Consultation response

Part 1: Your details

Original language of response: English

Name: Amanda Adams

Country of residence: United States

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: Professional organization (e.g. members of the International Association of Impact Assessment)

If 'Other', please specify below:

Are you responding on behalf of an organization? Yes

Please give the name of the organization: US Society on Dams (USSD) Tailings Dams Committee

Your level within the organisation: Other

Part 2: Your views on each of the Principles and Requirements in the Standard

Topic I: 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?
Partially

Which aspects of Principle 1 do your comments relate to?

Your comments on Principle 1

Principle 2

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

Which aspects of Principle 2 do your comments relate to?

Your comments on Principle 2

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?
Partially

Which aspects of Principle 3 do your comments relate to?

Your comments on Principle 3

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?
Partially

Which aspects of Principle 4 do your comments relate to?

Your comments on Principle 4

Principle 5

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

Which aspects of Principle 5 do your comments relate to?

Your comments on Principle 5

Principle 6

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

Which aspects of Principle 6 do your comments relate to?

Your comments on Principle 6:

Principle 7

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

Which aspects of Principle 7 do your comments relate to?

Your comments on Principle 7

Principle 8

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

Which aspects of Principle 8 do your comments relate to?

Your comments on Principle 8

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?
Partially

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?
Partially

Which aspects of Principle 10 do your comments relate to?

Your comments on Principle 10:

Principle 11

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

Which aspects of Principle 11 do your comments relate to?

Your comments on Principle 11:

Principle 12

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

Which aspects of Principle 12 do your comments relate to?

Your comments on Principle 12:

Principle 13

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

Which aspects of Principle 13 do your comments relate to?
No

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?
Partially

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?
Partially

Which aspects of Principle 15 do your comments relate to?

Your comments on Principle 15:

Principle 16

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

Which aspects of Principle 16 do your comments relate to?

Your comments on Principle 16:

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?
Partially

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):
2: Falls somewhat below my expectations

Please summarize why you chose this option:
see attached letter

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):
4: Will deliver improvements across all aspects of the safety and security of tailings facilities

Please summarize why you chose this option:
see attached letter

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)?
No

Please explain why and/or what is missing:
see attached letter

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?
see attached letter

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:0000001188:Q83

Attachment 2 reference (if applicable)

December 31, 2019

Dr. Bruno Oberle
Chair of the Global Tailings Review

RE: Comments on the Draft Global Tailings Standard

Dear Dr. Oberle:

The United States Society on Dams (USSD) through its Tailings Dams Committee is pleased to provide comments on the draft Global Tailings Standard ("Standard") issued by the co-conveners of the Global Tailings Review (GTR). USSD commends the work of the members of the GTR Expert Panel and the various organizations sponsoring this effort. The draft Standard provides a comprehensive international framework for tailings management and governance that has heretofore been lacking in this important global industry. Furthermore, the members of the Tailings Dams Committee, who have reviewed the draft in detail, fully support the efforts made to date and the intent behind this document.

The draft Standard is a significant step forward and, when finalized and supported by tailings-specific technical guidance documents, will be a critical resource to allow owners, designers, regulators, and other participants to implement these concepts. The six topics included in the Standard appropriately cover the broad spectrum of effective tailings management. With the goal of further improving the standard, we would like to make the following high-level comments:

- **Application of the Standard**. We support the plan to develop "protocols for determining compliance and non-compliance with the Standard". This is a difficult, but essential task for the effective implementation of the standard. It is our opinion that many of the requirements are too broad and lack sufficient detail to facilitate a proper auditing process. In addition, there could be multiple interpretations of the requirements depending on the stakeholders' viewpoint, background and knowledge.

- **Public Disclosure and Access to Information**. While this is an important requirement to make sure that stakeholders, and particularly the communities in proximity to the mine are well informed of the risks, consideration should be given to defining what "reasonable stakeholder requests" are. Leaving the text under Topic VI, including the notes, could lead to many requests for information with no real relevance to dam safety. In addition, consideration should be given to the possibility that the information could be used for someone's interests unrelated to tailings dam safety.

- **Risk Management**. The risk management portions of the Standard would benefit from reference to a specific risk management methodology (such as Failure Modes and Effects Analysis (FMEA)) for assessing potential hazards, defining failure modes, evaluating risk, and identifying risk reduction measures.

Specific comments on the text of the Standard have been compiled by the Tailings Dams Committee and are provided in the attached table.

Our members look forward to the further development of this document. We offer the technical support of our membership as you advance this important effort. USSD has several endeavors in progress that are closely aligned with this initiative, including development of tailings-specific dam safety guidelines to supplement the current body of knowledge for dam safety in the United States.

USSD, as the United States member of the International Commission on Large Dams (ICOLD), is a world class organization of engineering professionals who are dedicated to advancing the environmentally sustainable science of planning, design, construction, operation and maintenance of dams, levees and associated civil engineering projects. USSD brings together professionals who share expertise in the technical, economic, financial, environmental and social aspects of dam and levee projects. The findings of these efforts are published in USSD white papers and conference proceedings, as USSD is the premier source for technical information about dams and levee systems in the United States to help educate the general public, the media, government and policy-makers and others in the engineering practice.

The USSD Committee on Tailings Dams advocates for the engineering, construction, operation, and reclamation of tailings dams and coal combustion residual (CCR) impoundments in a safe, environmentally and socially responsible manner. Our committee regularly educates by providing a forum for exchange of knowledge and experience, including trainings and workshops. We actively collaborate by providing a forum for exchange of information between members of the committee, by interacting and participating in activities with other USSD committees and other organizations such as ICOLD, CDA, MAC, SME, and ICMM. Our committee cultivates the future of the industry by providing a community of practice where young professionals are actively involved.

Please contact the Committee Chair Amanda Adams or Vice Chair Robert Snow with any comments or questions.

Regards,

Denise Bunte-Bisnett
President
USSD Board of Directors

Amanda Adams
Chairperson
USSD Tailings Dams Committee

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Note: Red, underlined text to be inserted, ~~strikeout~~ text to be deleted.

Reference	Comment	Proposed Alternate Wording (where applicable)
The Global Tailings Standard		
Overview of the Standard 4th Paragraph	• There are generally more opportunities to reduce the risks by reduction of the likelihood (probability) of failure than by reduction of the consequences at an existing facility. Risk assessment and management through accepted methods should be a foundation of the Standard, and therefore "control" or "address" the risk should be cited rather than "minimize" in the Requirements (and here) unless appropriate qualification or basis for "minimize" are provided. Monitoring and correct application of the Observational Method also applies to the closure phase of the lifecycle, and monitoring continues into post-closure.	Topic Area 3 aims to lift the performance bar for designing, constructing, operating, maintaining, monitoring, and closing tailings facilities. For new tailings facilities, the Standard requires designers to presume an 'Extreme' consequence of failure classification. Operators can rebut this presumption only when specific conditions are met. Where upgrading an existing facility is not feasible, the Operator must identify and implement measures to control risks and reduce the consequences of a potential failure to the greatest feasible extent ~~possible~~. Recognizing that tailings facilities are dynamic engineered structures, Topic Area 3 requires the ongoing use of an updated knowledge base, consideration of alternative tailings technologies, robust designs, and well managed construction and operation processes to control ~~minimize~~ the risk of failure. It also specifies the development and implementation of an Operations, Maintenance and Surveillance (OMS) Manual that supports effective risk management of the tailings facility. A comprehensive monitoring system must support the full implementation of the Observational Method and the use of a performance-based approach for the ~~design, construction and operation of~~ tailings facilities lifecycle, including post-closure until relinquishment.
Overview of the Standard 5th Paragraph	• The repeated insertion of "or a member of senior management, as appropriate to the Operator's organizational structure" is a bit awkward and can be handled with a footnote (suggested new footnote 20A in Requirement 4.2) clarifying the cases where the company does not have a Board of Directors and subsequent use of the term "Board" whenever the intent is to affirm a responsibility of the top management of the company. • It has been suggested to require direct accountability of the Board of Directors for only Extreme classification, consistent with the comment for Requirement 2.2.	Topic Area 4 focuses on the ongoing management and governance of a tailings facility. This section elevates the accountability for tailings facilities that would result in ~~'Very High' or~~ 'Extreme' consequences in the event of failure, to the upper level of an organization's hierarchy; i.e., ~~-~~the Board of Directors ~~or a member of senior management (as appropriate to the Operator's organizational structure)~~. It also provides for the designation and assignment of responsibility to key roles in tailings facility management, including an Accountable Executive, an Engineer of Record, and a Responsible Tailings Facility Engineer. Further, it sets standards for critical systems and processes, such as the Tailings Management System and independent reviews, which are essential to upholding the integrity of a tailings facility during its entire lifecycle. Cross-functional collaboration and the development of a learning organizational culture that welcomes the identification of problems and protects whistleblowers are also included.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
The Role of the State 2nd Paragraph	• In regards to the State's responsibilities for inspection and enforcement, suggest using the word "scrutinize" or "evaluate" rather than "identify" solutions to problems. • The text implies the State will have experienced tailings engineers who will do technical inspections. I believe, the role of the state is first to adopt the standard or a part of it, and then enforce its application by auditing. I do not believe their role is to identify technical issues and "to identify solutions to reported problems	Not all States currently have the capacity to carry out these tasks. Good oversight requires a comprehensive understanding of the planning and engineering necessary to build, operate, maintain, and ultimately close tailings facilities. Inspectors with the credibility and authority to issue citations and to mandate appropriate corrective actions must share an understanding of these issues and possess the capacity to ~~identify~~ scrutinize solutions to reported problems. Moreover, developing a reliable and professional staff where one does not currently exist will require time and resources and these may be scarce. All States with tailings facilities should aspire to develop and implement an effective and well-staffed regulatory program.
TOPIC I: Knowledge Base		
Requirement 1.1	• The intent or purpose of this requirement is not clear. Please explain what the purpose is and how it is intended to be used to improve the safety of the facility. • Need to consider changes over time in the ore feed, mineralogy, and physical or chemical characteristics of the tailings, which can lead to changes in the geotechnical, hydrogeologic and geochemical risks.	Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with international best practice[4,5]. Updates should be carried out whenever there is a material change to the tailings facility, changes in the ore feed or processing, changes to 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.
Requirement 1.2	• Inadequate site characterization and understanding of the geology and impacts on the TSF are often the underlying reason for dam failures. • Consider what is an appropriate confidence level for site characterization. For example, consider the approach taken by the Canadian National Instrument 43-101 approach to resource definition. • What triggers updates to the site characterization? Is it acceptable to "close" the characterization for a "discrete" project? Does this allow a staged characterization?	Prepare ~~and regularly update~~ detailed site characterization of the tailings facility site(s) that includes geomorphology, geology, geochemistry, hydrogeology, geotechnical, seismicity and hydrology. This database should be updated when a material change in conditions, changes in methodology, new learnings from failure investigations or other advancements in engineering, or changes in the design or operational approach is identified. The need for an update should be evaluated as part of the Deviance Accountability Report identified in Requirement 7.5. The physical and chemical properties of the tailings shall also be characterized. For greenfield projects, the characterization should be based on pilot studies supplemented by data from literature. Physical and engineering properties of actual production tailings should be monitored ~~determined and~~ regularly and the tailings characterization updated based on the properties of the actual tailings produced.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Requirement 1.3	• Need to tie the level of analysis to the project stage of development. For example, a dam breach analysis for initial planning and siting studies can be must less detailed than a breach analysis to support final design and permitting. • Dam breach analyses should also consider Population at Risk (PAR) and identification of critical infrastructure. CDA is working on a standard approach, which is a great start. Also, the inundation evaluation should be re-evaluated when usage to the downstream potential impact zone occurs (e.g. people moving in or other land use changes). • Suggest that a formal review of the inundation study be performed on the 3 or 5 year schedule as part of a "Design Criteria Review" or possibly the "Deviance Accountability Report (DAR)" similar to what is defined in Topic III.	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. The level of analysis and the precision of the inputs should be appropriate to the stage of design development (e.g., less precise and assumed parameters may be used in conceptual studies, whereas more advanced design studies should be based on data with greater reliability). The study should be updated whenever a material change is made in the design, construction, and/or operation of the facility; when a major change occurs in the downstream inundation area; or when other conditions warrant an update to the study (e.g., a major change in the methodology for conducting such studies). The need for update to the inundation study should be reviewed and documented as part of the reviews described in Topic III.
Principle 2	• The standard has been written to address the major issue of TSF failures, but also addresses potential environmental impacts of a TSF. Throughout the standard, there are references to TSF failure that overlook or de-emphasize the other potential negative impacts of a TSF, such as dust, groundwater contamination, acid drainage, metal leaching, and process fluid spills. If the objective of the standard is to develop a "global standard for the safe and secure management of mine tailings facilities", it should ensure a balanced focused on managing the risk of ALL the potential TSF impacts, rather the focusing on failure due to overtopping or slope stability failure.	Integrate the social, economic, environmental and technical information to select the site and the technologies to minimize the risk of tailings facility failure or other negative impacts.

Reference	Comment	Proposed Alternate Wording (where applicable)
Requirement 2.2	• There appears to be 3 different applications of the term "independent senior technical reviewer" in the draft standard. It is suggested in Requirement 2.2 to use an alternative term to reflect the unique requirements of this role and avoid confusion with other roles that currently use the same term. The term "independent expert technical reviewer (IETR)" has been suggested, but an alternative title could be used – the important point is to distinguish this role from other uses of the "senior technical reviewer" title elsewhere. • An independent expert who performs in lieu of a Board should have more extensive experience and qualifications than a "senior technical reviewer" who may perform Dam Safety Reviews or other review functions defined elsewhere in the standard. The minimum qualifications for IETR, as well as members of the ITRB, should developed and defined in a separate, supporting document. • In Requirement 11.5, the draft standard provides that a single expert reviewer can be used only for dams with consequence classification of High or lower. This will place an immediate demand for ITRB members that will strain the engineering profession. It is suggested that the requirement for a multi-person board be applied to the Extreme classification and that an single IETR (or equivalent term, with appropriate qualifications defined) be allowed for Very High Consequence. • It is suggested that "conflict of interest" be defined. • Ideally, the Engineer of Record (EOR) should be selected to prepare the alternative analyses. It should be understood that the EOR role should ideally begin at the conceptual stage.	Engage an Independent Tailings Review Board (ITRB) or an I~~i~~ndependent-Expert ~~senior T~~technical R~~r~~eviewer (IETR) with no conflicts of interest to assess and review the alternatives analysis for site and technology selection. Use of a single expert in lieu of an ITRB should only be used for facilities which are not Extreme consequence.
Topic II: Affected Communities		
Requirement 4.1	• Rebuttal of Consequence Classification of "Extreme" should be broadened to also include a Potential Failure Modes Analysis (PFMA) or Failure Modes and Effects Analysis (FMEA) or similar methodology with additional failure modes, including ones involving water management. Presuming that the intent of "no potential for impactful flow failures" is that if flow failure (defined as loss of shear strength with increasing stress) can occur, it does not impact	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 and Failure Modes and Effects Analysis (FMEA)[19A] demonstrates that a lower classification can be

Reference	Comment	Proposed Alternate Wording (where applicable)
	downstream conditions beyond the proposed Consequence Classification, then recommend such analysis be based on site specific information and testing data and complemented with published information on the same or similar tailings materials, and supported by performing a FMEA. • Note also proposed revisions to Footnote 20 on closure. • The requirement to move to landform for all facilities is a major step-change. We recommend that the decision to a final disposition be based on the FMEA. • As an alternative to an "upgrade", could some form of mitigation to prevent or mitigate "extreme" consequences be proposed – e.g., purchasing land within the inundation area or relocating impacted facilities? • It should be noted that not all of the USSD Tailings Dam Committee membership agrees with the approach of assuming Extreme consequence, unless proven otherwise. Some of our members have expressed their preference to simply evaluate each facility on its own merits and assign the classification according to the facts. • Added footnote 19A regarding PFMA and FMEA terminology.	applied for the near future, including no potential for impactful flow failures based on site-specific information and testing data and complemented with published information on similar tailings materials; 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 to a level of detail sufficient to demonstrate, and does in fact demonstrate, that the design is conceptually feasible and implementable, ~~and the upgrade is demonstrated to be feasible~~ (the upgrade can include measures to mitigate consequences); 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 has been ~~safely~~ closed [20] and supported by a FMEA based on site-specific information and testing data demonstrating that downstream impacts do not rise to the Low Consequence Classification, whether from flooding or flow failure ~~and achieved a confirmed "landform" status or similar permanent non-credible flow failure state~~.
Requirement 4.2	• Addition to provide for consistency with proposed change to Requirement 4.1 • Consider whether it may be appropriate to appoint an IETR rather than a Board. However, as written, if a single person is not allowed to stand in lieu of an ITRB for an Extreme consequence, then it doesn't logically follow that an IETR would be applicable to this decision. • This requirement means in effect that all mining companies will need to first engage an ITRB, then if they are successful in justifying a lower classification, they may release all but one of the ITRB members – it may be difficult to find ITRB members to make this initial assessment of consequence classification. • The reference to an Accountable Executive has been deleted here because Accountability for Extreme Consequence facilities has been directed to the Board of Directors.	The decision to rebut the requirement to design for 'Extreme' Consequence Classification, shall be taken by ~~the **Accountable Executive** or~~ the ***Board of Directors***[20A] (the 'Board'), with input from ~~an independent senior technical reviewer or~~ the ITRB and the Engineer of Record (EOR). The ~~Accountable Executive~~ or Board shall document in writing the ~~give written~~ reasons for their decision.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Requirement 4.3	• Suggest change to eliminate reference to reducing risks to "the greatest extent possible," and have a more definable standard of implementing risk reduction measures, and continuing to evaluate potential failure modes and conduct risk assessment every 3 years to identify/implement additional risk reduction measures. To allow for existing facilities that operate as low or significant hazard potential impoundments to continue, and that may not have established ITRB, add "independent senior technical reviewer" as an alternative. • If a "reasonable amount of time" in include, there should ideally be some definition of what is "reasonable".	***Existing facilities*** shall comply with Requirements 4.1 and 4.2 or be brought into compliance within a reasonable amount of time. Where the required upgrade is not feasible, the Board, ~~or senior management (as appropriate based on the Operator's organizational structure)~~ with input from the ITRB/IETR and the EOR, shall approve the implementation of measures to reduce the risks associated with identified potential failure modes. Until compliance with the Requirements 4.1 and 4.2 has been achieved, the Board will review and approve, at least every 3 years, additional risk reduction measures based on input from the ITRB/IETR and EOR, with update of the FMEA and risk assessment. A timeline, reflecting the level of risk associated to the facility, should be developed to identify the target timeframe to meet Requirements 4.1 and 4.2.
Requirement 5.1	• Qualify the term "minimize" by reference to "alternative and impact analysis," and to also ensure that sole design focus on waste minimization is not interpreted.	Consider implementation of alternative options, including but not limited to in-pit disposal and underground tailings placement, and application of the technologies to minimize the amount of tailings and water, such as filtration, placed in external(21) above-grade tailings facilities as supported by alternative and impact analysis consistent with Requirements 2.1 and 2.3.
Requirement 5.3	• See revisions to definition of "robust design" in Glossary.	
Requirement 5.4	• Avoid term "credible failure modes" without definition. Recommend conducting an FMEA and evaluate risks.	~~Address all credible failure modes~~ The EOR shall conduct a FMEA of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures ~~to minimize~~ and evaluate risks. The FMEA must be reviewed by the ITRB/IETR. Risk assessments must be used to inform the design.
Requirement 5.6	• Include construction cost estimate for closure to demonstrate feasibility, and timeline for closure. The design needs to address post-closure status, and based on a well-crafted definition, and relinquishment would be aimed at meeting the requirements of a landform that averts potential failure modes including flow failures that impact downstream conditions.	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 must include a construction cost estimate and timeline, and where possible, progressive closure and ***reclamation*** during operations. The closure design must address transition with substantial elimination of excess surface water impounding capacity, containment as a mine waste structure, and ultimately through post-closure status to avert potential failure modes that impact downstream conditions.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
PRINCIPLE 6	• In the Draft Standard, risk is sometimes qualified to include people and environment, without reference to Operator. In Principle 6, risk should be clearly expressed without reference to the footnote.	Adopt design criteria that minimize risk to people, environment and the Operator, to the extent feasible.
Requirement 6.1	• Consistent with comment on Requirement 5.4, recommend citing FMEA rather than credible failure modes.	Select and clearly identify design criteria that are appropriate to reduce risk for the adopted Consequence Classification for all stages of the *tailings facility lifecycle* and based on a FMEA.
Requirement 6.2	• Encourage probability analysis; recommend clarify with reference to "capability" rather than "quality" and the "monitoring systems" as well as risk management system.	Apply factors of safety or probabilities against failure 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~~ capability of the ~~implementation of~~ monitoring and risk management systems.
Requirement 6.3	• Design criteria include factors of safety, such that recommend eliminating the reference as in some situations designing to limit deformation may be a more direct approach. Revise reference to "minimize" by substituting reference to averting its role in potential failure modes. • How does one identify this in the design phase without access to the tailings that will be generated in the future?	Identify and address brittle failure mechanisms with conservative design criteria and factors of safety to minimize the likelihood of their occurrence, to avert a role in potential failure modes, independent of trigger mechanisms. Whenever practical, construct tailings retaining structures to achieve dilative conditions and avoid the use of brittle materials.
Requirement 6.4		The EOR shall prepare a Design Basis Report (DBR) that details the design criteria, including operating constraints, and that provides the basis for the design of all stages of the tailings facility lifecycle. The DBR must be reviewed by the ITRB or IETR.
PRINCIPLE 7	• See comment on Principle 6	Build and operate the tailings facility to minimize risk to people, environment and the Operator.
Requirement 7.1	• Add reference to reviews under Principle 11, including EOR, independent senior technical reviewer, and ITRB reviews. • If the EOR is to be accountable for certification of the TSF they need to be involved in every aspect of the structure. See recent failures for examples.	Build, raise, operate, monitor and close the tailings facility, under the oversight of the EOR and according to the design intent of all stages of the *tailings facility lifecycle*, using qualified personnel and appropriate methodology, equipment, procedures, data acquisition, the *TMS* and the *environmental and social management system (ESMS)*. Conduct reviews consistent with Principle 11.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Requirement 7.2	• The terms in BOLD need to be added to the glossary. These programs should include implementation plans and reports of results. • Note that QC, QA and CDIV are AFTER THE FACT and verify or validate, but do not make it so. Yes, they provide, when done properly, a valuable, essential, record of what is there, and a defect might be found and addressed. But these are spot-checks and might miss something. We trust the builder and operator. See suggested additions above. • A QA/QC plan is only part of the requirement to produce accurate, precise, complete and representative data. Monitoring of the TSF requires a wide range of processes, that fall under a "Data Quality Assurance Plan". The document should mention the need for a DQAP describing sampling/monitoring procedures, data acquisition, QA/QC procedures, data quality objectives, data interpretation and data management. QA/QC should be part of the DQAP.	Manage the quality and adequacy of the construction and operation process by implementing ***Quality Control, Quality Assurance*** and ***Construction vs Design Intent Verification (CDIV)***. Implementation plans and reports of results for these programs shall be prepared or reviewed by the EOR. CDIV shall be used to ~~ensure~~ verify that the design intent is implemented and is still being met if the site conditions vary from the design assumptions
Requirement 7.3	• If it is a certificate it needs to be not just signed – there needs to be enough access by the EOR to verify that the contents of the report are accurate and complete. We've seen the results of inadequate oversight by the EOR at Samarco and at Feijão.	Prepare a detailed ***Construction Records Report*** under the oversight of and validated by the EOR at least annually or whenever there is any change to the *tailings facility*, its infrastructure or its monitoring system. ~~The *EOR* shall sign this report.~~
Requirement 7.4	• The OMS Manual should be prepared or approved by the EOR to ensure it is consistent with the design intent. Training of all personnel involved with the TMS, including contractors building the structure, should be aware of project risks and risk management practices. I agree with this, and suggest education gets it's own call-out.	Develop, implement and annually update an ***Operations, Maintenance and Surveillance (OMS) Manual*** that supports effective risk management as part of the *TMS*. The *OMS Manual* should be prepared or approved by the EOR, follow *best practices*, clearly provide the context and *critical controls* for safe operations, and be reviewed for effectiveness. ~~The EOR and RTFE shall provide access to the OMS Manual and training to a~~All personnel involved ~~in~~ with the *TMS* shall receive training as approved by the RTFE or EOR, including understanding of project risks.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Requirement 7.5	• Changes in tailings production or water storage for the mine can affect the tailings facility and lead to the need for associated changes in design, construction, operation and monitoring. Consider adding a minimum frequency for the DAR to Requirement 7.5	Implement a formal *change management system* that triggers the evaluation, review, approval and documentation of all changes to tailings production rates, water storage, and design, construction, operation and monitoring during the *tailings facility lifecycle*. *The change management system* shall also include the requirement for a periodic ***Deviance Accountability Report*** **(DAR)**, prepared by the *EOR,* that provides an assessment of the cumulative impact of the changes on the risk level of as-constructed facility. The *DAR* shall provide any resulting requirements for updates to the design, *DBR, OMS* and the monitoring program.
Requirement 7.6	• See comment on Requirement 7.5	Refine the design, construction and operation throughout the tailings facility lifecycle by considering the lessons learned from ongoing work and the evolving knowledge base, changes in tailings production/ characteristics and water storage, and by using opportunities for the inclusion of new and emerging technologies and techniques.
Requirement 7.8	• This seems to be a different use of "Senior Technical Reviewer" than previously applied. However, in this context, it appears that this terminology is ok as is in this section. These functions do not require the same level of expertise as would be expected of an IETR functioning in lieu of an ITRB. • Like 8.2 below, this requirement is open to the question of who are the relevant stakeholders? This reads like the Cyanide Code, perhaps? Many miners already conduct this type of review through stewardship programs and Dam Safety Inspections as described by CDA, for example. But the results are for their own use.	No changes to the text are suggested.
NEW Requirement 7.9	• This is important because the characteristics of the TSF and its resulting degree of hazard are dependent upon the actions of these people, not those performing periodic inspections.	Educate the constructor and the tailings management team with respect to the criteria and design basis and the consequence classification so that the TSF is built and operated in accordance with the established criteria and specifications with the hazard it represents always in mind. Establish construction methods and operating procedures that will result in the properties, configuration and attributes described in the design.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
NEW Requirement 7.10	• This is in accordance with the ADAPTIVE APPROACH referred to later and has been key to several failures while, fortunately far more often, allowing implementation of modifications during construction that addressed surprises encountered.	Validate during the construction and operation phase the conclusions drawn from the Knowledge Base and assumptions made by the designer, particularly with respect to the foundation conditions, material properties and performance of key elements of the containment system.
Requirement 8.1	• For tailing facilities, the observational approach should be used with great care. While the approach is being used the initial design and construction must provide a safe structure for the worst-case conditions. Then and only then, after construction has proceed to the point that there is assurance through observation, and appropriate testing and monitoring that conditions are going to be better than those initially assumed, can a less conservative design be incorporated in the construction.	
Requirement 8.1	• Recommend citing the OMS Manual and Potential Failure Mode Analysis to ensure they provide a basis for the monitoring program.	Design, implement and operate a comprehensive performance monitoring program for the *tailings facility* based on the OMS Manual and FMEA, and that allows full implementation of the ***Observational Method***.
Requirement 8.2	• Does the term "publish" mean they are to be made freely available to the public? I'd prefer different wording than "publish". • REPORT has a similar obligation….to WHOM shall we report?	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 *tailings facility lifecycle*. Record, evaluate and ~~publish~~ document the results at appropriate frequencies. Based on the data obtained, update the monitoring program throughout the *tailings facility lifecycle* to confirm that it remains effective.
Requirement 8.3	• Eliminate the phrase "if required", to ensure that the EOR is advised of evidence of deviations from expected performance promptly. Eliminate term "any" in first sentence for consistency with wording in other requirements.	Analyze monitoring data at the frequency recommended by the EOR, and assess the performance of the facility, clearly identifying and presenting evidence of deviations from the expected performance and deterioration of the performance over time~~, if required~~. Promptly submit evidence to the EOR for review and update the risk assessment and design. Performance outside the expected ranges shall be addressed swiftly through critical controls or trigger ~~response~~ action response plans (TARPs).
Topic IV: Management and Governance		
Requirement 9.1	• Rather than unqualified reference to "minimize the consequences," the Board should be presented with steps to	For a proposed new facility where a potential credible failure could have 'Very High' or 'Extreme' consequences, the Board ~~or senior~~

Reference	Comment	Proposed Alternate Wording (where applicable)
	control risk and reduce consequences based on independent expert review through the ITRB or equivalent. • Use of the role IETR is included here to distinguish between other portions of the Standard that specify an independent senior technical reviewer who does not necessarily need to be an expert in TSFs, assuming Requirement 11.5 is changed to allow a single expert for some facilities. If an ITRB is required for all Very High and Extreme facilities, then IETR should be removed here. • Remove "other senior management..." according to comment in Requirement 4.2 and Introductory Paragraph No. 5. • The EOR should be engaged at this phase and with sufficient project definition and before the ITRB, or the IETR is engaged.	~~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~~ reduce risks through the reduction of likelihood and/or ~~the~~ consequences, considering input from the EoR and ITRB/IETR.
Requirement 9.2	• There are generally more opportunities to reduce the risks (i.e., the likelihood) than the consequences at an existing facility. The DSR includes potential failure modes analysis, and evaluation of risks and risk reduction measures, and with review by the ITRB it should ensure that feasible measures are identified to achieve significant risk reduction. This also avoids using the term "minimize". • Remove "other senior management..." according to previous comments. • The "publish reason for its decision" is a broad phrase and publishing implies a larger audience with the decision subject to interpretation of a technical approach by non-tailing professionals who lack the necessary expertise and experience.	For an existing facility, where a potential credible failure could have 'Very High' or 'Extreme' consequences, the Board ~~or senior management (as appropriate on the Operator's organizational structure)~~ shall mandate the completion of a FMEA and preparation of a report, prepared in coordination with the EOR and the ITRB/IETR, recommending additional steps to ~~minimize~~ reduce risks, by reducing either the potential consequences or likelihood of failure (or both), to the degree feasible. The Board shall either mandate the implementation of the recommended additional measures or provide justification for the decision to not implement recommended measures, and shall document clearly the ~~publish~~ reasons for its decision. This process is to be repeated at the time of every Dam Safety Review (DSR).
Requirement 10.2	• The responsible tailing facility engineer (RTFE)/responsible person should have direct communication with the accountable executive, and communication with the EoR should also be facilitated. The accountable executive will require technical support from the RTFE, EOR or other internal or external resources. Reporting between the account executive and the RTFE is best described in 10.3 below. Consistency between 10.2 and 10.3 should be maintained.	A member of senior management **("Accountable Executive")** shall be accountable for the safety of tailings facilities and for minimizing the social and environmental consequences of a tailings facility failure. This Accountable Executive will also be accountable for a program of tailings management training, for emergency preparedness and response, and for recovery after failure. The Accountable Executive or delegate must have regular scheduled communication with the Engineer of Record (EOR) and the ITRB/IETR.

Reference	Comment	Proposed Alternate Wording (where applicable)
	• The definition for Accountable Executive should be modified to be clear that they are authorized to legally obligate the company.	
Requirement 10.4	• The requirement (consider implementing) for implementation of a performance incentive program is not appropriate for this type of guidance. The adherence to governance should be addressed by the individual operation and work within their culture and incentive program.	Either strike Paragraph 10.4, or revise to clarify that an performance incentive programs involving anyone with responsibility and/or accountability for tailings management should be based primary on technical and safety performance criteria and not on financial performance.
Requirement 10.5	• Specific recommendations for key roles should be developed and included in a supporting document.	Identify appropriate qualifications and experience requirements for all personnel who play safety-critical roles in the operation of a tailings facility, in particular, for the RTFE, the EOR and the Accountable Executive. Ensure that occupants of these roles have the identified training, qualifications and experience, and develop succession plans for these personnel.
Requirement 11.1		Conduct and regularly update risk assessments with a qualified multi- disciplinary team using best practice methodologies. Transmit risk assessments to the ITRB or IETR for review, and address with urgency all risks considered as unacceptable.
Requirement 11.3	• In this case, the term "senior independent technical reviewer" is appropriate since the person performing the annual review does not need to rise to the same level of experience and expertise as an IETR (who functions in lieu of a Board). • Add "Independent Senior Technical Reviewer" to glossary. • Develop minimum qualifications for the independent senior technical reviewer in a separate document. • The responsibility of annual verification of facility construction of performance reviews should be placed directly on the EoR. We are placing significant expectations and responsibilities on the EOR. • It is not unreasonable to have the EOR engaged in the annual review process if no other jurisdictional requirements exist.	The EOR ~~or a senior technical reviewer~~ shall conduct and document annual tailings facility construction and performance reviews. In the rare occasions where the EOR is an employee of the company, the annual tailings facility construction and performance reviews shall be conducted by an Independent Senior Technical Reviewer and the EOR.
Requirement 11.4	• Again, in this case, the term "independent senior technical reviewer" is appropriate for the same reason as 11.3. Also, require that the DSR not only reviews the potential failure modes analysis, but performs an update with evaluation of risks and potential risk reduction measures. Requirement 9.2	An ~~senior i~~Independent Senior ~~t~~Technical ~~r~~Reviewer shall conduct an independent DSR periodically (every 3 to 10 years, depending on complexity and performance, and the Consequence Classification of the tailings facility). The DSR shall include technical, operational and governance aspects of the tailings facility and shall be done

Reference	Comment	Proposed Alternate Wording (where applicable)
	then ensures that risks and risk reduction measures for existing facilities are conveyed to the Board. • The requirement to limit any potential DSR contractor to only one review per facility over its lifecycle lacks an understanding of the limited available industry resources.	according to best practices. The DSR shall include review and update of the FMEA with evaluation of risks and potential risk reduction measures. The DSR contractor cannot conduct a subsequent DSR on the same facility for two review cycles in a row.
Requirement 11.5	• The requirement to allow an IETR only for facilities with consequence classification less than Very High, which isn't evident in Requirement 2.2, should be reconsidered. Given the number of tailings dams with Very High or Extreme classification, it may be difficult to find enough properly qualified Board members to fill the need. Perhaps the requirement for an ITRB could be applied to only the Extreme classification and allow IETRs for Very High consequence.	For tailings facilities with ~~'Very High' or~~ 'Extreme' Consequence Classification, the ITRB, reporting to the Accountable Executive and/or the Board, shall provide ongoing independent expert review of the planning, siting, design, construction, operation, maintenance, monitoring, performance and risk management at appropriate intervals across all stages of the tailings facility lifecycle. For facilities with other consequence classifications, the ongoing independent review may ~~can~~ be done by a single person (i.e., an IETR).
Requirement 12.1	• The situation where the Operator appoints an employee as the EOR should be clarified. How does the employee maintain independence in these cases? Aren't they potentially subject to cost or other pressures from senior management if they are internal to Operator/Owner? This specific scenario should have additional requirements to make sure that independence and integrity is maintained. • Clear definition of the EoR, qualifications and operating battery limits should be provided by this document. It is the opinion of the review team that the EoR be an external firm. However, if the EoR is an internal delegate then the guidance should be adjusted accordingly. An external EoR provides a level of independence and quality that an internal delegate may not be able to afford. Therefore, specific guidance that addresses internal EoRs should be added throughout this document. • An internal delegate assigned as EoR is potentially in direct conflict with the RTFE. The interaction between the RTFE and the EoR is also in question for an internal delegate. • The concept of "responsible charge", as defined by the National Society of Professional Engineers in the United States (or equivalent organizations in other countries) should be defined in the Glossary.	Engage an engineering firm with expertise and experience in design and construction of tailings facilities of comparable complexity to provide EOR services for the tailings facility. Require that the firm nominate an individual to represent the firm as the EOR, in concurrence with the Operator, and verify that the individual has the necessary experience, skills and time to fulfil this role. In some cases, ~~Alternatively,~~ the Owner or Operator may choose to directly employ an engineer ~~appoint an employee~~ with an appropriate level of training, expertise and experience in comparable facilities as the EOR. This arrangement is not preferred, due to the potential to lose the degree of independence that is more likely with an external firm, but may be acceptable for companies with sufficient internal resources and governance and external review processes to ensure the design, construction, and operation of the facility adheres to the intent of this Standard. In this instance, the EOR may ~~delegate~~ contract with one or more ~~delegate the design to a~~ external firm(s), who may become the ~~(~~'Designer(s) of Record'~~)~~ but the internal EOR shall maintain ***responsible charge*** at all times and take full responsibility for ~~remain thoroughly familiar with~~ the design in executing their responsibilities as EOR. The Designer(s) of Record should also maintain involvement during construction and operation, to the extent practical, to verity that the bases of design are being adhered to.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Requirement 12.3	• Consider establishing performance reviews for the EOR and RTFE to be implemented or overseen by the Accountable Executive. Performance of the Accountable Executive should be reviewed by the Board of Directors.	
Requirement 12.4	• This requirement is effectively part of our requirement of 12.1 and can be combined for consistency.	Consider combining 12.4 into 12.1
Requirement 12.5	• As written, the plan is reactive and not proactive, because it is prudent to assume the EOR could change over time. The plan should be developed proactively prior to the need for succession to occur. Appropriate succession planning should be built into established governance documentation. • The transfer of EOR responsibility from one firm to another, which should never be based primarily on financial considerations, should be treated separately and a normal attrition of personnel due to human factors.	~~Where it becomes necessary to change the EOR firm, d~~Develop and update a detailed succession plan for the EOR in the event the individual serving as EOR needs to be replaced for any reason. Incorporate succession planning into the company's governance framework. The decision to transfer EOR responsibilities from one firm to another is to be made by the Accountable Executive or Board. In such case, a due diligence process that includes the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials leading to the formal acceptable of responsibility by the new EOR for the previous design(s) shall be implemented under the direct oversight of the Accountable Executive and/or Board of Directors.
Requirement 13.1	• This requirement is vague. The education of personnel is inherent to the tailing stewardship process and the tailing management plans. Specific guidance and requirements should be developed.	No specific wording recommended.
Requirement 13.2	• This is a crucial and significant point. Many of the mining companies incorporate a siloed management system. The siloed structure does not lend itself well to the inherent demands created by proper tailing management practices and the observational approach. • The engagement of construction experience, operations personnel experience, and maintenance experience is critically beneficial to the design process. Specific reference to planning and design should be added because many tailings facilities are in fact staged over their lifetimes.	Incorporate ~~workers'~~ construction, operation and maintenance experience-based knowledge into planning and design for all stages of the tailings facility lifecycle.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Topic V: Emergency Response and Long-Term Recovery		
Requirement 15.1	• ERP may need to be update after major changes to the TSF or downstream potential impact zone.	Prepare and implement a site-specific Emergency Response Plan (ERP) based on credible tailings facility failure scenarios and the assessment of potential consequences, using the knowledge base. Update regularly, ~~including during~~ or after any significant changes, throughout the operation and closure periods.
Requirement 15.4	• Include language for annual drills. Also consider early-warning systems, and evaluation of critical lifelines.	No specific wording recommended.
NEW Requirement 15.x	• Inundation mapping is inconsistent between countries and between mining companies. CDA has been working on developing a reasonable methodology, based on the stage of the project (e.g., initial planning, final design, operations). • Inundation mapping should be updated periodically, particularly if the downstream impact zone become encroached upon (developed).	Inundation mapping should be conducted at an appropriate level, to determine potentially impacted persons or communities. Companies should develop internal standards for conducting inundation mapping, consistent with international standards.
NEW Requirement 15.x	• This text could be added to in Requirement 15.4, rather than a separate requirement. But the response plan should include early warning systems, developing evacuation routes, and consider critrical community lifelines (highways, pipelines, water supply, etc)..	Develop early warning systems, informed by the inundation mapping and flood arrival times. Develop evacuation routes, similar to tsunami early warning systems, and evaluate potential impacts to critical community lifelines.
Requirement 16.3	• Evaluating long term impacts from the failure is potentially complex. Reference US Natural Damages Resource Assessment (Department of Interior, NOAA, EPA) for comparison. This may be a larger can of worms than was intended.	~~Work with public sector agencies and other stakeholders to facilitate the development of a Reconstruction and Recovery Plan that addresses medium- and long-term social, economic and environmental impacts of a tailings facility disaster .~~Develop medium- and long-terms plans to mitigate and/or restore impacted areas, working with downstream impacted persons, communities, and governmental authorities.
NEW Requirement 17.x	• Full disclosure • However, consideration should be given to releasing information that could aid or abet terrorist acts.	Commit to providing information on the facility to the public in a timely manner, to the maximum extent possible (excludes company proprietary information).
Footnotes		
Footnote 2	• The qualification wording applies to each instance of the use of the term "best practice".	Delete footnote and include wording in the definition of "best practice" in the Glossary.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Footnote 3	• The text from footnote 3 has been suggested to be added to Requirement 1.1 – thus the footnote should be deleted.	Delete footnote 3.
Insert new footnote 19A	• The term FMEA has been used to refer to a number of risk-based analyses, including Potential Failure Modes Analysis (PFMA). The term FMEA is more broadly used than some of the other methods and therefore is preferable to include in the body of the standard. However, it is acceptable that other methods of engineering risk assessment methodology may be used.	The term FMEA has been used broadly herein. Other types of risk-based analysis, including Potential Failure Modes Analysis (PFMA), or more advanced engineering risk assessment methodology, may be substituted.
Footnote 20	• For the purpose of Requirement 4.1 and closure, revise footnote to address broader requirements, and allow flow failures to be addressed by satisfying static and seismic conditions, recognizing that Consequence Classification may still exist due to susceptibility of tailings to flow failure. To move out of Post-Closure, the susceptibility to flow failure would need to be addressed, or the Consequence Classification must be less than "Low". • Address closure and post-closure status in Requirement 5.6. • "Flow Failure" here appears to refer to liquefaction of the tailings, but the potential for erosion-related failure in the event of overtopping should also be considered. • The "landform" reference is to a walk-away solution; however, many owners now accept the need for periodic maintenance and repair, say of erosion and settlement and periodic removal of trees and such from channels and covers. • It should be noted that several USSD Tailings Dam committee members do not agree that landform should be the requirement for ALL facilities.	Closure comprises providing stable containment of mine wastes under static and seismic loading conditions, with substantial elimination of excess surface water not required for treatment or cover systems and sustainable measures in place to protect the integrity of the TSF in the event of the design flood without the need for intervention. ~~Safe closure is achievement of a confirmed 'landform' status or similar status that also has a permanent non-credible flow failure state.~~
Insert new Footnote 20A	• Suggest adding a new footnote after footnote 20 (temporarily named 20A – will need to renumber footnotes of course) to clarify that any subsequent references to "The Board" will imply that top management will bear the same responsibilities in companies where the organizational structure does not include a Board of Directors. See previous comment on Introductory Paragraph No. 5	[20A]Hereinafter, the role of the top level of corporate management, typically represented by a Board of Directors, will be referred to as "the Board". For companies with alternative organizational structure without a formal Board of Directors, the term "Board" will refer to the highest level(s) of corporate management.
Footnote 36	• It may not be practical for the disclosure to be made in the language preference of the party making the request.	No specific changes to wording suggested.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Annex 1: Glossary and Notes		
Best Practices	• The qualification wording presented in Footnote 2 applies to each instance of the use of the term "best practice". "tailing" replaced with "tailings" for consistency • Need to recognize that some best practices tend to be endorsement by leaders in the profession, without documented research or experience, and produce "optimal" results for a range of conditions or parameters.	A procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption. Merriam-Webster Unabridged Dictionary, available at, https://www.merriam-webster.com/diction- ary/best%20practice. The Standard recognizes that there is no one "best practice" that can be viewed as applying to every tailings facility. Instead, there are a range of "best practices" that can apply to safely manage tailings facilities. Alternative definition: Procedures that are recognized by leaders in the profession, and preferably been shown by research and experience to produce optimal results for conditions or parameters under consideration, and that are established or proposed as a standard suitable for widespread adoption.
Dam Safety Review	• Need to define this term. • The definition included in the Geoprofessional Business Associations "Proposed Best Practices for the Engineer of Record (EOR) for Tailings Dams has been proposed.	Dam Safety Review (DSR): A comprehensive review of dam safety performed for a tailings dam (typically) by an independent review team (i.e., Third–Party Reviewer) on behalf of the Owner or Operator. The frequency for DSRs should be commensurate with the consequence classification of the facility, typically on the order of every five years. The EoR should be consulted by the Third–Party Reviewer to provide data and should be provided a copy of the DSR report for review, comment, and the opportunity to incorporate changes in the plans and specifications, as warranted..
Designer of Record	•	The professional engineer having overall responsibility for the design of the dam, which includes responsibility for developing and overseeing the site characterization of the dam's foundation and preparing final design plans and specifications issued for construction. The "of Record" refers to the signature and seal typically required to be affixed to the final construction documents in many political jurisdictions. The Designer of Record would normally maintain an oversight role in the construction of the structures he/she designed and would typically prepare or oversee preparation of Record Drawings and a Construction Completion report and would normally continue the role of Engineer of Record during the construction and operation phases of a tailings facility.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Engineer of Record	• This covers a very broad range of technical disciplines. • During design the Designer of Record relies on input for many different professionals that are outside the expertise of the Engineer of Record or Designer of Record. Do the engineers need to put their seal and signature on the reports, designs and drawings? If so, should a paragraph describing the limitations of the seal and signature be included?	The qualified engineer who is responsible for confirming that the tailings facility is designed, constructed, operated, and ~~decommissioned~~ closed with appropriate concern for health, safety and the environment, and that it aligns with and meets applicable regulations, statutes, guidelines, codes, and standards (*modified after Site Characterization for Dam Foundations in BC, EGBC, 2016*). For more information, please refer to PRINCIPLE 12: Appoint and empower an Engineer of Record.
Independent Tailings (or Technical?) Review Board (ITRB)	• The term ITRB is currently used commonly (although not exclusively) in practice to refer to Independent Technical Review Board. An alternative term occasionally used is Independent Professional Review Board (IPRB)	A group of 2 or more experts in tailings facility design, analysis, construction, operation and/or closure who provide ongoing independent technical review of the design, construction, operation and closure of tailings facilities. The number and expertise of the ITRB members relates to the specific technical aspects of the tailings facility site, material and design characteristics.
Independent Expert Technical Reviewer (IETR)	• This term replaces the term "senior independent technical reviewer" in certain sections, where the standard refers to a highly experienced and/or qualified individual who functions in lieu of a full review board.	A single expert with extensive experience in tailings facility design, construction, operation and closure who provides independent technical review, in lieu of a Board of experts, of the design, construction, operation and closure of tailings facilities. In general, the expertise and experience of a single reviewer should be at a higher level than required for all members of an ITRB. The IETR may require consultation from certain subject matter experts for which he/she is not specifically qualified to address.
Independent senior technical reviewer	• This term has been retained in the standard where the term "senior independent technical reviewer" refers to a person in a review role, who needs to be properly qualified, but when the role does not rise to the level of an internationally recognized expert who has the authority to serve in lieu of board of two or more experienced professionals.	An engineer, scientist, or other qualified professional who has sufficient experience in tailings facility design, evaluation, construction, operations, permitting, environmental management, social engagement or other relevant subjects that can perform independent reviews on one or more aspect of tailings management. Generally, the requirements of a senior technical reviewer are less stringent than required for an IETR or a member of an ITRB.
Observational Method	• The main purpose of the observational method is to confirm the design intent, assess risks if the observed conditions are different and make changes/implement mitigation measures. This is not described in the definition.	No specific changes to the wording have been suggested.

Comments to the Draft Global Tailings Standard by the Tailings Dam Committee of the U.S. Society of Dams (USSD)

Reference	Comment	Proposed Alternate Wording (where applicable)
Robust Design	• Encourage probability analysis, and recognize the sensitivity of stability analysis to material variability and tailings production/deposition rate . • This section needs to consider OVERTOPPING as a credible mode of failure in addition to the geotechnical discussion. For example, the incorporation of a spillway, even when undersized, would avert catastrophic failure and permit a perhaps more "elegant" failure with adequate risk mitigation.	The robustness of a tailings facility depends on each particular situation and it may be associated with various aspects, for example, the factor of safety against, or probability of occurrence of, each of the potential failure modes, the presence or absence of materials with brittle behaviour, the degree of brittleness of these materials, the sensitivity of stability analyses to variability of the materials and tailings production/deposition rate, the potential for thresholds of deformation that significantly affect the facility performance. The degree of robustness is related to the facility maintaining its overall integrity despite less than ideal performance of one or more of its components. Robustness must also consider the surface water management, particularly at closure and relinquishment.
Responsible Charge	• The addition of this term clarifies the responsibilities taken on by an EOR and clarifies the expectations of the level of involvement an EOR should have in order to accept that responsibility.	Direct control and personal supervision of engineering work. (after National Council of Examiners for Engineering and Surveying, Model Law, 2018). The National Society of Professional Engineers (NSPE) in the United States declares that "The professional engineer in Responsible Charge is actively engaged in the engineering process, from conception to completion. Engineering decisions must be personally made by the professional engineer or by others over which the professional engineer provides supervisory direction and control authority. Reviewing drawings or documents after preparation without involvement in the design and development process does not satisfy the definition of Responsible Charge."
Responsible Tailings Facility Engineer	• Suggest adding a description of the necessary qualifications including but not necessarily limited to demonstrated capability by education, training and experience. Consider developing a tailing certification program for the RTFE. Does the RFTE necessarily required it be a degreed engineer? Could the requirements differ for differing size projects?	An engineer appointed by the Operator to be responsible for the tailings facility. The) ~~RTFE~~ must be available at all times during construction, operations and closure. The RP ~~RTFE~~ has clearly defined, delegated responsibility for management of the tailings facility and has appropriate qualifications compatible with the level of complexity of the tailings facility. The RP ~~RTFE~~ is responsible for the scope of work and budget requirements for the tailings facility, including risk management. The RP ~~RTFE~~ may delegate specific tasks and responsibilities for aspects of tailings management to other qualified personnel.

Reference	Comment	Proposed Alternate Wording (where applicable)
Tailings Facility	•	A facility that is designed and managed to contain the tailings produced by the mine. Tailings can be placed in mined-out underground mines, in open pit mines and on external surface facilities. Tailings can be produced and managed as slurry-based (a mixture of solids and water) at various moisture contents ranging in appearance from a watery mixture to a less watery mixture to paste and to a dryer material that has been filtered. Tailings slurry in a surface facility is contained by dams constructed of borrow materials, including soil and rock, as well as constructed of materials gleaned from the tailings themselves. ~~Dryer materials, like f~~Filtered tailings, which are typically dewatered to a solid or near-solid state with relatively low moisture content when properly implemented, can frequently be stacked in piles, usually armored with thin rock layers, or other less robust containment methods.
Tailings Facility Lifecycle	• Recommend working on further definition of closure and post-closure lifecycle states, and principle for "relinquishment" from a dam safety perspective to revise Requirement 5.6 and others. • It is worth stressing that using the "closed TSF" as a reservoir for excess mine water or site water is not compatible with the concept of "closed". If the TSF is indeed repurposed for a different use that is a totally differnt case and needs to be managed accordingly.	The succession of phases in the life of a facility consisting of: project conception; initial construction; operation and ongoing construction; closure (including tempoary closure, care & maintenance); post-closure (including relinquishment, reprocessing, reloaction, removal). Permanent closure includes elimination of the excess surface water not required for treatment or cover systems impounding capacity of the structure and the conversion to a mine waste containment structure, with transition to post-closure and a state where Potential Failure Mode Analysis and if required deformation analysis demonstrate that potential failure modes do not impact downstream conditions.
Quality Control,	• Add definition, include provision for implementation plans and results reporting for consistency with Requirement 7.2	No specific wording recommended.
Quality Assurance,	• Same as for Quality Control	No specific wording recommended.
Construction vs Design Intent Verification	• Add definition, include provision for implementation plans and results reporting for consistency with Requirement 7.2	No specific wording recommended.
Failure Modes and Effects Analysis		A step-by-step approach for identifying all possible failures in a design, a manufacturing or assembly process, or a product or service. It is a common process analysis tool begun in the 1940s by the U.S. military. "Failure modes" means the ways, or modes, in which something might fail. Failures are any errors or defects, especially ones that affect a user, customer or other impacted person, and can

Reference	Comment	Proposed Alternate Wording (where applicable)
		be potential or actual. "Effects analysis" refers to studying the consequences of those failures. Failures are prioritized according to how serious their consequences are, how frequently they occur, and how easily they can be detected. The purpose of the FMEA is to take actions to eliminate or reduce failures, starting with the highest-priority ones. Failure modes and effects analysis also documents current knowledge and actions about the risks of failures, for use in continuous improvement. FMEA is used during design to prevent failures. Later it's used for control, before and during ongoing operation of the process. Ideally, FMEA begins during the earliest conceptual stages of design and continues throughout the life of the product or service. (modified after ASQ.org http://www.asq.org/quality-resources/fmea accessed 12/15/19).
Potential Failure Modes Analysis		Based on Failure Modes and Effects Analysis (FMEA) to evaluate the development and failure of system or equipment components, Potential Failure Modes Analysis (PFMA) is a structured process to evaluate loadings and responses of dams considering modes of failure and consequences, identifying factors affecting performance, parameters to be monitored, and potential risk reduction measures.
Annex 2		
Text	• Edit the first sentence as follows. • Remove references to Table 2. (See next comment)	Tailings facilities are classified according to the potential severity of the consequences of a plausible worst-case failure assuming no mitigative measures are in place.
Table 2	• Considering limitations in establishing these criteria for a Standard applicable to all regions and conditions, this document should indicate that appropriate and referencable design criteria shall be adopted considering the Consequence Classification, without citing specific values. • In other words, we do not recommend including the flood and earthquake design criteria in this document, but rather including them in a supporting technical guidance document.	Delete Table 2

Acknowledgement:

Comments were provided by the following members of the USSD Tailings Dam committee: Amanda Adams (chair), Robert E. Snow, (vice-chair), Paul W. Ridlen (review lead), Tatyana Alexieva (representative to ICOLD committee on Tailings Dams and Waste Lagoons); Christopher N. Hatton, Michael Henderson, Dean Korri, and Mark Abshire.