resources;
- Implementation requirements where site-specific circumstances make the required upgrades technically non-feasible;
- Implementation requirements where facilities are remote or pose low risk;
- Clarification with respect to what constitutes reduction of risks ‘to the greatest extent possible’.

Consideration should also be given as to how the Standard applies to incrementally permitted or reactivated TSFs (i.e. would these be considered “New” or “Existing” facilities?)

#### Roles, Responsibilities, Incentives<sup>2</sup>

- Clarity is needed with respect to who or what entity is responsible for executing or participating in the Requirement. (e.g. 14.1, 14.2, 14.3, 17.1, 17.2)
- The Engineer of Record (EOR) is mentioned in few Requirements. In EMPR’s experience, many of the Requirements would benefit from explicit inclusion of the EOR as a participant or responsible party (e.g. 4.2, 4.3, 9.1, 9.2, 11.1).
- Consideration should be given to the responsibility of the Owner/Operator to the EOR, including how recommendations from the EOR are implemented, and a dispute resolution process in the event of a disagreement or misalignment between the EOR and Owner/Operator.
- Performance incentives are included in the Standard (Requirements 10.4 and 13.5). There is the potential that this could encourage mis-reporting or suppression of critical issues. Consideration should be given to removing incentives from the Standard or carefully defining them in a way that will prevent misuse. Consideration could be given to “Whistleblower” protection and other ways to facilitate a culture which supports identification of concerns. Incentives could also be considered by investors/insurers for those operators who adopt Best Available Technologies and other best practices, including the adoption of the Standard.

#### Geochemistry

Further integration of geochemical (e.g. acid rock drainage, metal leaching) components into the Standard would be beneficial. This could include consideration of both geochemistry and water treatments requirements in alternatives assessment, selection of tailings technologies, TSF design, closure design, and long-term liabilities evaluation.

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<sup>2</sup> Please note that where lists of relevant Requirements are provided, these are intended to be illustrative examples only and are not intended to be exhaustive lists of relevant Requirements.

### Planning and Closure

Benefits and efficiencies may be gained by encouraging long-term reclamation and closure planning at early stages of project design. Consideration should be given to adding emphasis on long-term planning, particularly as it relates to:

- TSF ‘design for closure’ concepts;
- Progressive reclamation;
- TSF operation, including deposition planning;
- Monitoring and site data collection;
- Geochemical and water quality concerns;
- Mine planning.

### Records

A well-designed and monitored TSF will generate a significant amount of information. Consideration should be given to promoting best practices in data and records management, potentially including topics such as:

- Maintenance of current and complete documentation;
- Documentation and archiving of historical information;
- Management of electronic records, including emails;
- Management of instrumentation and monitoring data;
- QA/QC procedures for generated documentation and data;
- Process for documentation/knowledge transfer for changes in owner or EOR.

### Clarity and Terminology

- Some Requirements refer to outcomes that are difficult to assess and quantify (e.g. “reduce the risks of a potential failure to the greatest extent possible” and “strive for ‘zero-harm’ to people and the environment”). Consideration should be given to providing further explanation or guidance as to expected outcomes for such Requirements, as well as specifying who has the responsibility to assess satisfactory compliance with these Requirements.
- EMPR recommends clarity with respect to when (or at what point during a process) the Requirements should be in effect (e.g. 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3...)
- Various reviews, audits, updates, and reporting frequencies are indicated throughout the Standard; minimum frequencies for these should be provided where not already and consideration should be given to specifying consistent frequencies of reviews/audits (e.g. 1.2, 7.4, 7.5, 7.8, 11.1, 11.2, 11.4, 15.1, 15.4).
- Consideration should be given to adding or expanding Glossary definitions of the following terms or phrases:

- Landform
- Tailings (with consideration of applicability of Standard to by-products from gravel pit/quarry operations, Coarse Coal Reject, etc.)
- Credible and Non-Credible Failure Modes
- Credible tailings facility failure scenarios
- Slurry
- Site Characterization
- Waste Rock
- Near future
- Impacted Area
- Financial assurance
- Flow failure (including ‘impactful flow failure’, ‘permanent non-credible flow failure state’, and explanation of how to assess ‘potential for flow failure’)
- Dotted reporting line
- Closure and Post-Closure
- Performance objectives, indicators, criteria, and performance parameters
- Design Criteria
- Minimize risk
- Tailings Facility (remove design specifics or clarify to include more types of facilities and variation in facility designs)
- Tailings Facility Lifecycle (include permitting)
- Regulator
- Unacceptable/ acceptable
- Dam
- Design Basis

In closing, BC EMPR supports the implementation of a Global Tailings Standard. It is envisioned that this will facilitate a more consistent approach to the design, construction, operation, closure and regulation of TSFs globally, resulting in positive impacts to the mining industry.

Sincerely,



Heather Narynski, P.Eng  
A/Manager, Geotechnical Engineering  
BC Ministry of Energy, Mines and Petroleum Resources

Enclosure(s):

TABLE: BC Ministry of Energy, Mines and Petroleum Resources Comments on Specific Requirements of the Draft Global Tailings Standard



Table: BC EMPR Comments on Specific Requirements of the Draft Global Tailings Standard

DRAFT GLOBAL TAILINGS STANDARD REQUIREMENTS	BC EMPR FEEDBACK
<b>TOPIC I: KNOWLEDGE BASE</b>	
<b>PRINCIPLE 1: Develop and maintain an updated knowledge base to support safe tailings management across the tailings facility lifecycle.</b>	
<p>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.</p>	<ul style="list-style-type: none"> <li>• Consider specifying that site characterization applies to the final (ultimate) facility configuration.</li> <li>• Consider adding geohazards to the listed items.</li> <li>• Consider clarifying that tailings properties should be validated through testing of the produced/deposited tailings.</li> </ul>
<p>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.</p>	<ul style="list-style-type: none"> <li>• Consider including failure run-out assessment for non-liquefiable facilities including filtered (dry-stack) tailings. This should consider where failure run-out extent could become channelized.</li> <li>• Note that this Requirement appears to contradict the definition of inundation study provided in the Glossary (i.e. ‘hypothetical scenarios not connected to probability of occurrence’ vs. ‘credible hypothetical failure mode’).</li> </ul>
<b>PRINCIPLE 2: Integrate the social, economic, environmental and technical information to select the site and the technologies to minimize the risk of tailings facility failure.</b>	
<p>REQUIREMENT 2.1: Undertake a formal, multi-criteria <i>alternatives analysis</i> 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, <i>inundation studies</i>, a monitoring program, <i>Emergency Preparedness and Response Plans</i> (EPRP), and closure and post-closure plans.</p>	<ul style="list-style-type: none"> <li>• Consider including Metal Leachate and Acid Rock Drainage management.</li> <li>• Consider adding discussion of the role of economics in alternatives assessment and associated decision-making.</li> <li>• Consider splitting this Requirement into two parts as it seems to cover two topics.</li> </ul>
<p>REQUIREMENT 2.3: Use the knowledge base to assess the social, economic and environmental impacts of the tailings facility and its potential failure. Develop impact mitigation and management plans, and <i>meaningfully engage</i> potentially affected communities in the process.</p>	<ul style="list-style-type: none"> <li>• Consider adding clarification of when to begin engaging communities. Suggest that this should be at the conceptual/alternatives assessment/site selection phase of works or earlier.</li> </ul>
<p>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 <i>tailings facility</i>, the social or environmental context or conditions. If new data indicates that the impacts from the <i>tailings facility</i> differ from those assumed in the original assessments, the management of the facility shall be adjusted to reflect the new data using <i>adaptive management best practices</i>.</p>	<ul style="list-style-type: none"> <li>• Consider adding that the ‘design’ of the facility shall also be adjusted to reflect new data.</li> </ul>
<p>REQUIREMENT 2.5: The amount of financial assurance shall be reviewed periodically and updated based on estimated closure and post-closure costs.</p>	<ul style="list-style-type: none"> <li>• Consider specifying a minimum frequency for financial assurance reviews.</li> </ul>
<p>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 <i>tailings facility</i>.</p>	<ul style="list-style-type: none"> <li>• Consider specifying if this includes financial assurance in the event of a failure of the facility or whether this is specifically based on anticipated performance of the facility.</li> <li>• Consider clarifying who is to hold the financial assurance and under what conditions it could be released.</li> </ul>
<b>TOPIC II: AFFECTED COMMUNITIES</b>	
<b>PRINCIPLE 3: Respect the rights of project-affected people and meaningfully engage them at all stages of the tailings facility lifecycle.</b>	
<p>REQUIREMENT 3.2: <i>Meaningfully engage project-affected people</i> (PAP) throughout the <i>tailings facility lifecycle</i> regarding the matters that affect them.</p>	<ul style="list-style-type: none"> <li>• Consider providing examples of the types of engagement (and frequency) that would be expected to satisfy this requirement.</li> </ul>

<b>TOPIC III: DESIGN, CONSTRUCTION, OPERATION AND MONITORING OF THE TAILINGS FACILITY</b>	
<b>PRINCIPLE 4: Design, construct, operate and manage the <i>tailings facility</i> on the presumption that the consequence of failure classification is 'Extreme', unless this presumption can be rebutted.</b>	
<p>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:</p> <p>a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and</p> <p>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</p> <p>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 <i>tailings facility</i> is upgraded to the new classification within 3 years. This review should proceed until the facility has been safely closed and achieved a confirmed 'landform' status or similar permanent non-credible flow failure state.</p>	<ul style="list-style-type: none"> <li>• Consider providing greater clarity around the definition of a "new" facility to either clearly include or exclude existing facilities that go through a regular process of permit amendment (particularly where these permit amendments are significant in nature such as multiple dam raises or configuration changes over time) as well as facilities that have been closed for an extended period of time that re-start</li> <li>• Consider how this applies to small scale TSFs and pilot projects/tailings. Does the "knowledge base" need to include a formal dam break and inundation study to demonstrate a lower consequence classification, if not, what work is required to support the determination of consequence classification? Working backwards from "Extreme" consequence could prove to be impractical for small scale facilities with low consequence classification. <ul style="list-style-type: none"> <li>○ a) Requires greater clarity around what constitutes "knowledge base", "near future" and "impactful".</li> <li>○ b) Requires additional clarity as it was difficult to understand the intent of this bullet. Assuming this bullet intends that a lower consequence can be accepted and designed to (when demonstrated to be the case) provided an "Extreme" consequence design is prepared and can feasibly be implemented in the future should the consequence classification of the facility change to "Extreme"? It could also be read that for a consequence of failure classification determined to be "Extreme" this design does not need to be implemented until some time in the future provided the "Extreme" consequence design is prepared and can feasibly be implemented.</li> <li>○ c) Requires additional clarity. Lots of concepts blended into one bullet.</li> </ul> </li> </ul>
<p>REQUIREMENT 4.2: The decision to rebut the requirement to design for 'Extreme' Consequence Classification, shall be taken by the <i>Accountable Executive</i> or the <i>Board of Directors</i> (the '<i>Board</i>'), with input from an independent <i>senior technical reviewer</i> or the <i>ITRB</i>. The <i>Accountable Executive</i> or <i>Board</i> shall give written reasons for their decision.</p>	<ul style="list-style-type: none"> <li>• What measures would be required if there was a change in the Board and a new Accountable Executive transitioned into the role? Would there be indemnity for the past Accountable Executive? Would it initiate a requirement to review the operator's portfolio and issue new documented reasons for decision?</li> <li>• Consider including input from the EOR as well as the ITRB.</li> </ul>
<p>REQUIREMENT 4.3: <i>Existing facilities</i> shall comply with Requirements 4.1 and 4.2. Where the required upgrade is not feasible, the <i>Board</i>, or senior management (as appropriate based on the Operator's organizational structure), with input from the <i>ITRB</i>, shall approve the implementation of measures to reduce the risks of a potential failure to the greatest extent possible.</p>	<ul style="list-style-type: none"> <li>• Consider including guidance on the expectation to reduce risk of a potential failure of an existing facility when the consequence is limited to environment (i.e. no loss of life or infrastructure). The value of environmental damage varies greatly amongst different groups and cultures. This speaks to the acceptable level of effort expected by the mine to protect the environment. A zero-harm policy may not be realistic (and will be left to interpretation).</li> <li>• Consider including input from the EOR as well as the ITRB.</li> <li>• Consider clarifying that the measures to reduce risk shall be 'implemented' (rather than just approved).</li> </ul>
<b>PRINCIPLE 5: Develop a robust design that integrates the knowledge base and minimizes the risk of failure for all stages of the <i>tailings facility lifecycle</i>.</b>	
<p>REQUIREMENT 5.1: Consider 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 tailings facilities.</p>	<ul style="list-style-type: none"> <li>• Consider adding discussion of the role of economic considerations in decision making.</li> </ul>
<p>REQUIREMENT 5.2: Develop and implement water balance and water management plans for the <i>tailings facility</i>, taking into account the knowledge base, upstream and downstream hydrological basins, the overall mine site, mine planning and operations and the integrity of the <i>tailings facility</i> for all stages of its lifecycle.</p>	<ul style="list-style-type: none"> <li>• Suggest requirement for annual reconciliation of water balance and update of water management plans.</li> <li>• Consider specifying that the TSF water balance should be reconciled with the site-wide water balance (often these are carried out by different professionals and not appropriately linked)</li> <li>• Consider adding a requirement for Mines to track tailings levels and pond levels against the design water balance projections. This may include procedures for proactively preventing and managing accumulations of water, which may include revision to the TSF design or raising schedule</li> <li>• Consider adding requirement for assessment of climate variability, continuous reassessment of site conditions, and forecast climate change.</li> </ul>

<p>REQUIREMENT 5.3: Develop a <i>robust design</i> that considers the social, economic and environmental context, the <i>tailings facility</i> Consequence Classification, site conditions, water management, mine plant operations, tailings operational issues, and the construction, operation and closure of the <i>tailings facility</i>.</p>	<ul style="list-style-type: none"> <li>Consider including an understanding of previous TSF failures and failure modes to assess and address the potential for similar conditions at the specified TSF (not sure the best place to locate this in the document i.e. “lessons learned”)</li> </ul>
<p>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.</p>	<ul style="list-style-type: none"> <li>Consider providing guidance on how to establish, prove, and document that a failure mode is not credible. Also consider requiring re-assessment of credibility of failure modes at a regular interval to capture future improvements in understanding.</li> </ul>
<p>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.</p>	<ul style="list-style-type: none"> <li>Consider adding that design should also be updated in response to operational/mine planning changes and relevant regulatory changes.</li> <li>Consider clarifying that the design for all stages of the facility lifecycle is required at the initial phase of planning.</li> </ul>
<p>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 <i>reclamation</i> during operations.</p>	<ul style="list-style-type: none"> <li>Consider including “phased” closure concepts similar to the CDA Mining Dams Bulletin which outlines various phases of closure (transition, active and passive care)</li> </ul>
<p><b>PRINCIPLE 6: Adopt design criteria that minimize risk.</b></p>	
<p>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 <i>tailings facility lifecycle</i> and for all credible failure modes.</p>	<ul style="list-style-type: none"> <li>Consider clarifying the intent and phrasing of this Requirement.</li> </ul>
<p>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.</p>	<ul style="list-style-type: none"> <li>Consider revising the Requirement to a) discuss appropriate conservatism, b) selection considerations for input parameters and c) stability analysis scenarios to include in assessment.</li> </ul>
<p>REQUIREMENT 6.4: The EOR shall prepare a <i>Design Basis Report (DBR)</i> that details the design criteria, including operating constraints, and that provides the basis for the design of all stages of the <i>tailings facility lifecycle</i>. The <i>DBR</i> must be reviewed by the <i>ITRB</i> or senior independent technical reviewer.</p>	<ul style="list-style-type: none"> <li>Consider adding that the <i>DBR</i> be updated as required to remain current.</li> </ul>
<p><b>PRINCIPLE 7: Build and operate the <i>tailings facility</i> to minimize risk.</b></p>	
<p>REQUIREMENT 7.4: Develop, implement and annually update an <i>Operations, Maintenance and Surveillance (OMS) Manual</i> that supports effective risk management as part of the <i>TMS</i>. The <i>OMS Manual</i> should follow <i>best practices</i>, clearly provide the context and <i>critical controls</i> for safe operations, and be reviewed for effectiveness. The <i>EOR</i> and <i>RTFE</i> shall provide access to the <i>OMS Manual</i> and training to all personnel involved in the <i>TMS</i>.</p>	<ul style="list-style-type: none"> <li>Consider providing a minimum frequency for <i>OMS</i> update.</li> </ul>
<p>REQUIREMENT 7.6: Refine the design, construction and operation throughout the <i>tailings facility lifecycle</i> 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.</p>	<ul style="list-style-type: none"> <li>Consider adding refinement of reclamation and closure planning to this Requirement.</li> </ul>
<p>REQUIREMENT 7.8: Independent <i>senior technical reviewers</i>, with qualifications and expertise in social and environmental sciences and performance management, shall carry out a full review of the <i>ESMS</i> and monitoring results every 3 years, with annual summary reports provided to relevant stakeholders.</p>	<ul style="list-style-type: none"> <li>Consider adjusting the frequency of this requirement to integrate with completion of <i>DSRs</i>.</li> </ul>
<p><b>PRINCIPLE 8: Design, implement and operate monitoring systems.</b></p>	
<p>REQUIREMENT 8.1: Design, implement and operate a comprehensive performance monitoring program for the <i>tailings facility</i> that allows full implementation of the <i>Observational Method</i> and covers all potential failure modes.</p>	<ul style="list-style-type: none"> <li>Consider separating discussion of requirements for monitoring programs from the use of the <i>Observational Method</i>. Monitoring programs are good practice even if the <i>Observational method</i> is not being applied.</li> </ul>
<p>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 <i>tailings facility lifecycle</i>. Record, evaluate and publish the results at appropriate frequencies. Based on the data obtained, update the monitoring program throughout the <i>tailings facility lifecycle</i> to confirm that it remains effective.</p>	<ul style="list-style-type: none"> <li>Consider including quantifiable performance objectives</li> </ul>



<b>TOPIC IV: MANAGEMENT AND GOVERNANCE</b>	
<b>PRINCIPLE 10: Establish roles, functions, accountabilities and remuneration systems to support the integrity of the tailings facility.</b>	
<p>REQUIREMENT 10.2: A member of senior management shall be accountable for the safety of <i>tailings facilities</i> and for minimizing the social and environmental consequences of a <i>tailings facility</i> failure. This <i>Accountable Executive</i> will also be accountable for a program of tailings management training, for emergency preparedness and response, and for recovery after failure. The <i>Accountable Executive</i> or delegate must have regular scheduled communication with the <i>Engineer of Record</i> (EOR).</p>	<ul style="list-style-type: none"> <li>Should this refer to the 'Accountable Executive'?</li> </ul>
<p>REQUIREMENT 10.3: Appoint a site-specific <i>Responsible Tailings Facility Engineer</i> (RTFE) who is accountable for the integrity of the <i>tailings facility</i>, liaises with the <i>EOR</i>, the Operations and the Planning teams and who either reports directly to the <i>Accountable Executive</i>, or via a reporting line that culminates with the <i>Accountable Executive</i>. The <i>RTFE</i> will have a dotted reporting line to mine management to represent the delivery of services to the site.</p>	<ul style="list-style-type: none"> <li>Clarify the Role and Responsibility of the Responsible Tailings Facility Engineer. Is the RTFE required to be an Engineer (or is a Qualified Person sufficient)?</li> <li>Consider requiring the RTFE and EOR to be registered and in good standing with the relevant engineering regulatory body (where applicable).</li> <li>Consider clarifying the relationship and authority represented by the "dotted reporting line to mine management to represent the delivery of services to the site".</li> </ul>
<b>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.</b>	
<p>REQUIREMENT 11.3: The EOR or a senior independent technical reviewer shall conduct annual tailings facility construction and performance reviews.</p>	<ul style="list-style-type: none"> <li>Consider removing the option for a senior independent technical reviewer to conduct the DSI, perhaps replace with "The EOR or their designate shall conduct...". It is understood that the senior independent technical reviewer is another level of oversight.</li> <li>Consider if certifying TSF performance or safety is a desired component of DSIs.</li> </ul>
<p>REQUIREMENT 11.4: A senior independent technical reviewer shall conduct an independent <i>DSR</i> periodically (every 3 to 10 years, depending on performance and complexity, and the Consequence Classification of the tailings facility). The <i>DSR</i> shall include technical, operational and governance aspects of the tailings facility and shall be done according to <i>best practices</i>. The <i>DSR</i> contractor cannot conduct a subsequent <i>DSR</i> on the same facility.</p>	<ul style="list-style-type: none"> <li>Consider aligning <i>DSR</i> frequencies with existing guidance (e.g. CDA) and/or providing clarity on how to select the <i>DSR</i> period.</li> <li>Consider allowing for a previous <i>DSR</i> contractor on a specified frequency or include language regarding reasonable effort to utilize a new <i>DSR</i> contractor ((possibly replace with "no consecutive <i>DSRs</i>" or similar). It may be impractical to require a new <i>DSR</i> contractor for each <i>DSR</i>, particularly for mines with a long operational life.</li> <li>Consider if certifying TSF performance or safety is a desired component of <i>DSRs</i>.</li> </ul>
<p>REQUIREMENT 11.5: For <i>tailings facilities</i> with 'Very High' or 'Extreme' Consequence Classification, the <i>ITRB</i>, reporting to the <i>Accountable Executive</i> and/or the <i>Board</i>, 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 <i>tailings facility lifecycle</i>. For facilities with other consequence classifications, the ongoing senior independent review can be done by a single person.</p>	<ul style="list-style-type: none"> <li>Consider adding "High" and "Significant", to requirements in addition to Very High and Extreme.</li> <li>Consider removing the last sentence (for facilities with other consequence classifications, the ongoing senior independent review can be done by a single person) and instead clarifying the expectations for the composition of the <i>ITRB</i>. The number of <i>ITRB</i> members and their expertise should be selected to reflect the site-specific conditions and challenges.</li> </ul>
<b>PRINCIPLE 12: Appoint and empower an Engineer of Record.</b>	
<p>REQUIREMENT 12.1: Engage an engineering firm with expertise and experience in design and construction of tailings facilities of comparable complexity to provide <i>EOR</i> services for the tailings facility. Require that the firm nominate an individual to represent the firm as the <i>EOR</i>, in concurrence with the <i>Operator</i>, and verify that the individual has the necessary experience, skills and time to fulfil this role. Alternatively, the <i>Operator</i> may appoint an employee with expertise and experience in comparable facilities as the <i>EOR</i>. In this instance, the <i>EOR</i> may delegate the design to a firm ('<i>Designer of Record</i>') but shall remain thoroughly familiar with the design in executing their responsibilities as <i>EOR</i>.</p>	<ul style="list-style-type: none"> <li>Consider adding that an employee appointed EOR must also have experience in design and construction of tailings facilities of comparable complexity. As written, it implies that an employee EOR can have lesser expertise and qualifications than an engineering firm EOR.</li> <li>Suggest adding language which provides a defined process for an internal EOR to have autonomy in making decisions/recommendations in the absence of influence by management.</li> </ul>
<p>REQUIREMENT 12.3: Establish and implement a system to manage the quality of all engineering work, the interactions between the <i>EOR</i>, the <i>RTFE</i> and the <i>Accountable Executive</i>, and their involvement in the <i>tailings facility lifecycle</i> as necessary to confirm that both the implementation of the design and the design intent are met in all cases.</p>	<ul style="list-style-type: none"> <li>Recommend that a name for this system be determined so that it can be discussed, referenced and confirmed that it exists in reviews or audits.</li> </ul>

<p>REQUIREMENT 12.5: Where it becomes necessary to change the <i>EOR</i> firm, develop a detailed plan for the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials.</p>	<ul style="list-style-type: none"> <li>Consider revising this to refer to the EOR individual rather than the firm. Consider providing additional clarity that the EOR is considered to be an individual and not a firm</li> </ul>
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**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.**

<p>REQUIREMENT 15.1: Prepare and implement a site-specific <i>Emergency Response Plan</i> (ERP) based on credible <i>tailings facility</i> failure scenarios and the assessment of potential consequences, using the knowledge base. Update regularly, including during closure.</p>	<ul style="list-style-type: none"> <li>Consider requiring the TSF ERP to be integrated with the Mine ERP.</li> </ul>
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<p>REQUIREMENT 15.4: Maintain a state of readiness at the mine site and within at-risk communities by training all appropriate personnel, <i>public sector agencies</i>, first responders and at-risk communities and by testing <i>emergency response plans</i> and procedures with all involved stakeholders.</p>	<ul style="list-style-type: none"> <li>Suggest adding frequency for testing of Emergency Response Plans.</li> </ul>
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**PRINCIPLE 16: Prepare for long term recovery in the event of catastrophic failure.**

<p>REQUIREMENT 16.2: In the event of <i>tailings facility disaster</i>, assess social, economic and environmental <i>disaster</i> impacts as soon as possible after people are safe and short-term survival needs have been met.</p>	<ul style="list-style-type: none"> <li>Consider clarifying that actions to prevent further environmental impacts is also expected in the immediate wake of a disaster, after human safety is established.</li> </ul>
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<p>REQUIREMENT 16.3: Work with <i>public sector agencies</i> and other stakeholders to facilitate the development of a <i>Reconstruction and Recovery Plan</i> that addresses medium- and long-term social, economic and environmental impacts of a <i>tailings facility disaster</i>.</p>	<ul style="list-style-type: none"> <li>Clarify when this should be developed.</li> </ul>
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**ANNEX 2: CONSEQUENCE CLASSIFICATION**

<p>BC MEMPR Feedback</p>	
<ul style="list-style-type: none"> <li>The write-up accompanying Annex 2 contains discussion of the necessity for correct implementation of the design, quality construction, and good management practices, and highlights how bad management practices or decisions can dramatically increase likelihood of failure. Consider expanding upon some of these principles within the Standard and its Requirements.</li> </ul>	
<ul style="list-style-type: none"> <li>Consider removal or modification of the dollar values from the 'Infrastructure and Economics' column in order to reflect a more global approach.</li> </ul>	
<ul style="list-style-type: none"> <li>"livelihoods" and "livelihood systems" should be defined.</li> </ul>	
<ul style="list-style-type: none"> <li>It is unclear and not explained how the values contained within Table 2 were arrived at. These appear to be inconsistent with (and sometimes may be lower than) other well-known and well-utilized sources (e.g. CDA). The basis for selecting these values should be provided.</li> </ul>	
<ul style="list-style-type: none"> <li>Consider including the minimum duration of the design annual flood exceedance probability.</li> </ul>	