

January 7, 2020

Global Tailings Review and the Advisory Panel

Dr. Bruno Oberle
Chair of the Global Tailings Review and the Advisory Panel

Dear Dr. Oberle:

Global Tailings Standard – Review of Draft GTS

1 SUMMARY

This letter provides a summary of my review comments on the Draft Global Tailings Standard (GTS), issued November 15, 2019. My review covers the Topics, Principles, Requirements and Annexes, on the assumption that the introductory comments will be revised as the GTS is developed. I appreciate that a lot of good work has gone into the document and that the goal of a GTS is laudable. My review is not exhaustive as the scope covers a wide range of tailings dam safety aspects and there are many components that need to be carefully documented.

General Comments on the Process

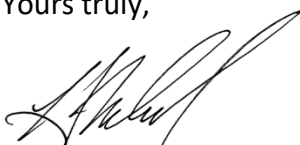
- There has been little interaction with the Advisory Panel and my impression is that the panel is not being utilized effectively as a resource and, to some degree, is there to be ‘heard’ but not ‘listened’ to.
- There has been no interaction with ICOLD, beyond the modification of the Draft Consequence Classification Matrix.
- Without the structure and content of the associated “Report” it is difficult to understand what might be missed or what is going to be covered in more detail.

General Comments on the Draft Standard

- The standard is a mix between Technical (35%), Governance (50%) and Social (15%). The overemphasis on Governance and Social does not proportionally reflect the root problem of safe design, which is largely technical.
- Social aspects are very important, however discretion is required with overemphasizing the social aspects related to dam failure as the reality is that most dams do not fail. This overemphasis will have the negative effect that countries with different social standards, despite the desire and commitment to have safe dams, would not adopt the Standard.
- Requirements need to be measurable and auditable.
- The Standard should be aligned with the ICOLD Technical Guideline (Draft).

I look forward to constructive discussions in Stellenbosch in February.

Yours truly,



Harvey McLeod, P.Eng.
Member, Advisory Panel

| Suggested Amendments | Rationale and Comments |
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| Topic 1 KNOWLEDGE BASE | |
| Principle 1: Develop and maintain an updated a knowledge base to support safe tailings management across the tailings facility life cycle | |
| Footnote 3: Updates should be carried out whenever there is a material change to the tailings facility..... | Redundant, you should be updating all the time. |
| Requirement 1.1 Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with international best practice. | I do not know how one defines international best practice? |
| Requirement 1.2 Prepare and regularly update detailed site characterization of the tailings facility site(s) that includes geomorphology geology, geochemistry, hydrogeology, geotechnical, seismicity, hydrology, and surface and groundwater quality. | |
| Requirement 1.3 Develop and regularly update a dam breach analysis for the tailings facility. | Assessing the potential for a flow failure is part of the science of dam break assessment. The requirement as it is worded gets too much into the details of what a dam breach assessment might look like – details are best kept to a guideline especially as the practice is changing quickly. |
| Requirement 1.4: Identify stakeholders and how they are related to... | Delete, this is covered under 1.1 and further details are best left to a guideline. |
| Footnotes 7 and 8 | Delete, this is covered under 1.1 and further details are best left to a guideline. |
| Principle 2: Integrate the social, economic, environmental and technical information to select the site and the technologies to for design the tailings facility to minimize the risk. of tailings facilities. | This principle is addressing the design of the TSF so not sure why it is under Knowledge Base? |
| Footnote 9 | Delete, this is covered under 1.1 and best left to a guideline. |
| Requirement 2.1: Undertake a formal multi-criteria analysis of all feasible sites and technologies for tailings management with the goal of minimizing risk to people and the environment at all stages of the tailings facility life cycle. Use the knowledge base to inform the assessment. For the selected alternative, develop facility designs, inundation studies, a monitoring program, Emergency Preparedness and Response Plans (EPRP), and closure and post closure plans. | The last sentence may be redundant as all these are covered later. The requirements stated in the last sentence are covered under other Topics/Principles. |
| Requirement 2.2: Engage an Independent Tailings Review Board (ITRB)... | Delete: The ITRB is an overarching requirement, not just for selection of the site and technologies. |
| Requirement 2.3: Use the knowledge base to assess the social, ... | Delete: This is part of the EIA for the project, which includes the tailings facility. The impact assessment of a potential failure should be covered under dam break guidance. |

| Suggested Amendments | Rationale and Comments |
|---|---|
| Requirement 2.4: Update the assessment of the social, economic and environmental impact and update stakeholder identification, and information for any material changes to the facility. If new data indicates that the impacts from the tailings facility..... | Delete: This is part of the ongoing environmental monitoring of the mine. |
| Requirement 2.5: The amount of financial assurance shall be reviewed periodically and updated based on estimated closure and post-closure costs | |
| Requirement 2.5: Taking into account actions to mitigate risk, the Operator will consider obtaining appropriate insurance to mitigate risks, | I think it is difficult to get an insurer willing to step up to this challenge. |
| TOPIC II: POTENTIALLY AFFECTED COMMUNITIES | |
| Principle 3: Respect the rights of project-affected people and meaningfully engage them at all stages of the tailings facility lifecycle. | I agree with the Principle however the Requirements need to be carefully worded to not alienate Operators from different countries where they have different social values, which will likely result in those countries and Operators not ratifying the GTS. The footnotes are overly prescriptive. Most of this section relates to a new facility and most of them relate to the overall mine. |
| Requirement 3.1: Demonstrate respect for human rights... | |
| Requirement 3.2: Meaningfully engage..... | |
| Requirement 3.3: Where the risks of a potential tailings facility failure | Delete: Implying resettlement is a time-bomb in many countries and in most cases is not practical. Linking it to potential loss of life is inappropriate. |
| Requirement 3.4: Establish an effective operational level, non-judicial, grievance mechanism that addresses the concerns, complaints and grievances of project-affected people that relate to the tailings facility. | |
| TOPIC III: DESIGN, CONSTRUCTION, OPERATION AND MONITORING OF THE TAILINGS FACILITY | |
| Principle 4: 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. | Delete: A dam break analysis is used to inform the consequence classification of the tailings facility which is carried out by the EOR and reviewed by the ITRB and the DSR consultant. For some reason, people still feel that because you are designing a dam to a much longer return period for flood and seismic, that somehow this results in a safer dam. Most dam failures are due to poor design and operations, not the dam classification or the extreme floods and earthquakes. We need to require that good design and governance is necessary for all dams, not just those classified as “Extreme”. I think this Principle is better addressed under governance. |

| Suggested Amendments | Rationale and Comments |
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| Requirement 4.1: a) The knowledge base demonstrates.... b) A design of the upgrade.... c) The consequence of failure classification.... | An “impactful” flow failure is determined by the dam break and consequence category. This is good practice to demonstrate what an upgrade would require and should be in Principle 5. Good practice. |
| Requirement 4.2: The decision to rebut... | The Board should approve ‘Extreme’ consequence tailings facilities; but should not be approving tailings facilities that are presumed to be ‘Extreme’. |
| Requirement 4.3: Existing facilities... | |
| Principle 5: Develop a robust design that integrates the knowledge base and minimizes risk of failure for all stages of the tailings facility lifecycle. | This is the most important section with respect to safe dams. Principles 5 and 6 are closely related and their structure and emphasis could be improved and likely put into one Principle. Seismic and extreme flood management are two critical design criteria, yet they are not directly addressed. Environmental design is missing. I think that Requirements 6.1 and 6.2 (6.3 should be part of 6.2) should be the first two requirements of Principle 5. Requirement 6.4 should go at the end of Principle 5. |
| Requirement 5.1: Consider implementation of alternative options... | Not sure why this is repeated as it is covered in Requirement 2.1. |
| Requirement 5.2: Develop and implement water balance and water management plans..... | I would prefer an emphasis on determination of, and planning for, extreme floods and updating designs for climate change. |
| Requirement 5.3: Develop a robust design that considers the social, economic and environmental context... | This is a very vague requirement. |
| Requirement 5.4: Address all credible failure modes... | Good. |
| Requirement 5.5: Develop a design for all stages... | Good. |
| Requirement 5.6: Design the closure stage... | Not sure what the words “immediate implementation” is meant to convey? |
| Principle 6: Adopt design criteria that minimize risk. | |
| Requirement 6.1: Select flood and seismic and clearly identify design criteria that are clearly supported with the dam break assessment and consequence classification | I am not sure what <u>other criteria</u> this could be referring to?? |
| Requirement 6.2: Apply factors of safety... | Good. |
| Requirement 6.3: Identify and address brittle failure mechanisms... | Although ‘banning’ upstream dams is noted as not being the purvey of the Expert Panel, this requirement effectively results in banning of upstream dams with the words ‘independent of trigger mechanisms’. |

| Suggested Amendments | Rationale and Comments |
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| Requirement 6.4: The EOR shall prepare a Design Basis Report... | The DBR applies to both Principles 5 and 6. <u>The DBR should be updated every 5 years or when there are material changes in design!</u> |
| Principle 7: Build and operate the tailings facility to minimize risk. | |
| Requirement 7.1: Build, raise, operate, monitor and close the tailings facility according to... | The ESMS should be a component of the TMS. |
| Requirement 7.2: Manage the quality and adequacy of the construction and operation process... | I always love another acronym --- I think CDIV should be part of QA, which is to assure that the dam is being constructed according to the design intent, specifications, etc. This should be covered in a guidance document. |
| Requirement 7.3: Prepare a detailed construction record report at least annually or whenever there is a material any change to ... | Dams are not always raised annually. All dams should have a representative cross-section(s) that documents actual geotechnical conditions and instrumentation locations. |
| Requirement 7.4: Develop, implement and annually update an OMS... | The EOR cannot provide access to the OMS nor can he/she train the personnel – The RTFE needs to take this on, with support from the EOR. |
| Requirement 7.5: Implement a formal change management system that triggers the evaluation, review, approval and documentation of all material changes to design... The change management system shall also include the requirement for a periodic Deviance Accountability Report (DAR) | Good. Another acronym, The DAR should be part of the updating of the DBR (6.4), which I think should be updated every 5 years. |
| Requirement 7.6: Refine the design... | Good. |
| Requirement 7.7: Ensure that the ESMS is designed... | Okay, although the tailings usually part of most EMS for the mine site. |
| Requirement 7.8: Independent senior technical reviewers, with qualifications and experience in social and environmental sciences and performance management, shall carry out a full review of the ESMS and monitoring every 3 years, with annual summary reports provided to relevant stakeholders. | This should be part of the environmental management systems for the mine and the tailings facility is one component of it. |
| Principle 8: Design, implement and operate monitoring systems. | |
| Requirement 8.1: Design, implement and operate a comprehensive performance monitoring program for the tailings facility that allows full implementation of the Observational Method and covers all potential failure modes. | Okay, but in general I believe that there is too much emphasis put on the observational method. You want a good design and you want good monitoring to confirm the performance and you want to respond to both the results of monitoring as well as the on-going knowledge base learnings. |
| Requirement 8.2: Establish performance objectives... | |
| Requirement 8.3: Analyze monitoring data... | The requirement has too many words in it – should be shortened and details covered in a guidance document. |
| Requirement 8.4: Report the results... | Overlaps with 8.3, could be tidied up or combined. |

| Suggested Amendments | Rationale and Comments |
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| TOPIC IV: MANAGEMENT AND GOVERNANCE | |
| PRINCIPLE 9: Elevate decision-making responsibility for tailings facilities with a ‘Very High’ or ‘Extreme’ Consequence Classification. | I agree with the Principle, but the requirements could be cleaned up. |
| Requirement 9.1: For a proposed new facility that is classified as where a potential credible failure could have ‘Very High’ or ‘Extreme’ consequences , the Board or senior management (as appropriate) based on the Operator’s organisational structure) shall be responsible for approving the proposal, after deciding what additional steps shall be taken to minimize the consequences. | Reword: The Board has no technical capacity to determine steps for minimizing consequences. |
| Requirement 9.2: For an existing facility, that is classified as where a potential credible failure could have ‘Very High’ or ‘Extreme’ consequences the Board or senior management (as appropriate) based on the Operator’s organisational structure) shall mandate additional steps to minimize the consequences and publish reasons for its decision. This process is to be repeated at the time of every Dam Safety Review (DSR). | Delete or reword. The Board has no technical capacity to determine and mandate additional steps to minimize the consequences. Publishing these reports every time there is a DSR is not reasonable. |
| PRINCIPLE 10: Establish roles, functions, accountabilities and remuneration systems to support the integrity of the tailings facility. | |
| Requirement 10.1: The Board of the parent corporation shall adopt and publish a policy on commitment... | Good. |
| Requirement 10.2: A member of senior management shall be accountable for the safety of tailings facilities and for minimizing the risk of social and environmental consequences of a tailings facility failure.... | There is much emphasis on reducing consequences of failure, which is not always practical, however it is always possible to reduce the risk of failure. |
| Requirement 10.3: Adopt a site-specific Responsible Person (RP) Tailings Facility Engineer (RTFE) ... The RTFE will have a dotted reporting line to mine management to represent the delivery of services to the site. | I think that the person does not necessarily have to be an engineer – he/she can work closely with the EoR. Particularly for lower consequence dams. Reporting line to mine management needs to be solid – The RTFE, to be effective, needs to work within the operations of the mine. |
| Requirement 10.4: For employees who have a role in the TMS, consider implementing a performance incentive program to include a component linked to the integrity of tailings facilities. | This seems odd, as it is the persons job!! |
| Requirement 10.5: Identify appropriate qualifications and experience requirements... | Good. |
| PRINCIPLE 11: Establish and implement levels of review as part of a strong quality and risk management system for all stages of the tailings facility lifecycle. | |
| Requirement 11.1: Conduct and regularly update risk assessments | |

| Suggested Amendments | Rationale and Comments |
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| Requirement 11.2: Conduct internal audits... | |
| Requirement 11.2: The EOR or an independent technical reviewer shall conduct annual tailings facility construction and performance reviews. An Independent Peer Review should be carried out for all major design changes | This should be the EOR who is responsible for the dam otherwise you start muting responsibility. This should be explicitly captured. |
| Requirement 11.4: A senior independent technical reviewer(s) shall conduct an independent DSR periodically (every 3 to 10 years depending on performance and complexity 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 according to best practices. The DSR contractor cannot conduct a subsequent DSR on the same facility. | Soften the requirement that it cannot be the same contractor as it is not always practical to get good independent engineers, say 10 years? |
| Requirement 11.5: For tailings facilities with a ‘Very High’ or ‘Extreme’ Consequence classification, the ITRB... ITRB reports shall be submitted to the Accountable Executive for distribution to the EOR and the RP. Formalize the appointment of the ITRB or the senior technical reviewer through a written agreement that clearly describes their authority, role and responsibilities throughout the lifecycle of the tailings facilities. | The ITRB has to be given more accountability. |
| PRINCIPLE 12: Appoint and empower an Engineer of Record | Given the severe shortage of competent EORs, it is dangerous to ‘empower’ them. That is why it is so important to have ITRB’s and DSRs. |
| Requirement 12.1: Engage an engineering firm... | Good. |
| Requirement 12.2: Empower Formalize the EOR through a written agreement that clearly describes their authority, role and responsibilities throughout the lifecycle of the all tailings facilities, including closed facilities , and during transfer of ownership of mining properties | |
| Requirement 12.3: Establish and implement a system to manage the quality of all engineering work, the interactions between the EOR, the RTFE and the Accountable Executive, and their involvement with the tailings facility lifecycle as necessary to confirm that both the implementation of the design and the design intent are met. in all cases. | |
| Requirement 12.4: Given its potential impact on the risks associated with a tailings facility, the selection of the EIR shall be decided by the Accountable Executive and not influenced or decided by procurement personnel. | |
| Requirement 12.5: | |

| Suggested Amendments | Rationale and Comments |
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| PRINCIPLE 13: Develop an organizational culture that promotes learning and early problem recognition | |
| Requirement 13.1: Educate personnel who have a role in the TMS... | Education and training are also covered in other sections, should restrict the requirements to one place. |
| Requirement 13.2: Incorporate workers experience-based knowledge into planning for all stages of the tailings facility lifecycle. | |
| Requirement 13.3: Establish mechanisms that promote cross-functional collaboration to ensure data and knowledge integration and communication across the TMS and the ESMS. | |
| Requirement 13.4: Identify and implement lessons from internal investigation and relevant external accident reports, paying particular attention to human and organizational factors | There should be a requirement for an <i>incident reporting system</i> , which this description partially covers. |
| Requirement 13.5: Develop procedures to recognize and reward employees and contractors who identify potential risks speak up about problems or identify opportunities for safety improvement. Respond in a timely manner and communicate actions taken and their outcomes. | |
| PRINCIPLE 14: Respond promptly to concerns, complaints and grievances. | |
| Requirement 14.1: Establish a formal written complaint process... | Combine with 14.3 – investigations. |
| Requirement 14.2: Establish an effective pathway that guarantees anonymity for employees and contractors to express concerns about tailings facility safety. | Combine with 14.4 – whistleblower. |
| Requirement 14.3: Initiate prompt investigations of all credible employee and stakeholder complaints and grievances with respect to the safety of the tailings facility and resolve in a timely manner. swiftly resolve concerns and complaints provide remedy as required... | |
| Requirement 14.4: In accordance with international best practices for whistleblower protection, the Operator shall not discharge, or discriminate against, or otherwise retaliate in any way against a whistleblower, or any employee or person, who, in good faith, has reported a possible violation or unsafe condition. | |
| TOPIC V: EMERGENCY RESPONSE AND LONG-TERM RECOVERY | The requirements do not adequately address the Emergency Preparedness Plans which include identification of failure mechanisms, linkage to TARPs, and preparedness to prevent incidents from escalating into a catastrophic failure. There is no linkage between with the EOR, ITRB or RTFE in development of Emergency Preparedness Plans. |

| Suggested Amendments | Rationale and Comments |
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| PRINCIPLE 15: Prepare for emergency response to tailings facility failures and support local level emergency preparedness and response using best practice methodologies. | |
| Requirement 15.1: Prepare and implement a site-specific Emergency Response Plan (ERP)... | |
| Requirement 15.2: Meaningfully engage employees... | |
| Requirement 15.3: Meaningfully engage with public sector agencies and first responders, and other organizations involved in emergency response for the purpose of developing and implementing a site-specific Emergency Preparedness and Response Plan (EPRP). The plans shall assess the capacity and capability of emergency response services and the Operator shall act accordingly. | This seems similar to 15.2, can they be combined? |
| Requirement 15.4: Maintain a state of readiness... | |
| PRINCIPLE 16: Prepare for long term recovery in the event of catastrophic failure | |
| Requirement 16.1: Meaning fully engage with public sector agencies and other organizations that would participate in medium and long term social and environmental post-failure response strategies. | Delete, this would be part of the Plan- Requirement 16.3. |
| Requirement 16.2: In the event of tailings facility disaster, assess social, economic and environmental disaster impacts as soon as possible after people are safe and short-term survival needs have been met. | Delete, this would be part of the Plan - Requirement 16.3. |
| Requirement 16.3: Work with public sector agencies and other stakeholders to prepare facilitate the development of a Reconstruction and Recovery Plan that addresses potential medium and long-term social, economic and environmental impacts of a tailings facility disaster... | |
| Requirement 16.4: Enable the participation of affected people in restoration, disaster recover works and ongoing monitoring activities | Delete, this would be part of the Plan - Requirement 16.3. |
| Requirement 16.5: Facilitate the monitoring and public reporting of post-failure.. | This seems to be an odd requirement and not sure how one would do this. |
| TOPIC VI: PUBLIC DISCLOSURE AND ACCESS TO INFORMATION | |
| PRINCIPLE 17: Provide public access to information on tailings facility decisions, risk and impacts, management and mitigation plans, and performance monitoring. | It is not reasonable to disclose all information . A freedom of information requirement is needed to control release of appropriate information. |

| Suggested Amendments | Rationale and Comments |
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| Requirement 17.1: Publicly disclose relevant data and information about the tailings facility and its the consequence classification and relevant tailings facility details to in order to fairly inform interested stakeholders. | |
| Requirement 17.2: Respond in a systematic and timely manner to all reasonable stakeholder requests for information about the tailings facility, to the fullest extent possible and to fully inform the interested party making the request. | |
| Annex 2: Consequence Classification | |
| Tailings facilities are classified according to the potential severity..... This standard adopts the Consequence Classification Matrix set out in Table 1 (below), which is a slightly modified version of the draft matrix proposed in 2019 by the International Commission on Large Dams (ICOLD). The matrix involves..... ... infrastructure and economics and livelihood | Delete the reference to ICOLD as it implies ICOLD acceptance of other aspects of this Standard. Livelihood should not be a separate column. |
| Where the consequence of failure includes loss of life, tailings facilities must be designed, built and operated so that there is a negligible likelihood of failure. The Standard also includes a number of requirements across all stages of the tailings facility lifecycle to achieve the goal of negligible likelihood of failure. | I think that this should apply to all dams, it is also contrary to the recommended flood and seismic criteria for such dams. Delete, it is a bit gratuitous. |
| It is reasonable for the designers to chose less restrictive designs for tailings facilities with a Consequence Classification of ‘Low’ or ‘Significant’. However, it is noted that the criteria set out in Table 2.... | A ‘good’ design is a ‘good’ design, there is no such thing as a ‘less restrictive or ‘less rigorous’ design’ and it sends the wrong message! The flood and seismic criteria should be consistent with international best practices for dams. THIS PARAGRAPH SHOULD BE DELETED. |
| The likelihood of a tailings failure cannot be rendered negligible by use of stringent design criteria alone..... | |
| Possible ways to minimize consequences include: negotiating to resettle downstream populations, negotiating with local authorities to prevent occupancy of land in the inundation area, changing the location of the tailings facilities, or by some other means. Some of these measures may be beyond the Operators and may require participation of the State. The consequence classification can provide the trigger to escalate decisions about ‘Very High’ and ‘Extreme’ consequence tailings facilities to the Board so that it is aware of the | I do not think that this is the place to talk about resettlement, etc. – this is best left to a guidance document. |

| Suggested Amendments | Rationale and Comments |
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| material risks to which it is exposed and is able to make informed decisions. These include go/no go decision or approval of capital investments | This should not be discussed here. |
| This Standard requires that tailings facilities be designed for the most severe level in the Consequence Classification Matrix, unless it can be demonstrated that a lower classification is appropriate. | This should not be discussed here – I also do not agree with it. |
| Finally, it is important that the Consequence Classification is not interpreted as a ‘risk level’. Risk is a factor of both the consequences and the probability of the event occurring. By contrast, the consequence classification.....As note earlier, the design of a tailings facility is intended to reduce the probability of failure to negligible levels. | Good. No need to restate this. |
| Table 2: External loading criteria required by the Standard | Return periods should be as per the previously recommended Draft ICOLD Guidance. The GTS recommended values are not consistent with International guidance associated with the Low to High categories for water dams, natural disasters and societal acceptance of loss of life. |
| Annex 3: Outline of the Organizational Structure referred to in the Standard | The RTFE should be a line function parallel with operations and reporting to the Mine Manager, with a dotted reporting to the Accountable Executive. The ITRB should be included. |