

January 7, 2020

Global Tailings Review

To Dr. Bruno Oberle and the Expert Panel:

### **Global Tailings Standard KCB's Response**

This letter summarizes Klohn Crippen Berger Ltd.'s (KCB) response to the Global Tailings Standard draft for public consultation, dated November 2019.

KCB is an international engineering, geoscience and environmental consulting firm with its head office in Vancouver and offices in strategic locations in Canada, Australia, Peru, Brazil, United Kingdom and the United States. We have 70 years of participation in some of the largest and most challenging tailings projects in the world, and our team is recognized internationally as experts in tailings management. Members of our team have been involved in or led the independent forensic investigations for tailings dam failures. Our team has a vested interest in participating in the consultation and review of the Global Tailings Standard (Standard).

We agree with the intent of the Standard, which aims to prevent tailings dam failures and improve international tailings stewardship. This is a complex and difficult task, and we applaud the efforts by the Global Tailings Review team (Panel) in preparation of this draft. However, in our opinion, the Principles and Requirements submitted for public consultation are not suitable to effectively meet those objectives and we are concerned they will lead to confusion, within the industry and external parties of interest, which could either slow or negatively impact improvement in tailings management.

Our comments / feedback on the Principles and Recommendations are consolidated in Tables 1 and 2 at the end of this document and can be summarized as follows:

#### **Principles (Table 1)**

- We recommend rewording and consolidation of the proposed Principles in the Standard.
  - ◆ If the Principles are not removed/adjusted, as we recommend, we have included comments on rewording the current Principles (e.g. Principle 4).

#### **Requirements (Table 2)**

- The Requirements form an enforceable Standard, they need to be rewritten to:
  - ◆ make them measurable and auditable;

- ◆ clearly state how each Requirement is to be met and how to demonstrate compliance, either within the written Requirement or by referring to a separate document (new or existing).

As an additional comment, the Standard will impose a significant demand on all parties involved in tailings management (Owners, Regulators, Designers, Operation Teams, etc.). The pool of experienced resources which are qualified to fill these roles are limited and already stretched across the industry. We recommend that the Panel include some Requirements regarding training and development to help implement the Standard over the short and long-term.

We are supportive of the overall objectives and intent of the proposed Standard and appreciate the opportunity to provide comment. We have some concerns with the Standard, as written, but commend the Panel for their efforts to improve tailings management and hope that you find our feedback helpful.

Yours truly,

**KLOHN CRIPPEN BERGER LTD.**



Len Murray, P.Eng.  
President and CEO

RF/MS/DW/AW/JS:dI

**Table 1 KCB Recommended Actions Regarding the Standard Principles**

	Existing Principle	Action (suggested re-wording, deletion or addition)	Rationale
1	Develop and maintain an updated knowledge base to support safe tailings management across the tailings facility lifecycle <sup>3</sup>	<i>Develop and maintain an <del>updated</del> knowledge base <b>of the tailings facility to the level appropriate to its consequence classification and lifecycle stage</b> to support safe tailings management <del>across the tailings facility lifecycle</del></i>	As written, this Principle doesn't recognize the different objectives for planned, operating, and closed facilities.
2	Integrate the social, economic, environmental, and technical information to select the site and the technologies to minimize the risk of tailings facility failure.	<i><b>For all proposed facilities or expansions, integrate the social, economic, environmental, and technical information to select the site and the technologies to minimize the risk of tailings facility failure.</b></i>	Clarify that this Principle is applicable to new facilities or future expansion of existing facilities. Potential risk reduction of existing facilities is captured under Principle 7.
3	Respect the rights of project-affected people and meaningfully engage them at all stages of the tailings facility lifecycle.	Reword the Principle to reflect that the overall mine site development and activities, including the tailings facilities.	The approach to interacting with affected communities should be a site-wide approach. We leave it to the Panel to best define how this should be recognized in the wording of the Principle. The Panel should consider how to word this Principle to avoid alienating Operators from different countries with different social values.
4	<del>Design, construct, operate and manage the tailings facility on the presumption that the consequence of failure classification is 'Extreme', unless this presumption can be rebutted.</del>	<b>Remove</b> – captured by reworded Principle 5 and Principle 7  <b>If the Principle is not removed, Reword to:</b> <i>Design, construct, operate and manage the tailings facility <b>for the 10,000-year Return Period or Maximum Credible Earthquake (MCE) and Probable Maximum Flood (PMF) unless the consequence of failure supports rebutting this design criteria.</b> <del>on the presumption that the consequence of failure classification is 'Extreme', unless this presumption can be rebutted.</del></i>	<b>Basis for removal:</b> We believe the intent of the Principle overlaps with, and is made redundant by, Principles 5 and 7.  <b>If the Principle is not removed:</b> KCB do not support assigning an "Extreme" consequence classification to a facility for factors other than an assessment of the incremental downstream consequence. A consequence classification is an important, structured, system to rank potential impact of a structure under a worst-case failure condition. The wording as proposed by the Standard fundamentally undermines that and lessens the effectiveness.  KCB would support the concept of designing all tailings facilities to the design criteria equivalent to an "Extreme" classification under the CDA, unless a lower design criteria can be justified based on a review of potential downstream consequences. We believe this will also meet the intent of the Standard but not undermine existing consequence classification systems e.g. CDA; ANCOLD etc.

Existing Principle		Action (suggested re-wording, deletion or addition)	Rationale
5	Develop a robust design that integrates the knowledge base and minimizes the risk of failure for all stages of the tailings facility lifecycle.	<b>Reword</b> – <i>Select and implement an appropriate design that meets criteria and allows effective management risks and uncertainties.</i>	Reworded to be consistent with other Principles and to recognize how an appropriate design concept must be selected not just criteria.
6	<del>Adopt design criteria that minimize risk.</del>	<b>Remove</b> – captured by reworded Principle 5 <b>If the Principle is not removed, Reword to:</b> <del>Adopt design criteria that</del> <i>Select and implement an appropriate design that meets criteria and allows effective management risks and uncertainties. minimize risk.</i>	We believe the intent of the Principle overlaps with, and is made redundant by, Principle 5.
7	Build and operate the tailings facility to minimize risk.	<b>Reword</b> – <del>Build</del> <i>Plan and operate the tailings facility to manage existing and potential future minimize risks.</i>	Reworded to recognize that establishing a solid plan is key to safe and proactive management.
8	Design, implement and operate monitoring systems.	<b>Reword</b> – <i>Design, implement and operate a comprehensive performance monitoring program for the tailings facility that is appropriate for the failure modes.</i>	Reworded to establish linkage from monitoring to failure modes.
9	Elevate decision-making responsibility for tailings facilities with a 'Very High' or 'Extreme' Consequence Classification.	<b>Reword</b> – <i>Define appropriate Elevate decision-making responsibility related to for tailings management facilities within the Owner's organization a 'Very High' or 'Extreme' Consequence Classification</i>	Revised wording proposed to expand scope of decision making for all tailings facilities. Decision making level and authorities may differ based on some criteria (e.g. consequence classification) but the system should outline process for all tailings facilities.
10	Establish roles, functions, accountabilities and remuneration systems to support the integrity of the tailings facility.	<b>Reword</b> – <i>Appoint, empower and support a qualified team with defined roles and responsibilities to manage tailings related risks.</i>	Revised wording to cover all team members, key team members, roles and responsibilities should be defined in the requirements.
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>Reword</b> – <i>Develop and maintain a company tailings management system which promotes a plan-do-check-act philosophy and includes multiple levels of review.</i>	Expanded scope to require an overall company level Tailings Management System. Reviews should include Peer Reviews.

	Existing Principle	Action (suggested re-wording, deletion or addition)	Rationale
12	<del>Appoint and empower an Engineer of Record.</del>	<b>Remove</b> – captured by reworded Principle 10	We believe the intent of the Principle overlaps with, and is made redundant by, Principle 10.
13	Develop an organizational culture that promotes learning and early problem recognition.	<b>Reword</b> – <i>Develop and maintain an organizational culture that promotes learning and early problem recognition.</i>	Reworded to be consistent with other Principles.
14	<del>Respond promptly to concerns, complaints and grievances.</del>	<b>Remove</b> - covered by Principle 17.	We believe the intent of the Principle overlaps with, and is made redundant by, Principle 17.
15	Prepare for emergency response to tailings facility failures and support local level emergency preparedness and response using best practice methodologies.	<b>Reword</b> – <i>Prepare for emergency response and recovery to tailings facility failures and support local level emergency preparedness and response using best practice methodologies.</i>	Reworded to include basis of a recovery plan into the emergency response plan as both plans should be consistent with one another throughout the facility life.
16	<del>Prepare for long term recovery in the event of catastrophic failure.</del>	<b>Remove</b> – captured by reworded Principle 15	We believe the intent of the Principle overlaps with, and is made redundant by, Principle 15.
17	Provide public access to information on tailings facility decisions, risks and impacts, management and mitigation plans, and performance monitoring.	Reword the Principle to reflect that it is not reasonable to disclose all information.	A freedom of information requirement is needed to control release of appropriate information.  We leave it to the Panel to best define how this should be recognized in the wording of the Principle.

**Table 2 KCB Recommended Actions Regarding the Standard Requirements**

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
All	Rewrite all requirements to be actionable and auditable with an explicit statement on how it is achieved.	This can reference existing documents from industry but requires a reference.
All	Define or remove undefined terms from the Standard and engage with industry groups to develop definitions: <ul style="list-style-type: none"> <li>- Safe and secure.</li> <li>- Risk: The text misuses the word risk, i.e. as a synonym of likelihood or probability which is wrong.</li> <li>- Resiliency: “capacity within the system to recover quickly from difficulties. It is the ability to absorb or avoid damage without suffering complete failure.”</li> <li>- “Credible”: too many biased decisions occur because of lack of clarity in this aspect.</li> </ul>	Improve clarity / auditability to remove room for interpretation.  Where existing references/definitions are used from industry, include a reference.  Reduce introducing new terms that don't add value and have the potential to be conflicting between the draft standard and existing industry guidelines (e.g., CDA, EGBC, ICOLD, ANCOLD, MAC, etc.).
New	Add a new Requirement which requires companies to maintain training and development programs for tailings management roles. This is best captured as part of the Tailings Management System.  This is an industry-wide challenge which requires collaboration but that is beyond the scope of this Standard.	The Standard, and existing tailings requirements, impose a significant demand on all parties involved in tailings management (Owners, Regulators, Designers, Operation Teams, etc.). The pool of experienced resources which are qualified to fill these additional requirements are limited and already stretched across the industry. To help implement the Standard over the short and long-term, training and development programs are required.
Footnote 3 Updates should be carried out whenever there is a material change to the tailings facility, the social or environmental context or conditions, or at a minimum every 3 years for ‘Very High’ and ‘Extreme’ Consequence Classifications, and every 5 years for others.	Reword to change:  <i>... and every 5 years for others or to the level appropriate to its consequence classification and lifecycle stage.</i>	For low consequence facilities in a state of post closure, the frequency of 5 years to update the knowledge base to meet the Principle will not be appropriate in some cases. Further information on this can provided in the Guidance document.

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
<p>REQUIREMENT 1.1: Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with international <i>best practice</i>.</p>	<p>The extent of these updates should be detailed in the appropriate Guidance documents separate from the Standard.</p> <p>Provide one definition of <i>Best Practice</i>.</p>	<p>“Best Practice” is defined in two places within the Standard and different intended meanings can be interpreted.</p>
<p>REQUIREMENT 1.2: Prepare and regularly update detailed <i>site characterization</i> of the tailings facility site(s) that includes geomorphology, geology, geochemistry, hydrogeology, geotechnical, seismicity and hydrology. The physical and chemical properties of the <i>tailings</i> shall be determined and regularly updated.</p>	<p>The extent of these updates should be detailed in the appropriate Guidance documents separate from the Standard.</p> <p>Reword to clarify:</p> <p><i>Prepare and regularly update detailed site characterization of the tailings facility site(s) that includes geomorphology, geology, geochemistry, hydrogeology, geotechnical, seismicity and hydrology, and surface and groundwater quality. The physical and chemical properties of the tailings shall be <del>determined</del> characterized and regularly updated when there is a material change to the tailings facility design or operation.</i></p> <p><i>The tailings properties should be monitored for change during operations to a minimum frequency required based on the dam consequence and lifecycle stage.</i></p>	<p>Frequency of routine reviews / updates should be defined in the Guidance document as well as what constitutes a “material change.”</p> <p>The word “determine” implies reaching a right answer, which lacks the nuance required for the inherent variability of tailings over short or long periods of time.</p>
<p>REQUIREMENT 1.3: Where there is a potential for flow failure, conduct and regularly update an <i>inundation study</i> for the tailings facility using a methodology that considers credible hypothetical failure modes, site conditions, <i>tailings facility</i> conditions, hydraulic routing models of the slurry, and the amount of <i>tailings</i> and downstream materials</p>	<p>Further define requirements for dam break and runout assessments in a Guidance document, or refer to an existing standard (e.g. the upcoming CDA guideline).</p>	<p>The requirements for what comprises an appropriate dam inundation study (fluid and/or solids) and required outputs should be defined in a dam break and runout Guidance document and should refer to a failure mode review Guidance document for the process to select “credible hypothetical failure modes.”</p>

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<p>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>		<p>The dam break and runout Guidance document should also differentiate appropriate inundation models for different purposes with different levels of information. For example, studies to select consequence classification / design criteria vs emergency planning and studies at early project stage vs during operation vs at closure.</p> <p>The dam breach and inundation study should be conducted to support developing design criteria and should consider all credible failure modes. A process to identify and assess credible failure models for a tailings facility should be defined in a guidance document. The process should include a review of failure modes, triggers and potential consequence of failure. This is necessary to identify and implement appropriate controls that reduce/eliminate likelihood of a failure mode from occurring or the potential impacts if such a failure is to occur.</p>
	<p>Reword to change:</p> <p><del>Where there is a potential for flow failure, conduct</del> <b>Develop and regularly update a dam breach analysis and inundation study for the tailings facility. 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.</b></p>	<p>Simplify and refer to a supporting guideline.</p>



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<p>Footnote 8 Groups that are most at risk include people who risk loss of life in the event of a tailings facility failure and people who would experience significant impacts to livelihoods, cultural heritage, health or other aspects of their lives. Special attention must be given to gender, diversity and vulnerability when identifying groups at risk.</p>	<p>Reword to change:</p> <p><i>Groups that are most at risk include people who risk loss of life in the event of a tailings facility failure and people who would experience significant impacts to livelihoods, cultural heritage, health or other aspects of their lives. Special attention must be given to gender, diversity and vulnerability when identifying groups at risk.</i></p>	<p>A life is a life, special attention is not required because all lives are considered equally.</p>
<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 (EPRP)</i>, and closure and post-closure plans.</p>	<p>Further define requirement in a Guidance document.</p>	<p>Minimum requirements of an appropriate review of potential tailings disposal alternatives (e.g. site, technology, design, etc.) should be defined in a separate Guidance document. The Guidance should include a flexible process which could be adapted to the large variability of tailings management projects across the globe and the unique challenges they present.</p> <p>The scope of this assessment should be restricted to new tailings storage facilities or future expansion of existing. Potential risk mitigation of existing facilities is captured under Requirement 4.3.</p>
	<p>Reword to clarify:</p> <p><i>Undertake a <del>formal</del>, multi-criteria alternatives analysis of <del>all</del> feasible sites and technologies for tailings management with the goal of minimizing risk to people and the environment <b>during all stages of the tailings facility cycle</b>. Use the knowledge base to inform this analysis and to develop facility designs, <del>inundation studies</del>, a monitoring program, <del>Emergency Preparedness and Response Plans (EPRP)</del>, and closure and <del>post-closure plans</del>.</i></p>	<p>This information, and other requirements, would be defined within the supporting Guidance document.</p>

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<p>REQUIREMENT 2.2: Engage an <i>Independent Tailings Review Board</i> (ITRB) or an independent <i>senior technical reviewer</i> with no conflicts of interest to assess and review the <i>alternatives analysis</i> for site and technology selection.</p>	<p>Remove from Principle 2 and move to the Principle that discusses the Tailings Management System and Governance.</p> <p>The Requirements and Guidance documents should also include peer reviews of major design/operating changes and periodic peer reviews.</p> <p>Further define requirement in a Guidance document.</p>	<p>Roles of the ITRB should be defined with other roles related to tailings management in a tailings management system Guidance document.</p>
<p>REQUIREMENT 2.3: Use the knowledge base to assess the social, economic and environmental impacts of the tailings facility and its potential failure.<sup>10</sup> Develop impact mitigation and management plans<sup>11</sup>, and <i>meaningfully engage</i> potentially affected communities in the process.</p>	<p>Remove as a requirement.</p>	<p>This is part of an Environmental Impact Assessment (EIA) for a project, which includes the tailings facility. The impact assessment of a potential failure should be covered under dam break Guidance.</p>
<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>	<p>Remove as a requirement.</p>	<p>This should be considered as part of the environmental monitoring and change management system.</p>
<p>Footnote <sup>10</sup> Given the long-term nature of a tailings facility, the Operator is encouraged to address uncertainties around climate change and its potential impacts on environmental and social conditions and trends.</p>	<p>Reword to clarify:</p> <p><i>Given the long-term nature of a tailings facility, the Operator <del>is encouraged to address</del> <b>must consider</b> uncertainties around climate change and its potential impacts on environmental and social conditions and trends.</i></p>	<p>As written, this is not actionable or auditable.</p>
<p>Footnote <sup>12</sup> As defined in the United Nations Guiding Principles on Business and Human Rights (UNGPR). Demonstrating respect for indigenous peoples rights</p>	<p>Reword to change:</p> <p>Delete “<i>may involve</i>”.</p>	<p>This may be interpreted differently by different stakeholders and using the term “<i>may</i>” could be considered a loophole.</p>

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<p>may involve obtaining their ‘free prior and informed consent’ (FPIC), as outlined in the ICMM Indigenous Peoples and Mining Position Statement.</p>		
<p>REQUIREMENT 3.3: Where the risks of a potential <i>tailings facility</i> failure could result in loss of life or sudden <i>physical and/or economic displacement</i> of people, the Operator shall consider in good faith additional measures to minimize those risks or implement resettlement following international standards<sup>18</sup>. The Operator shall communicate these decisions to those affected.</p>	<p>Remove as a requirement.</p>	<p>This is not consistent with the requirements for hydro-electric dams or other large projects. Using the word consider is not actionable or auditable.</p>
<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:                      a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and                      b) A design of the upgrade of the facility to meet the requirements of an ‘Extreme’ consequence of failure classification in the future, if required, is prepared and the upgrade is demonstrated to be feasible; and                      c) The consequence of failure classification is reviewed every 3 years, or sooner if there is a material change in any of the categories in the Consequence Classification Matrix, and the tailings facility is upgraded to the new classification within 3 years. This review should proceed until the facility</p>	<p>Reword to change:  <del>Presume the consequence of failure classification of all new tailings facilities as being ‘Extreme’ (see Annex 2, Table 1: Consequence Classification Matrix)</del> <b>Design all new tailings facilities to the Maximum Credible Earthquake (MCE) and the Probable Maximum Flood (PMF). The design criteria can be reduced if the following three conditions are met:</b> (and adjust following text accordingly).                       Clarify the appropriate method to assign the consequence classification (e.g. CDA, ANCOLD, etc.).</p>	<p>KCB do not support assigning an “Extreme” consequence classification to a facility for factors other than an assessment on the incremental downstream consequence as it would undermine the effectiveness of established consequence classification systems.                       The consequence definitions in its current form (Annex 2) cannot be applied broadly across the industry (e.g., major mining company vs. sole operator). The matrix has a lack of granularity which impedes rational prioritization of dam inventories and focus of resources for these sites.                       A dam that would have a mix of non-extreme consequences that may lead to a high impact scenario may be disregarded.</p>

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<p>has been safely closed<sup>20</sup> and achieved a confirmed 'landform' status or similar permanent non-credible flow failure state.</p>	<p>Annex 2 Table 1: Review and update with industry working groups (e.g. ICMM, etc.)</p>	<p>Remove:</p> <p>Cover in a consequence classification Guidance document. The consequence definitions in its current form cannot be applied broadly across the industry (e.g., major mining company vs. sole operator). The matrix has a lack of granularity which impedes rational prioritization of dam inventories and focus of resources for these sites.</p> <p>A dam that would have a mix of non-extreme consequences that may lead to a high impact scenario being disregarded.</p>
	<p>Annex 2 Table 2: align with existing industry guidelines (e.g., CDA, etc.)</p>	<p>Unclear how / why these were developed. There is good existing international guidance for this already.</p>
	<p>Remove:</p> <p><del>a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and</del></p>	<p>This is redundant after defining the appropriate method to assign consequence classification.</p> <p>By nature, consequence classification system should address the impacts of a potential flow failure, or any other failure mode, which could have the greatest downstream consequence.</p>
	<p>Define:</p> <p><i>impactful flow failure</i></p>	<p>There is no consensus across the industry on how to determine whether a facility has the potential to flow. Reliance on empirical relationships is the current state of practice and insufficient to use as a basis for defending "no potential for impactful flow failures"</p> <p>Additionally, why is the consequence of a flow failure handled differently than other breach and failure mechanisms?</p>
	<p>Reword to change:</p> <p><i>Design should meet criteria assuming that all triggers to potential failure modes develop (e.g.</i></p>	<p>Safe operation of a tailings facility should not rely upon the trigger to a failure condition not being triggered during the life of the facility. For example,</p>

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	<p><i>contractive materials liquefy, extreme seismic or flood event occurs).</i></p> <p><i>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</i></p>	<p>the design of a structure should be such that physical stability is maintained even if residual shear strengths develop in contractive materials, regardless of what the triggering analysis or assessments indicate.</p>
<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>	<p>Reword to change:</p> <p><i>...with input (at a minimum) from the Tailings Facility Site Responsible Person (TFSRP), Mine Manager and EOR for the facility in question <del>an independent senior technical reviewer or the ITRB...</del></i></p>	<p>This should be discussed in a Guidance document, as part of discussion regarding selection of design criteria and consequence classification.</p> <p>Input should be provided by all key figures involved in tailings management of the facility.</p> <p>ITRB input on decisions, such as design criteria, is encouraged. However, the role of an ITRB (or independent reviewer) is to support the Owner through independent check of the decisions and plans for a tailings facility. The Standard, as written, changes this role and shifts it from support to have greater direct responsibility for the structure.</p>
<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>	<p>Remove:</p> <p>Replace with a risk-based assessment that identifies potential hazards which do not meet appropriate safety criteria and for an Owner to identify and prioritize appropriate actions to reduce existing risks.</p>	<p>There are estimated to be more than ~15,000 existing tailings facilities. Applying 4.1 and 4.2, as written, to them would require an enormous pool of resources (people, time and funding). Depending on the need to do additional investigations, testing, analyses, etc. this assessment could take years for a single facility. Such an activity must be done in a systematic approach that allows resources to be allocated appropriately to priority facilities, as needed, based on an <i>informed position</i>, not arbitrary. Risk-based approaches are commonly used across other industries where large risk portfolios involve issues of public safety.</p>

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	If the Requirement is not removed or adjusted, reword to clarify:  <i>implementation of measures to reduce the risks of a potential failure to <del>the greatest extent possible</del> as low as reasonably practicable (ALARP).</i>	
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 <sub>21</sub> tailings facilities.	Further define requirement in a Guidance document.	Supportive of intent but requires additional context and definition which should be detailed in a Guidance document separate from the Standard.
	Reword to clarify:  <del>Consider</del> <i>Perform alternative assessments to consider implementation of alternative tailings disposal options, ...</i>	Reworded to clarify this is an instruction rather than suggestion.
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.	Reword to change:  <i>Address all <del>credible</del> failure modes of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures, to minimize risk and identify which are credible and non-credible.</i>	Reliance on human judgement to define credible failure modes is a fatal flaw in this Standard. Engineers and owners should address all failure modes and then provide comment on their credibility and consider sensitivities whether their rating of credibility is flawed.  Competence is required to make a sound judgement on credibility.
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.	Define:  <i>material changes to the risk assessment</i>	Subjective term which requires further clarity in a Guidance document, if used.  Additionally, risk assessment methodologies vary widely in process and effectiveness. Provide guidance on minimum considerations for risk assessments and how to consider controls.

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<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>	<p>Define: <i>immediate implementation and reclamation</i></p>	<p>“Immediate” implementation is not practical in most cases as additional measures require time to construct, establish, engage with communities, or gain regulatory approval. Also, the timing at which this is intended is unclear. Both should be expanded upon in the Guidance document with consideration for practical limitations of timing. Also consider adopting the ICMM 2019 definition for remediation/reclamation.</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>	<p>Reword to clarify: <i>Select and clearly identify flood and seismic design criteria that are appropriate to reduce risk for the adopted Consequence Classification for all stages of the tailings facility lifecycle and for all credible failure modes and clearly supported with a dam break assessment and consequence classification.</i></p>	<p>As written, this is not specific enough to be auditable.</p>
<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>	<p>Further define requirement in a Guidance document. Factor of safety criteria and selection of appropriate material parameters should be covered in a Guidance document. Material parameter selection should reference influence of variability and uncertainty.</p>	<p>KCB recommends that influence of variability and uncertainty should be considered during the selection of parameters for specific materials rather than safety factors. Safety factors are influenced by multiple parameters, assumptions, etc. which can change depending on the specific case or segment of the dam being assessed.</p>
<p>REQUIREMENT 6.3: Identify and address brittle failure mechanisms with conservative design criteria and factors of safety to minimize the likelihood of their occurrence, independent of trigger mechanisms.</p>	<p>Reword to change: <i>Identify and address brittle all failure mechanisms with conservative design criteria and factors of safety to minimize the likelihood of their occurrence, independent of trigger mechanisms.</i></p>	<p>The design should appropriately manage all failure modes equally and consider the triggers for those failure modes. Appropriate methods to do so are not the same for all failure modes (e.g. brittle, ductile) which must be defined in the Guidance document.</p>

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
<p>REQUIREMENT 6.4: The EOR shall prepare a <i>Design Basis Report</i> (DBR) 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>	<p>Reword to change:</p> <p><i>The DBR must be reviewed by the <b>Tailings Facility Site Responsible Person (TFSRP)</b> and <b>ITRB</b> or senior independent technical reviewer.</i></p>	<p>The TFSRP, as the “on site” tailings management point person, must be familiar with the Design Basis Report. As a point of Best Practice, the EOR and TFSRP should prepare a summary of the Design Basis Report for the Accountable Executive and Mine Manager.</p>
<p>REQUIREMENT 7.1: Build, raise, operate, monitor and close the tailings facility according to the design intent of all stages of the <i>tailings facility lifecycle</i>, using qualified personnel and appropriate methodology, equipment, procedures, data acquisition, the <i>TMS</i> and the <i>environmental and social management system (ESMS)</i>.</p>	<p>Remove or further define requirement in a Guidance document.</p>	<p>The requirements to appropriately manage the facility during construction, operation and closure is are comprehensive and justify preparation of a separate OMS Manual.</p> <p>The OMS Manual is to be prepared specifically for the Operations team and therefore will summarize requirements from several other Guidance documents which must be appropriately referenced and reported.</p>
<p>REQUIREMENT 7.3: Prepare a detailed <i>Construction Records Report</i> at least annually or whenever there is any change to the <i>tailings facility</i>, its infrastructure or its monitoring system. The Engineer of Record (EOR) shall sign this report.</p>	<p>Reword to change:</p> <p><i>Prepare a detailed Construction Records Report <del>at least annually or whenever there is any a</del> <b>material change to the tailings facility, its infrastructure or its monitoring system. The Tailings Facility Site Responsible Person (TFSRP) and the Engineer of Record (EOR) shall sign this report.</b></i></p>	<p>Having both the EOR and the TFSRP sign the report demonstrates their commitment and responsibility to the correctness of the CRR.</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>	<p>Reword to change:</p> <p><i>The <del>EOR and RTFE</del> <b>TFSRP</b> shall provide access to the <i>OMS Manual</i> and training to all personnel involved in the <i>TMS</i> <b>with support from the EOR.</b></i></p>	<p>The Owner/Operator is ultimately responsible for training their employees.</p>



Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
<p>REQUIREMENT 7.5: Implement a formal <i>change management system</i> that triggers the evaluation, review, approval and documentation of all changes to design, construction, operation and monitoring during the <i>tailings facility lifecycle</i>. The <i>change management system</i> shall also include the requirement for a periodic <i>Deviance Accountability Report</i> (DAR), prepared by the <i>EOR</i>, that provides an assessment of the cumulative impact of the changes on the risk level of as-constructed facility. The <i>DAR</i> shall provide any resulting requirements for updates to the design, <i>DBR</i>, <i>OMS</i> and the monitoring program.</p>	<p>Further define requirement in a Guidance document.</p> <p>Requirement for each site to maintain a change management system and DAR should be defined in a Guidance document.</p> <p>Must ensure related Guidance documents integrated with each other.</p> <p>Consider making Change Management its own Principle.</p>	<p>Supportive of intent but requires additional context and definition which should be detailed in Guidance documents separate from the Standard.</p>
<p>REQUIREMENT 7.8: Independent senior technical reviewers, with qualifications and expertise in social and environmental sciences and performance management, shall carry out a full review of the ESMS and monitoring results every 3 years, with annual summary reports provided to relevant stakeholders.</p>	<p>Confirm whether this is the same or different review board than the independent tailings review board.</p>	<p>Clarify in Guidance document(s) that these reviewers are not necessarily the same as those involved in review of other aspects of tailings management (e.g. ITRB).</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>	<p>Further define requirement in a Guidance document.</p>	<p>Development, implementation and execution of an appropriate monitoring program needs to link several key aspects of the facility (e.g. design, performance expectations, risk controls, operations, and emergency response). The basis for this process needs to be transparent and consistent throughout these steps.</p> <p>Should also be recognized that not all monitoring is tied to a specific failure mode but is necessary to provide baseline trends to compare to design assumptions/expectations.</p>

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
		<p>Some rewording is required to reflect that not all failure modes are amenable to the Observational Method. If not amenable, or the Owner choose to not adopt the Observational Method, then the design should be based on a precautionary principle (taking preventive action in the face of uncertainty). The requirements / expectations of the monitoring program differ for each approach which should be discussed in the Guidance document.</p> <p>The Guidance document should define how all of this information should be summarized for use of the Operations team to realize potential value.</p>
<p>REQUIREMENT 9.1: For a proposed <i>new facility</i> where a potential credible failure could have 'Very High' or 'Extreme' consequences, the <i>Board</i> or senior management (as appropriate based on the Operator's organizational structure) shall be responsible for approving the proposal, after deciding what additional steps shall be taken to minimize the consequences.</p>	<p>Further define requirement in a Guidance document.</p>	<p>Decision making within an organization should be captured under an overall Tailings Management System which should define general requirements which must be met at all tailings facilities. How each requirement is met at each facility, and other appropriate, information will be captured under the OPERATIONS, MAINTENANCE AND SURVEILLANCE Guidance document.</p> <p>In addition to decision making, the Tailings Management System should define other requirements such as: roles and responsibilities; audits and compliance checks; plan-do-check-act principles; risk management reporting; and minimum requirements for each tailings facility during each lifecycle stage.</p>

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
	<p>Reword to change:</p> <p><i>For a proposed new facility <b>that is classified as where a potential credible failure could have 'Very High' or 'Extreme' consequences</b>, the Board or senior management (as appropriate based on the Operator's organizational structure) shall be responsible for approving the proposal, after deciding what additional steps shall be taken to minimize the consequences.</i></p>	<p>Consider adding words related to risk-informed design principles.</p>
<p>Principle 10:</p> <p>Establish roles, functions, accountabilities and remuneration systems to support the integrity of the tailings facility.</p>	<p>Adjusted rewording captured in Table 1.</p> <p>If the Principle is not adjusted as suggested, reword to change:</p> <p>Reword to clarify:</p> <p><i>Establish roles, functions <b>and</b> accountabilities <b>and remuneration systems</b> to support the integrity of the tailings facility</i></p>	<p>Linking remuneration too closely to tailings management KPIs can have the unintended consequence of resulting in a lack of proactive reporting of potential issues of concern or "optimistic" reporting of tailings risks to avoid impacts to compensation.</p> <p>KCB would propose, as an alternative, that KPIs and base compensation related to tailings management of the Operations team (e.g. TFSRP, Accountable Executive, Mine Manager, Inspectors) be based on identification of issues, measures to reduce risk and not tied to cost-savings or production. A similar approach to what many sites we have observed take with promoting other safety activities.</p> <p>In addition, Owner's should develop long-term career paths for individuals with tailings experience (on and off site-based roles). For example, progression for TFSRP should allow them to stay focused on tailings, rather than switching to a supervisor-type role, without compromising career progression or compensation.</p>

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
<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>	<p>Reword to clarify if this role must be filled by a suitably trained and qualified “Engineer” or if someone with suitable tailings management experience could act in the role. Also clarify that this person should be a site staff member.</p> <p>“Responsible Tailings Facility <i>Engineer</i>” to “Tailings Facility Site Responsible <i>Person</i>”</p>	<p>Reword to clarify if this role must be filled by a suitably trained and qualified “Engineer” or if someone with suitable tailings management experience could act in the role.</p> <p>There are numerous operations where this function is effectively carried out by an environmental scientist, or other non-Engineer, in partnership with the EOR. Requiring this role to be filled by an engineer may not fit within the Owner’s organizational structure and be unnecessarily onerous to retain an engineer for this purpose (e.g., for closed sites or lower consequence facilities).</p>
	<p>Reword to change:</p> <p>Delete: <del>The RTFE will have a dotted reporting line to mine management to represent the delivery of services to the site.</del></p>	<p>KCB does not concur with the suggested organizational chart and responsibilities that defines tailings management as a “service line” to the mine operation and recommends strongly that the TFSRP report directly to the Mine Manager who reports directly to the Accountable Executive on issues related to tailings management.</p>
<p><sup>24</sup> See Annex 3: Outline of the Organizational Structure referred to in the Standard</p>	<p>Remove from the Standard.</p>	<p>KCB does not concur with the suggested organizational chart and responsibilities that defines tailings management as a “service line” to the mine operation and recommends strongly that the TFSRP report directly to the Mine Manager who reports directly to the Accountable Executive on issues related to tailings management.</p>
<p>REQUIREMENT 11.3: The EOR or a senior independent technical reviewer shall conduct annual tailings facility construction and performance reviews.</p>	<p>Reword to change:</p> <p><del>The EOR or EoR Delegate or a senior independent technical reviewer shall conduct annual tailings facility construction and performance reviews.</del></p>	<p>The EOR or designate should conduct the annual reviews. If a senior independent reviewer also conducts a review, the EOR or designate should still conduct their review.</p>

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
<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>	<p>Reword to change:  Change frequency for <i>DSR</i> to “<i>every 5 to 10 years</i>”</p>	<p>This would be consistent with established best practices of CDA and MAC guidelines. Every 3 years is excessive considering the scope of a comprehensive <i>DSR</i>, and the annual oversight that is already in place from the EOR, TFSRP, and ITRB.</p>
	<p>Reword to clarify whether the “<i>DSR contractor</i>” is an individual or a firm.</p>	<p>There are a limited number of firms that employ staff with suitable qualifications. Suggest that a firm may be able to perform a <i>DSR</i> in the future but the individual may not, and an ethical wall should be used as required.</p>
<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>	<p>Further define requirement for “expertise and experience” in a Guidance document.</p>	
<p>REQUIREMENT 12.4: Given its potential impact on the risks associated with a <i>tailings facility</i>, the selection of the <i>EOR</i> shall be decided by the <i>Accountable Executive</i> and not influenced or decided by procurement personnel.</p>	<p>Strongly support as written.</p>	
<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,</p>	<p>Reword to clarify:  <i>Where it becomes necessary to change the EOR firm, the TFSRP will develop a detailed plan for</i></p>	<p>Strongly support this requirement. It is the responsibility of the Owner to manage the data and maintain data records.</p>

Requirement ##	Action (suggested re-wording, deletion or addition)	Rationale
knowledge and experience with the construction procedures and materials.	<i>the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials.</i>	
REQUIREMENT 15.1: Prepare <sup>28</sup> and implement a site-specific <i>Emergency Response Plan</i> (ERP) <sup>29</sup> based on credible <i>tailings facility</i> failure scenarios and the assessment of potential consequences <sup>30</sup> , using the knowledge base. Update regularly, including during closure.	Reword to clarify: <i>...based on <del>worst-case credible</del> tailings facility failure scenarios as determined by the EOR, and the assessment of potential consequences</i>	Refer to comments above on credibility of failure modes and human error. All failure modes should be considered to avoid discounting a worst-case condition by stating that it is not credible.
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. <sup>33</sup>	Remove/delete: <i>Maintain a state of readiness at the mine site <del>and within at-risk communities by training all appropriate personnel, public sector agencies, first responders and at-risk communities and by testing emergency response plans and procedures with all involved stakeholders</del></i>	Maintaining a state of readiness within at-risk communities is very strong wording and doesn't characterize the intent of this Requirement compared to other risks in everyday life.
<sup>32</sup> Where gaps remain in the capacity of public sector agencies to provide required emergency response services for credible failure scenarios, the Operator will provide them.	Remove from the Standard.	It is the responsibility of the public sector agencies to provide these services.  This has significant implications for closure. This Standard is mandating that closed facilities maintain emergency response services into perpetuity to augment local agencies.
REQUIREMENT 17.1: Publicly disclose <sup>36</sup> relevant data and information <sup>37</sup> about the <i>tailings facility</i> and its consequence classification in order to fairly inform interested stakeholders. <sup>38</sup>	Reword to clarify: <i>Publicly disclose<sup>36</sup> <del>relevant data and information<sup>37</sup> about the tailings facility and its</del> the consequence classification and relevant tailings facility details in order to fairly inform interested stakeholders.<sup>38</sup></i>	
	Define: <i>relevant data and information.</i>	