30 December 2019

To the Global Tailings Review Expert Panel and Advisory Board,

The Secretariat of the Initiative for Responsible Mining Assurance (IRMA) appreciates the opportunity to provide comments on the draft Global Tailings Standard. The comments submitted here reflect a review and analysis carried out by the IRMA Secretariat, and do not reflect the opinions of individuals or organizations that make up the Board of the Initiative for Responsible Mining Assurance.

Foremost, the IRMA Secretariat wishes to express respect for the grave importance of the work of the Global Tailings Review process. The time is overdue for commitment to a precautionary principle approach to managing mine waste; there have been too many accidents in recent years and too many lives lost. Collectively, with shared responsibility, we must seek practices and policies that prioritize safety and the protection of human health and the environment. IRMA seeks to promote such protections through its *Standard for Responsible Mining*, and is committed to improving its Standard over time, as multi-stakeholder definitions of best practices evolve and progress. Consequently, where the GTS expects something more or different than what is in the IRMA Standard, we will, in conversation with our multi-stakeholder leadership, consider whether IRMA's standard should be updated to better protect the wellbeing of human communities and the environment on which they depend.

In submitting the attached comments we have responded to a request that we analyze the IRMA *Standard for Responsible Mining*'s coverage of mine waste management against the draft Global Tailings Standard (GTS). In this review you will find a detailed comparative analysis. Specifically, in this submission, the IRMA Secretariat provides the following:

- **Section 1** provides some general feedback on the content of the Global Tailings Standard (GTS), including questions when the GTS requirements are not entirely clear.
- **Section 2** provides a comparative analysis to determine how the requirements in the IRMA Standard compare to those outlined in the Global Tailings Standard. This section includes three tables of differing levels of detail.
    - Table 1 is a short summary table that provides a broad overview of the alignment of IRMA requirements with GTR requirements on a principle by principle basis.
    - Table 2 is a longer table, which lists each GTR requirement and shows IRMA's alignment with the requirement. This enables the reader to gain greater understanding of the content of the individual GTR requirements that are being compared to the IRMA Standard.
    - Table 3 is the most detailed, providing rationale for alignment on a requirement-by-requirement basis, and recommendations for IRMA based on the GTR requirements.

Please do not hesitate to contact us if you have any questions or wish to discuss any of the comments contained in this submission: info@responsiblemining.net.

Sincerely,

The IRMA Secretariat

1. IRMA Comments on Requirements in Draft Global Tailings Standard (GTS)

IRMA congratulates the Global Tailings Review Expert Panel and Advisory Group for the monumental work carried out to create this draft global standard aimed at promoting the safe and secure management of tailings facilities. The IRMA Secretariat recognizes some of the areas where the Global Tailings Standard has gone beyond many existing mining standards and common practice, for example, in requiring mines to design, construct, operate and managing tailings facilities on the presumption that the consequence of failure classification is 'extreme', in requiring greater transparency and public disclosure of information about tailings facilities, and also demanding greater accountability on the part of mining company leadership for decisions related to tailings facilities.

As you will see, some of the IRMA Secretariat's comments express a desire for additional information on the intent or expectations of certain GTS requirements. In these cases, added clarification, either in the requirement itself or in a guidance document, will be helpful for mines that want to implement the GTS. Such clarification will also be helpful to organizations like IRMA, so that we might better understand if our Standard aligns with those GTS requirements.

In other cases, the IRMA Secretariat proposes for consideration some suggested structural changes to requirements. For example, there are some cases where the Global Tailings Standard might benefit from expanding a single requirement into two or more requirements, for example, because an original requirement attempts to tackle too many disparate concepts. IRMA has just begun its own process of independent auditing, and we are seeing places in our own Standard where we have done the same thing, and have found it difficult to audit such requirements. Additionally, putting too many expectations into one requirement does not give mines a fair assessment of each of the issues included in the requirement, and can obfuscate where are the true gaps in performance.

General Comment 1: There is no requirement in GTS to develop an Environmental and Social Management System (ESMS), yet "the ESMS" is mentioned throughout the Draft Standard. It may be an assumption on the part of the GTS that all mines will have an ESMS, or that if ESMS exist they will be of adequate quality. But this may not be the case. As a result, it might be useful for the GTS to include some expectations for what should be included in an effective ESMS.

General Comment 2: As with the term "Environmental and Social Management System" (ESMS), "Tailings Management System" (TMS) is used throughout the Standard, but it is not clear what elements need to be included in a TMS (other than by looking at the glossary). It might worth considering adding a requirement that lays out what Operators must include in a TMS. Or at least clarifying what auditors should look for when the term TMS is used, and if the TMS is not adequate, enable the gaps to be identified so that mines can improve their TMS.

REQUIREMENT 1.1: Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with international *best practice*.[4, 5]

[4] This knowledge should capture the uncertainties associated with variations due to climate change.

[5] This information may already exist in whole-of-operations studies (e.g. baselines, impact assessments and specialist studies) and/or may subsequently be incorporated into other studies.

Comment on the GTS requirement: The world is increasingly recognizing the importance of the information mentioned in footnote 4 of Requirement 1.1 (i.e., of capturing the uncertainties associated with variations due to climate change), as planning for and being able to adapt to a

changing climate is critical to ensuring the adequate design and management of long-term chemical and physical stability of tailings impoundments.

While IRMA's Waste Chapter (4.1) includes a requirement to factor in climate projections, we are reviewing our Standard more broadly to see how we might better reflect this important point. In light of our own review, we respectfully suggest that it may be worth considering moving this out of the footnote and including it directly in the requirement itself.

REQUIREMENT 2.1: Undertake a formal, multi-criteria *alternatives analysis* of all feasible sites and technologies for tailings management with the goal of minimizing risk to people and the environment. Use the knowledge base to inform this analysis and to develop facility designs, *inundation studies*, a monitoring program, *Emergency Preparedness and Response Plans* (EPRP), and closure and post-closure plans.

Comment on the GTS requirement: There are a lot of sub-requirements packed into this one requirement. Consider separating into two requirements, as there are distinct expectations., i.e., 1) the need to undertake an alternatives analysis and 2) the need to use the knowledge base to inform the various elements listed in the second sentence.

REQUIREMENT 2.4: Update the assessment of the social, economic and environmental impact best practices, and update stakeholder identification and information for any material change to the tailings facility, the social or environmental context or conditions. If new data indicates that the impacts from the tailings facility differ from those assumed in the original assessments, the management of the facility shall be adjusted to reflect the new data using adaptive management.

Comment on the GTS requirement: Not sure why the term "best practices" is used (i.e., "Update the assessment of the social, economic and environmental impact best practices"). It seems that what should be updated is the assessment of potential impacts, not the assessment of best practices? It would be good to get clarify what exactly is being updated.

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.

Comment on the GTS requirement: May want to consider moving this to Principle 14: Respond promptly to concerns, complaints and grievances.

REQUIREMENT 4.1: Presume the consequence of failure classification of all new tailings facilities as being 'Extreme' (see Annex 2, Table 1: Consequence Classification Matrix) and design, construct, operate and manage the facility accordingly. This presumption can be rebutted if the following three conditions are met:

a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and
b) A design of the upgrade of the facility to meet the requirements of an 'Extreme' consequence of failure classification in the future, if required, is prepared and the upgrade is demonstrated to be feasible; and
c) The consequence of failure classification is reviewed every 3 years, or sooner if there is a material change in any of the categories in the Consequence Classification Matrix, and the tailings facility is upgraded to the new classification within 3 years. This review should proceed until the facility has

been safely closed and achieved a confirmed 'landform' status or similar permanent non-credible flow failure state.

Comment on the GTS requirement: In 4.1.c) the phrase" permanent non-credible flow failure state" is not very clear. The use of "non-credible" suggests that the flow failure state is not to be believed. I don't think this was the intent.

REQUIREMENT 5.1: Consider implementation of alternative options, including but not limited to in-pit disposal and underground tailings placement, and application of the technologies selected according to Requirement 2.1, to minimize the amount of tailings and water placed in external tailings facilities.

Comment on the GTS requirement: The wording of this makes it sound as if mines only need to "consider" applying the technologies selected according to Requirement 2.1. Is that the intent, or is the intent that mines apply the technologies selected as per Requirement 2.1? If the latter is the intent, then you may want to separate this into two different concepts: 1) Application (or implementation) of the technologies selected as per requirement 2.1, and 2) Consideration of in-pit disposal and underground tailings placement (or other alternatives) to further minimize the amount of tailings and water placed in external facilities.

REQUIREMENT 7.1: Build, raise, operate, monitor and close the tailings facility 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).

Comment on the GTS requirement: There are many elements embedded in this one requirement, which will make it very difficult to understand, and, as a result, it will be difficult to audit.

The primary goal of requirement 7.1 seems to be ensuring that the tailings impoundment has been built and is operated according to the design intent of the facility. These issues (i.e., ensuring construction and operation according to design intent) are already covered in 7.2.

Perhaps the remaining concepts could be the focus of Requirement 7.1 (e.g., that tailings management, throughout all phases from construction through closure, be carried out using qualified personnel and appropriate methodologies, equipment and procedures).

It's not clear what you mean by appropriate . . .data acquisition. Is this related to monitoring and surveillance? Should it be "appropriate data acquisition methods"? More clarity/guidance on this would be useful.

Also, as written it is not clear why the TMS and the environmental and social management system (ESMS) are mentioned here. Perhaps the intention is that Operators build, raise, operate, monitor and close the tailings facility according to the TMS and ESMS. If that is the case, the Requirement 7.1 should be re-written to better reflect this intent.

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.

Comment on the GTS requirement: As per the definition of Observational Method, the monitoring program is supposed to enable "previously defined modifications to be incorporated during or after construction as appropriate." It's unclear if this is the same as IRMA requirement 4.1.5.5.e, where IRMA requires "pre-defined actions to be taken if performance criteria are not met or control is lost."

We think this is similar in intent, but this would need to be clarified to know, for sure, if we are fully aligned with the Global Tailings Standard.

REQUIREMENT 8.2: Establish performance objectives, indicators, criteria, and performance parameters and include them in the design of a monitoring program that measures performance at all stages of the tailings facility lifecycle. Record, evaluate and publish 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.

Comment on the GTS requirement: One small grammatical suggestion - see addition in red in Requirement 8.2.

Also, it is unclear what is "appropriate" frequencies, and also what exactly is expected to be published (e.g., just monitoring data, or also all objectives, criteria, evaluations of performance, etc.).

REQUIREMENT 8.4: Report the results of the monitoring program at the frequency required to meet company, regulatory and public disclosure requirements, and as a minimum on a quarterly basis. The RTFE and the EOR shall review and approve these reports.

Comment on the GTS requirement: Unclear what exactly is expected to be published (e.g., just monitoring data, or also all objectives, criteria, evaluations of performance, etc.). Also, it is unclear if these reports are included or in what gets "published" in requirement 8.2.

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.

Comment on the GTS requirement: IRMA does not require this. Some IRMA stakeholders have expressed concerns about certain performance incentive programs, as they may provide a perverse incentive to not report issues. We would have to discuss this with our stakeholders before adding it to the IRMA Standard.

Also, it is unclear how a company would demonstrate that it has considered implementing an incentive program. Would this involve, for example, demonstrating that a proposal has been developed on how an incentive program might work, evidence that company management or Board has reviewed the proposal, and evidence that the program was and either adopted or rejected (with rationale for why it was rejected if that is the case)?

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 for review, and address with urgency all risks considered as unacceptable.

Comment on the GTS requirement: Unclear whether you are assuming it is the ITRB that is identifying that risks are unacceptable (seems implied since it is in the same sentence), or whether unacceptable risks are identified in the risk assessment itself.

REQUIREMENT 11.2: Conduct internal audits to verify consistent implementation of company procedures, guidelines and corporate governance requirements consistent with the TMS and the ESMS developed to manage risks.

Comment on the GTS requirement: It is unclear what exactly is being referred to when you use the term "guidelines."

REQUIREMENT 11.4: A senior independent technical reviewer 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.

Comment on the GTS requirement: It is unclear if a single independent reviewer would have the varied expertise needed carry out a review of the technical, operational and governance aspects of the tailings facility. And it seems like the review of tailings facility governance is already covered in Requirement 11.2: "Conduct internal audits to verify consistent implementation of company procedures, guidelines and corporate governance requirements consistent with the TMS and the ESMS developed to manage risks."

REQUIREMENT 11.5: For tailings facilities with 'Very High' or 'Extreme' Consequence Classification, the ITRB, reporting to the Accountable Executive and/or the Board, shall provide ongoing senior independent review of the planning, siting, design, construction, operation, maintenance, monitoring, performance and risk management at appropriate intervals across all stages of the tailings facility lifecycle. For facilities with other consequence classifications, the ongoing senior independent review can be done by a single person.

Comment on the GTS requirement: IRMA requires independent review bodies for high risk facilities, and allows possibility for single reviewers for lower risk facilities. We think this meets the intent of requirement 11.5, "for tailings facilities with 'Very High' or 'Extreme' Consequence Classification". But this may need to be clarified.

REQUIREMENT 12.4: Given its potential impact on the risks associated with a tailings facility, the selection of the EOR shall be decided by the Accountable Executive and not influenced or decided by procurement personnel.

Comment on the GTS requirement: Consider incorporating this into Requirement 12.1, since both relate to selection of EOR.

REQUIREMENT 13.2: Incorporate workers' experience-based knowledge into planning for all stages of the tailings facility lifecycle.

Comment on the GTS requirement: It is not clear what the expectation is of companies. Are they supposed to specifically ask workers for feedback in a systematic way? If so, this should be more clearly stated in the Requirement 13.2.

REQUIREMENT 13.3: Establish mechanisms that promote cross-functional collaboration to ensure data and knowledge integration and communication across the TMS and the ESMS.

Comment on the GTS requirement: It would be useful to have examples of what mechanisms might be acceptable here.

REQUIREMENT 14.1: Establish a formal written complaint process that provides the Operator and the appropriate regulatory authority with information about possible permit violations or other conditions relating to the tailings facility that pose a risk to public health, safety, or the environment.

Comment on the GTS requirement: Not sure why complaints need to be written. Not all stakeholders are literate, and this may present a barrier to filing a complaint about permit violations or other issues of concern related to the tailings facility. Perhaps consider, instead, that all complaints be documented.

That would allow a stakeholder to phone or send a voice text to the company, and the onus would be on mine staff to formally document the complaint.

Also, consider re-writing that the requirement to make it clear that it is the Operators' responsibility to pass along complaints/concerns to the regulatory authority, and not something that the complainant is supposed to do.

REQUIREMENT 14.3: Initiate prompt investigations of all credible employee and stakeholder complaints and grievances, swiftly resolve concerns and complaints and provide remedy as required.

Comment on the GTS requirement: There is overlap between this requirement and 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."

It may be useful to consolidate all of the complaints/grievance requirements into Principle 14 for ease of auditing.

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 plan shall assess the capacity and capability of emergency response services and the Operator shall act accordingly.

Comment on the GTS requirement: It is not clear what is meant by "and the Operator shall act accordingly." Perhaps instead the requirement might be for the Operator to collaborate with the local emergency response providers to ensure that identified capacity/capability gaps are addressed.

PRINCIPLE 16: Prepare for long term recovery in the event of catastrophic failure.

Comment on the GTS requirement: The requirements in this principle are not just about preparing, but also implementing actions related to long term recovery in the event that a catastrophic failure occurs. You may want to rename the principle.

REQUIREMENT 16.1: Meaningfully engage with public sector agencies and other organizations that would participate in medium- and long-term social and environmental post-failure response strategies.

Comment on the GTS requirement: Meaningfully engage about what? To identify potential impacts, to discuss post-failure response strategies, or to agree on strategies that will feed into actual plans? All of the above? Perhaps this could be combined with 16.3.

Also, should this engagement always happen, or only happen if, using GTS's terms, the consequence is 'Very High' or 'Extreme'? It seems most proactive and prudent to engage no matter what the consequence level, but the degree of engagement could be scaled to the consequence level (i.e., the greater the potential consequence, the deeper the engagement).

REQUIREMENT 16.3: 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.

Comment on the GTS requirement: It is unclear if this plan is developed pre- or post-failure of a tailings facility. Requirement 16.2 is prefaced with "In the event of…" but this is not, so that suggests this should happen pre-failure, but it would be good to clarify this.

If it happens pre-failure, it seems like Requirement 16.3 might be combined with Requirement 16.1, as the purpose of meaningful engagement would likely be to identify potential impacts and ultimately collaborate on the development of acceptable strategies and a recovery plan.

Also, as per comments on Requirement 16.1, should this engagement always happen, or only happen if, using GTS's terms, the consequence is 'Very High' or 'Extreme'? As above, it seems most proactive and prudent to engage no matter what the consequence level, but the degree of engagement could be scaled to the consequence level (i.e., the greater the potential consequence, the deeper the engagement).

REQUIREMENT 16.5: Facilitate the monitoring and public reporting of post-failure outcomes that are aligned with the thresholds and indicators outlined in the plans and adapt recovery activities in response to findings and feedback.

Comment on the GTS requirement: It is unclear why you are using the word "facilitate" here. Shouldn't the Operator be responsible for carrying out the monitoring, and for publicly reporting on outcomes? Or are you saying that these things are overseen by some other entity, and the Operator is just responsible for paying for it, or facilitating it in some other way? If so, it would be good to know, the options and Operator would have for facilitating monitoring and public reporting of post-failure outcomes.

Also, in requirement 16.4 the GTS doesn't actually require that thresholds and indicators be developed. You may want to add this in.

REQUIREMENT 17.1: Publicly disclose relevant data and information about the tailings facility and its consequence classification in order to fairly inform interested stakeholders.

Comment on the GTS requirement: It will be useful, either by adding to the requirement or adding details in Guidance, to better understand what is meant by "relevant data and information" about the tailings facility.

2. IRMA Standard Alignment with the Draft Global Tailings Standard (GTS)

Background on the Comparison: IRMA has a chapter devoted Waste and Materials Management (4.1), which includes management of tailings, the alignment exercise necessarily included requirements found in other IRMA chapters due to the cross-cutting nature of the IRMA Standard. Other IRMA chapters reviewed included: 1.2 Community and Stakeholder Engagement; 1.3 Human Rights Due Diligence; 1.4 Complaints and Grievance Mechanism and Access to Remedy; 2.1 Environmental and Social Impact Assessment and Management; 2.4 Resettlement; 2.5 Emergency Preparedness and Response; 2.6 Planning and Financing Reclamation and Closure and 4.2 Water Management.

It is important to understand, however, that the IRMA Secretariat's analysis did not look at gaps in the Global Tailings Standard when compared to the entire IRMA Standard (or even compared to all of the requirements in the chapters listed above), because the GTS is focused on the safe and secure management of mine tailings facilities while the IRMA Standard seeks to cover a much wider scope of social and environmental issues related to mining.

This alignment exercise has required use of the IRMA Secretariat's best judgement. Occasionally, there was not enough information in the GTS requirements to have a high degree of certainty of some the ratings. So the results of this alignment exercise should be viewed with that in mind.

In a few cases, where a GTS requirement contained multiple expectations the IRMA Secretariat broke the GTS requirement into subsections to enable a closer and more accurate assessment of alignment with specific expectations. (See, for example, ratings for Requirements 7.4, 8.2, 8.3)

Finally, it is worth noting that this has been an extremely useful exercise for IRMA, not only because it has helped identify potential areas for improvement in how the IRMA Standard approaches tailings management, but also because it has helped the Secretariat see some of the places in the IRMA Standard where the intent is not as obvious as it could be, or where we need more Guidance (explanatory notes) to enable mines and stakeholders to better understand IRMA's own expectations.

Results: As seen in Table 1, below, there is a high degree of overlap in the content of the two Standards, although there are areas where partial gaps exist in the IRMA Standard relative to the GTS. There are also some cases where IRMA does not address concepts outlined in the GTS. For example, Principle 4 of the GTS takes a novel approach in requiring the presumption that tailings facilities be managed based on the assumption that the consequence of a failure would be extreme, unless such a presumption is adequately rebutted. In areas, such as this one, where gaps have been identified the IRMA Secretariat will present this information to the IRMA leadership and stakeholders for discussion and consideration as we look to revising the IRMA Standard in 2020 and beyond.

There are also areas where the IRMA Standard "exceeds" what is required in the GTS. By highlighting these areas the IRMA Secretariat is not suggesting that the GTS must fill these gaps, but rather, is pointing out the areas so that some consideration may be given to whether there might be benefit in doing so. Given that the IRMA Standard is meant to cover a broader scope than the GTS, the Global Tailings Review Expert Panel may not deem it necessary to add additional expectations.

Legend for Comparison Tables

✓	Elements of the IRMA Standard **exceed** the proposed GTS requirement.
	IRMA Standard **meets** the proposed GTS requirement.
	IRMA Standard **partially addresses** proposed GTS requirement, and would need revisions to fully address the GTS requirement
	IRMA Standard **does not address** proposed GTS requirement. IRMA would need to add language to address this requirement.

Table 1. Summary of IRMA Standard Alignment with the Global Tailings Standard Principles and Requirements.

Principle 1: Develop and maintain an updated knowledge base to support safe tailings management across the tailings facility lifecycle.
1.1 | 1.2✓ | 1.3 | 1.4
Principle 2: Integrate the social, economic, environmental and technical information to select the site and the technologies9 to minimize the risk of tailings facility failure.
2.1 | 2.2 | 2.3 | 2.4 | 2.5✓ | 2.6✓
Principle 3: Respect the rights of project-affected people and meaningfully engage them at all stages of the tailings facility lifecycle.
3.1✓ | 3.2✓ | 3.3✓ | 3.4✓
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.
4.1 | 4.2 | 4.3
Principle 5: Develop a robust design that integrates the knowledge base & minimizes risk of failure for all stages of the tailings facil. lifecycle.
5.1 | 5.2 | 5.3 | 5.4 | 5.5 | 5.6
Principle 6: Adopt design criteria that minimize risk
6.1 | 6.2 | 6.3 | 6.4
Principle 7: Build and operate the tailings facility to minimize risk.
7.1 | 7.2 | 7.3 | 7.4 | 7.5 | 7.6 | 7.7 | 7.8
Principle 8: Design, implement and operate monitoring systems.
8.1 ? | 8.2 | 8.3 | 8.4
Principle 9: Elevate decision-making responsibility for tailings facilities with a 'Very High' or 'Extreme' Consequence Classification.
9.1 | 9.2
Principle 10: Establish roles, functions, accountabilities and remuneration systems to support the integrity of the tailings facility.
10.1 | 10.2 | 10.3 | 10.4 | 10.5
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.
11.1 | 11.2 | 11.3 | 11.4 | 11.5 ?
Principle 12: Appoint and empower an Engineer of Record.
12.1 | 12.2 | 12.3 | 12.4 | 12.5
Principle 13: Develop an organizational culture that promotes learning and early problem recognition.
13.1 | 13.2 ? | 13.3 | 13.4 | 13.5
Principle 14: Respond promptly to concerns, complaints and grievances.
14.1✓ | 14.2✓ | 14.3 | 14.4
Principle 15: Prepare for emergency response to tailings facility failures and support local level emergency preparedness and response using best practice methodologies.
15.1 | 15.2 | 15.3 | 15.4
Principle 16: Prepare for long term recovery in the event of catastrophic failure.
16.1 | 16.2 | 16.3 | 16.4 | 16.5
Principle 17: Provide public access to information on tailings facility decisions, risks and impacts, management and mitigation plans, and performance monitoring.
17.1 | 17.2 ✓ | 17.3

Table 2. Alignment of the IRMA Standard (*) with the Requirements in the Global Tailings Standard.

Requirements in Draft Global Tailings Standard	*
REQUIREMENT 1.1: Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with 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 and hydrology. The physical and chemical properties of the tailings shall be determined and regularly updated	✓
REQUIREMENT 1.3: Where there is a potential for flow failure, conduct and regularly update an inundation study for the tailings facility using a methodology that considers credible hypothetical failure modes, site conditions, tailings facility conditions, hydraulic routing models of the slurry, and the amount of tailings and downstream materials entrained in the outflow. The results of the study should include estimates of the inundation area, flow arrival times, depth and velocities, duration of flooding, and depth of material deposition.	
REQUIREMENT 1.4: Identify stakeholders and how they are related to the tailings facility site, inundation area and impacted area; collect land, livelihood and demographic data for groups most at risk from a tailings facility failure.	
REQUIREMENT 2.1: Undertake a formal, multi-criteria alternatives analysis of all feasible sites and technologies for tailings management with the goal of minimizing risk to people and the environment. Use the knowledge base to inform this analysis and to develop facility designs, inundation studies, a monitoring program, Emergency Preparedness and Response Plans (EPRP), and closure and post-closure plans.	
REQUIREMENT 2.2: Engage an Independent Tailings Review Board (ITRB) or an independent senior technical reviewer with no conflicts of interest to assess and review the alternatives analysis for site and technology selection.	
REQUIREMENT 2.3: Use the knowledge base to assess the social, economic and environmental impacts of the tailings facility and its potential failure. Develop impact mitigation and management plans, and meaningfully engage potentially affected communities in the process.	
REQUIREMENT 2.4: Update the assessment of the social, economic and environmental impact best practices, and update stakeholder identification and information for any material change to the tailings facility, the social or environmental context or conditions. If new data indicates that the impacts from the tailings facility differ from those assumed in the original assessments, the management of the facility shall be adjusted to reflect the new data using adaptive management	
REQUIREMENT 2.5: The amount of financial assurance shall be reviewed periodically and updated based on estimated closure and post-closure costs.	✓
REQUIREMENT 2.6: Taking into account actions to mitigate risks, the Operator will consider obtaining appropriate insurance to the extent commercially reasonable or providing other forms of financial assurance if appropriate to address risks relating to the construction, operation, maintenance, and/or closure of a tailings facility.	✓
REQUIREMENT 3.1: Demonstrate respect for human rights by conducting human rights due diligence to understand how a tailings facility failure may cause or contribute to adverse human rights impacts, including impacts on the individual and collective rights of indigenous peoples and tribal peoples.	✓
REQUIREMENT 3.2: Meaningfully engage project-affected people (PAP) throughout the tailings facility lifecycle regarding the matters that affect them.	✓
REQUIREMENT 3.3: Where the risks of a potential tailings facility failure could result in loss of life or sudden physical and/or economic displacement of people, the Operator shall consider in good faith additional measures to minimize those risks or implement resettlement following international standards. The Operator shall communicate these decisions to those affected.	✓

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.	✓
REQUIREMENT 4.1: Presume the consequence of failure classification of all new tailings facilities as being 'Extreme' (see Annex 2, Table 1: Consequence Classification Matrix) and design, construct, operate and manage the facility accordingly. This presumption can be rebutted if the following three conditions are met: a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and b) A design of the upgrade of the facility to meet the requirements of an 'Extreme' consequence of failure classification in the future, if required, is prepared and the upgrade is demonstrated to be feasible; and c) The consequence of failure classification is reviewed every 3 years, or sooner if there is a material change in any of the categories in the Consequence Classification Matrix, and the tailings facility is upgraded to the new classification within 3 years. This review should proceed until the facility has been safely closed and achieved a confirmed 'landform' status or similar permanent non-credible flow failure state.	
REQUIREMENT 4.2: The decision to rebut the requirement to design for 'Extreme' Consequence Classification, shall be taken by the Accountable Executive or the Board of Directors (the 'Board'), with input from an independent senior technical reviewer or the ITRB. The Accountable Executive or Board shall give written reasons for their decision.	
REQUIREMENT 4.3: Existing facilities shall comply with Requirements 4.1 and 4.2. 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, shall approve the implementation of measures to reduce the risks of a potential failure to the greatest extent possible.	
REQUIREMENT 5.1: Consider implementation of alternative options, including but not limited to in-pit disposal and underground tailings placement, and application of the technologies selected according to Requirement 2.1, to minimize the amount of tailings and water placed in external tailings facilities.	
REQUIREMENT 5.2: Develop and implement water balance and water management plans for the tailings facility, taking into account the knowledge base, upstream and downstream hydrological basins, the overall mine site, mine planning and operations and the integrity of the tailings facility for all stages of its lifecycle.	
REQUIREMENT 5.3: Develop a robust design that considers the social, economic and environmental context, the tailings facility Consequence Classification, site conditions, water management, mine plant operations, tailings operational issues, and the construction, operation and closure of the tailings facility.	
REQUIREMENT 5.4: Address all credible failure modes of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures to minimize risk. Risk assessments must be used to inform the design.	
REQUIREMENT 5.5: Develop a design for all stages of the facility, including but not limited to start-up, partial raises and interim configurations, final raise, and all closure stages. The design should be reviewed and updated as performance and site data become available and in response to material changes to the risk assessment.	
REQUIREMENT 5.6: Design the closure stage in a manner that meets all the Requirements of the Standard with sufficient detail to demonstrate the feasibility of the closure scenario and allows immediate implementation of elements of the design, as required. The design should include, where possible, progressive closure and reclamation during operations.	
REQUIREMENT 6.1: Select and clearly identify design criteria that are appropriate to reduce risk for the adopted Consequence Classification for all stages of the tailings facility lifecycle and for all credible failure modes.	
REQUIREMENT 6.2: Apply factors of safety that consider the variability and uncertainty of geologic and construction materials and of the data on their properties, the parameters selection approach, the mobilized shear strength with time and loading conditions, the sensitivity of the failure modes and the strain compatibility issues, and the quality of the implementation of risk management systems.	

REQUIREMENT 6.3: Identify and address brittle failure mechanisms with conservative design criteria and factors of safety to minimize the likelihood of their occurrence, independent of trigger mechanisms.	
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 senior independent technical reviewer.	
REQUIREMENT 7.1: Build, raise, operate, monitor and close the tailings facility 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).	
REQUIREMENT 7.2: Manage the quality and adequacy of the construction and operation process by implementing Quality Control, Quality Assurance and Construction vs Design Intent Verification (CDIV). CDIV shall be used to ensure that the design intent is implemented and is still being met if the site conditions vary from the design assumptions.	
REQUIREMENT 7.3: Prepare a detailed Construction Records Report 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: 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 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 all personnel involved in the TMS.	
REQUIREMENT 7.5: Implement a formal change management system that triggers the evaluation, review, approval and documentation of all changes to 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: Refine the design, construction and operation throughout the tailings facility lifecycle by considering the lessons learned from ongoing work and the evolving knowledge base, and by using opportunities for the inclusion of new and emerging technologies and techniques.	
REQUIREMENT 7.7: Ensure that the ESMS is designed and implemented to align decisions about the tailings facility with the changing environmental and social context as identified in the knowledge base, in accordance with the principles of adaptive management.	
REQUIREMENT 7.8: Independent senior technical reviewers, with qualifications and expertise in social and environmental sciences and performance management, shall carry out a full review of the ESMS and monitoring results every 3 years, with annual summary reports provided to relevant stakeholders.	
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.	?
REQUIREMENT 8.2: Establish performance objectives, indicators, criteria, and performance parameters and include them in the design **of** a monitoring program that measures performance at all stages of the tailings facility lifecycle.	
Record, evaluate and publish 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: Analyze monitoring data at the frequency recommended by the EOR,	

and assess the performance of the facility, clearly identifying and presenting evidence on any deviations from the expected performance and any deterioration of the performance over time. Promptly submit evidence to the EOR for review and update the risk assessment and design, if required. Performance outside the expected ranges shall be addressed swiftly through critical controls or trigger response action plans (TARPs).	
REQUIREMENT 8.4: Report the results of the monitoring program at the frequency required to meet company, regulatory and public disclosure requirements, and as a minimum on a quarterly basis. The RTFE and the EOR shall review and approve these reports.	
REQUIREMENT 9.1: For a proposed new facility where a potential credible failure could have 'Very High' or 'Extreme' consequences, the Board or senior management (as appropriate based on the Operator's organizational structure) shall be responsible for approving the proposal, after deciding what additional steps shall be taken to minimize the consequences.	
REQUIREMENT 9.2: For an existing facility, where a potential credible failure could have 'Very High' or 'Extreme' consequences, the Board or senior management (as appropriate based on the Operator's organizational 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).	
REQUIREMENT 10.1: The Board of the parent corporation shall adopt and publish a policy on or commitment to the safe management of tailings facilities, to emergency preparedness and response, and to recovery after failure that is mandatory for all its subsidiaries and joint ventures. The commitment shall require the Operator to establish a Tailings Management System (TMS), and a governance framework to assure the effective implementation and continuous improvement of the TMS.	
REQUIREMENT 10.2: A member of senior management 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).	
REQUIREMENT 10.3: Appoint a site-specific Responsible Tailings Facility Engineer (RTFE) who is accountable for the integrity of the tailings facility, liaises with the EOR, the Operations and the Planning teams and who either reports directly to the Accountable Executive, or via a reporting line that culminates with the Accountable Executive. The RTFE will have a dotted reporting line to mine management to represent the delivery of services to the site.	
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.	
REQUIREMENT 10.5: 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 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 for review, and address with urgency all risks considered as unacceptable.	
REQUIREMENT 11.2: Conduct internal audits to verify consistent implementation of company procedures, guidelines and corporate governance requirements consistent with the TMS and the ESMS developed to manage risks.	
REQUIREMENT 11.3: The EOR or a senior independent technical reviewer shall conduct annual tailings facility construction and performance reviews.	
REQUIREMENT 11.4: A senior independent technical reviewer 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.	
REQUIREMENT 11.5: For tailings facilities with 'Very High' or 'Extreme' Consequence Classification, the ITRB, reporting to the Accountable Executive and/or the Board, shall provide ongoing senior independent review of the planning, siting, design, construction, operation, maintenance, monitoring, performance and risk management at appropriate intervals across all stages of the tailings facility lifecycle. For facilities with other consequence classifications, the ongoing senior independent review can be done by a single person.	?
REQUIREMENT 12.1: 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. Alternatively, the Operator may appoint an employee with expertise and experience in comparable facilities as the EOR. In this instance, the EOR may delegate the design to a firm ('Designer of Record') but shall remain thoroughly familiar with the design in executing their responsibilities as EOR.	
REQUIREMENT 12.2: Empower the EOR through a written agreement that clearly describes their authority, role and responsibilities throughout the lifecycle of all 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 in 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 EOR shall be decided by the Accountable Executive and not influenced or decided by procurement personnel.	
REQUIREMENT 12.5: Where it becomes necessary to change the EOR firm, develop a detailed plan for the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials.	
REQUIREMENT 13.1: Educate personnel who have a role in the TMS about the reason for and importance of their job procedures for the prevention of a tailings facility failure.	
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 incident investigations and relevant external accident reports, paying particular attention to human and organizational factors.	
REQUIREMENT 13.5: Develop procedures to recognize and reward employees and contractors who speak up about problems or identify opportunities for improvement. Respond in a timely manner and communicate actions taken and their outcomes.	
REQUIREMENT 14.1: Establish a formal written complaint process that provides the Operator and the appropriate regulatory authority with information about possible permit violations or other conditions relating to the tailings facility that pose a risk to public health, safety, or the environment.	✓
REQUIREMENT 14.2: Establish an effective pathway that guarantees anonymity for employees and contractors to express concerns about tailings facility safety.	✓
REQUIREMENT 14.3: Initiate prompt investigations of all credible employee and stakeholder complaints and grievances, swiftly resolve concerns and complaints and provide remedy as required.	

REQUIREMENT 14.4: In accordance with international best practices for whistleblower protection, the Operator shall not discharge, 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.	
REQUIREMENT 15.1: 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 closure.	
REQUIREMENT 15.2: Meaningfully engage employees and/or employee representatives, site contractors, public sector agencies, first responders and at-risk communities to participate in emergency planning and implementation, including development of specific ERPs for at-risk communities.	
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 plan shall assess the capacity and capability of emergency response services and the Operator shall act accordingly.	
REQUIREMENT 15.4: Maintain a state of readiness at the mine site and within at-risk communities by training all appropriate personnel, public sector agencies, first responders and at-risk communities and by testing emergency response plans and procedures with all involved stakeholders.	
REQUIREMENT 16.1: Meaningfully engage with public sector agencies and other organizations that would participate in medium- and long-term social and environmental post-failure response strategies.	
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.	
REQUIREMENT 16.3: 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.	
REQUIREMENT 16.4: Enable the participation of affected people in restoration, disaster recovery works and ongoing monitoring activities. Design and implement plans that take an integrated approach to remediation, reclamation and the re-establishment of functional ecosystems.	
REQUIREMENT 16.5: Facilitate the monitoring and public reporting of post-failure outcomes that are aligned with the thresholds and indicators outlined in the plans and adapt recovery activities in response to findings and feedback.	
REQUIREMENT 17.1: Publicly disclose relevant data and information about the tailings facility and its consequence classification 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 fairly inform the interested party making the request.	✓
REQUIREMENT 17.3: Commit to transparency and participate in credible global initiatives led by qualified independent organizations to create standardized, independent, industry-wide and publicly accessible databases, inventories or other information repositories about tailings facilities.	

Table 3. Detailed information on alignment of the IRMA Standard (*) with the Requirements in the Global Tailings Standard (GTS).

Requirements in Draft GTS	*	IRMA Requirements	Comments
TOPIC I: KNOWLEDGE BASE			
PRINCIPLE 1: Develop and maintain an updated knowledge base to support safe tailings management across the tailings facility lifecycle			
REQUIREMENT 1.1: Develop and regularly update knowledge about the social, economic and environmental context of a tailings facility, aligned with international best practice.[4,5] [4] This knowledge should capture the uncertainties associated with variations due to climate change. [5] This information may already exist in whole-of-operations studies (e.g. baselines, impact assessments and specialist studies) and/or may subsequently be incorporated into other studies.		2.1.4.1. Baseline data describing the prevailing environmental, social, economic and political environment shall be collected at an appropriate level of detail to allow the assessment of the potential impacts of the proposed mining project. 2.1.2.2. Prior to the implementation of the ESIA process the operating company shall prepare a report . . . The report shall provide: a. A general description of the proposed project, including details on the proposed location, and nature and duration of the project and related activities; b. The preliminary identification of potential significant environmental and social impacts, and proposed actions to mitigate any negative impacts; . . . 2.1.3.1. The operating company shall carry out a scoping process to identify all potentially significant social and environmental impacts of the mining project to be assessed in the ESIA.[1] 2.1.3.3. Scoping shall include the consideration of: a. Social impacts (including potential impacts on communities and workers) and environmental impacts (including potential impacts on wildlife, air, water, vegetation and soils) during all stages of the project life cycle, from pre-construction through post-closure;[2] b. Direct, indirect and cumulative impacts; and c. Potential impacts of extreme events. 4.1.3.1. The operating company shall identify all existing and/or proposed mine waste facilities that have the potential to be associated with waste discharges or incidents, including catastrophic failures, that could lead to impacts on human health, safety, the environment or communities.	**Comment on IRMA alignment:** In the IRMA Standard, as part of ESIA companies are required to establish the environmental, social, economic and political context of the proposed mining project (2.1.4.1, 2.1.2.2, 2.1.3.1, 2.1.3.3). IRMA doesn't specify that these activities be done in relation to tailings facilities, per se, but rather, for the mine site as a whole. However, the context of a tailings site would be included if tailings facilities are part of the mine site. Additionally, as per listed requirements from Chapter 4.1, establishing the context of the tailings site includes understanding geology, hydrogeology, hydrology, and climate change projections (4.1.3.2). Use of data on social, economic and environmental context feeds into the risk assessment

[1] Scoping refers to the early, open and interactive process of determining the major issues and impacts that will be important in decision-making on the proposal, and need to be addressed in an ESIA.

[2] See the Notes section at the end of the chapter for a more detailed list of the types of issues that should be included in the scoping process.

		4.1.3.2. The operating company shall perform a detailed characterization for each mine waste facility that has associated chemical risks. Characterization shall include:[3] a. A detailed description of the facility that includes geology, hydrogeology and hydrology, climate change projections, and all potential sources of mining impacted water (MIW);[4] b. Source material characterization using industry best practice to determine potential for acid rock drainage (ARD) or metals leaching (ML). . . 4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes: a. Identification of potential chemical risks (see 4.1.3.2) and physical risks (see 4.1.3.3) during the project conception and planning phase of the mine life cycle; b. A rigorous risk assessment to evaluate the potential impacts of mine waste facilities on health, safety, environment and communities early in the life cycle; c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c).	(4.1.4.1), which is updated over the course of the mine lifecycle.
REQUIREMENT 1.2: Prepare and regularly update detailed site characterization of the tailings facility site(s) that includes geomorphology, geology, geochemistry, hydrogeology,	✓	4.1.3.2. The operating company shall perform a detailed characterization for each mine waste facility that has associated chemical risks. Characterization shall include:[5] a. A detailed description of the facility that includes geology, hydrogeology and hydrology, climate change projections, and all potential sources of mining impacted water (MIW);[6]	**Comment on IRMA alignment:** IRMA aligns with this requirement. IRMA also exceeds the requirement by including detailed, descriptive elements of

[3] See also IRMA Chapter 4.2, criteria 4.2.2

[4] Mining impacted water, also referred to as mining influenced water or MIW, includes acid rock drainage (ARD), neutral mine drainage, saline drainage, and metallurgical process waters of potential concern. In Australia, the term acid and metalliferous drainage (AMD) is used as a synonym for ARD. A key characteristic of most of these waters is that they contain elevated metals that have leached from surrounding solids (e.g., waste rock, tailings, mine surfaces, or mineral surfaces in their pathways). This fact is commonly acknowledged by the phrase "metal leaching" (ML), frequently resulting in acronyms such as ARD/ML.

[5] See also IRMA Chapter 4.2, criteria 4.2.2

[6] Mining impacted water, also referred to as mining influenced water or MIW, includes acid rock drainage (ARD), neutral mine drainage, saline drainage, and metallurgical process waters of potential concern. A key characteristic of most of these waters is that they contain elevated metals that have leached from surrounding solids (e.g., waste rock, tailings, mine surfaces, or mineral surfaces in their pathways). This fact is commonly acknowledged by the phrase "metal leaching" (ML), frequently resulting in acronyms such as ARD/ML. Note that in Australia, the term acid and metalliferous drainage (AMD) is used as a synonym for ARD.

geotechnical, seismicity and hydrology. The physical and chemical properties of the tailings shall be determined and regularly updated		b. Source material characterization using industry best practice to determine potential for acid rock drainage (ARD) or metals leaching (ML). This shall include: i. Analysis of petrology, mineralogy, and mineralization; ii. Identification of geochemical test units; iii. Estimation of an appropriate number of samples for each geochemical test unit; and iv. Performance of comprehensive geochemical testing on all samples from each geochemical test unit. c. A conceptual model that describes what is known about release, transport and fate of contaminants and includes all sources, pathways and receptors for each facility;[7] d. Water balance and chemistry mass balance models for each facility;[8] e. Identification of contaminants of concern for the facility/source materials, and the potential resources at risk from those contaminants.[9] 4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: a. Detailed engineering reports, including site investigations, seepage and stability analyses; b. Independent technical review (see 4.1.6); c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment; d. Descriptions of facility design criteria; e. Design report(s); f. Short-term and long-term placement plans and schedules for tailings and waste rock or other facilities that are subject to stability concerns; g. Master tailings placement plan (based on life of mine);	what is expected as part of site and waste characterization.

[7] This information will feed into the Conceptual Site Model required in IRMA Chapter 4.2, requirement 4.2.2.3.a.

[8] This information should feed into the site-wide water balance model in IRMA Chapter 4.2, requirement 4.2.2.3.b.

[9] This should be done using the results from 4.1.3.2.a-d and also hydrogeochemical/hydrogeological modeling as per IRMA Chapter 4.2, if relevant. (See Chapter 4.2, requirement 4.2.2.3.c).

		h. Internal and external inspection reports and audits, including, if applicable, an annual dam safety inspection report; i. Facility water balances (see 4.1.3.2.d); and j. Dam breach inundation (if applicable) and waste rock dump runout analyses. 4.1.3.4. Facility characterizations shall be updated periodically to inform waste management and reclamation decisions throughout the mine life cycle.[10] 4.1.3.5. Use of predictive tools and models for mine waste facility characterization shall be consistent with current industry best practice, and shall be continually revised and updated over the life of the mine as site characterization data and operational monitoring data are collected.	
REQUIREMENT 1.3: Where there is a potential for flow failure, conduct and regularly update an inundation study for the tailings facility using a methodology that considers credible hypothetical failure modes, site conditions, tailings facility conditions, hydraulic routing models of the slurry, and the amount of tailings and downstream materials entrained in the outflow. The results of the study should include estimates of the inundation area, flow arrival times, depth and velocities, duration of flooding, and depth of material deposition.		4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: . . . j. Dam breach inundation (if applicable) and waste rock dump runout analyses. 4.1.3.4. Facility characterizations shall be updated periodically to inform waste management and reclamation decisions throughout the mine life cycle.[11] 4.1.3.5. Use of predictive tools and models for mine waste facility characterization shall be consistent with current industry best practice, and shall be continually revised and updated over the life of the mine as site characterization data and operational monitoring data are collected. Explanatory Notes Re: 4.1.3.3.j, all high-consequence facilities will include a breach inundation and/or runout analysis and it should be applied to an Emergency Preparedness Plan (EPP) or Emergency Response Plan (ERP), addressed in IRMA Chapter 2.5. For example, an operating tailings storage facility (TSF) should include a breach inundation analysis,	**Comment on IRMA alignment:** The IRMA Standard does not have the level of detail included in the GTS requirement, however, some of this information is included in the references cited in our Explanatory Notes. **Recommendation for IRMA:** Consider adding more detail on expectations related to inundation studies in the requirement.

[10] See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.

[11] See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.

		and a closed TSF no longer containing water, or a waste rock pile considered to be high-consequence, should include a run-out analysis. A breach analysis should be performed consistent with applicable regulations or in the absence of regulations current best practice as identified by Bernedo (2013).[12]	
REQUIREMENT 1.4: Identify stakeholders and how they are related to the tailings facility site, inundation area and impacted area; collect land, livelihood and demographic data for groups most at risk from a tailings facility failure.		1.2.1.1. The operating company shall undertake identification and analysis of the range of groups and individuals, including community members, rights holders and others (hereafter collectively referred to as "stakeholders") who may be affected by or interested in the company's mining-related activities. 2.1.4.1. Baseline data describing the prevailing environmental, social, economic and political environment shall be collected at an appropriate level of detail to allow the assessment of the potential impacts of the proposed mining project.	**Comment on IRMA alignment:** While the IRMA Standard does not specifically mention stakeholders in relation to tailings facilities, given that these stakeholder face potential risks their identification would be expected to occur as per requirement 1.2.1.1. **Recommendation for IRMA:** While IRMA mentions the need to collect "social" baseline data, IRMA should consider adding into its requirements or guidance specific details such as: "collect land, livelihood and demographic data for groups most at risk".
PRINCIPLE 2: Integrate the social, economic, environmental and technical information to select the site and the technologies to minimize the risk of tailings facility failure			
REQUIREMENT 2.1: Undertake a formal, multi-criteria alternatives analysis of all feasible sites and		4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices.[13] The assessment shall:	**Comment on IRMA alignment:** The IRMA Standard does not specifically mention that the

[12] Bernedo, C. 2013. "Predictive Models and Available Software," Presentation at USSD Workshop on Dam Break Analysis Applied to Tailings Dams. https://docplayer.net/14116454-Ussd-workshop-on-dam-break-analysis-applied-to-tailings-dams.html

[13] Alternatives assessment is a process to identify and objectively and rigorously assess the potential impacts and benefits (including environmental, technical and socio-economic aspects) of different options so that an informed decision can be made.

For more on alternatives assessment see: Environment Canada. 2016. Guidelines for the Assessment of Alternatives for Mine Waste Disposal. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter-2.html; and Mining Association of Canada. 2017. Guide to the Management of Tailings Facilities, p. 46. http://mining.ca/sites/default/files/documents/MAC-Guide-to-the-Management-of-Tailings-Facilities-2017.pdf.

technologies for tailings management with the goal of minimizing risk to people and the environment.		a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle, including mine closure objectives and post-closure land and water uses; b. Identify possible alternatives for siting and managing mine wastes, avoiding a priori judgements about the alternatives; c. Carry out a screening or "fatal flaw" analysis to eliminate alternatives that fail to meet minimum specifications; d. Assess remaining alternatives using a rigorous, transparent decision-making tool, such as Multiple Accounts Analysis (MAA) or its equivalent, that takes into account environmental, technical, socio-economic and project economics considerations, inclusive of risk levels and hazard evaluations, associated with each alternative; e. Include a sensitivity analysis to reduce potential that biases will influence the selection of final site locations and waste management practices; and f. Be repeated, as necessary, throughout the mine life cycle (e.g., if there is a mine expansion or a lease extension that will affect mine waste management). 4.1.1.1. The operating company shall develop a policy for managing waste materials and mine waste facilities in a manner that eliminates, if practicable, and otherwise minimizes risks to human health, safety, the environment and communities.	objective of the assessment should have a goal of minimizing risk to people and the environment. However, we think that we meet the intent of this requirement, as that sentiment is captured in the objective of the IRMA Chapter: "To manage wastes and materials in a manner that minimizes their short- and long-term physical and chemical risks, and protects the health and safety of communities and future land and water uses." IRMA also requires that minimization of risks to people and the environment be part of the company's policy (see 4.1.1.1, to the left) related to mine waste management.
Use the knowledge base to inform this analysis and to develop facility designs, inundation studies, a monitoring program, Emergency Preparedness and Response Plans (EPRP), and closure and post-closure plans.		"Use the knowledge base to inform this analysis and to develop facility designs. . ." 4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices.[14] The assessment shall: a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle	**Recommendation to IRMA:** While the selection of "waste management practices" influences the facility design, IRMA could make it more explicit that assessment of alternatives is also meant to inform the design of the facility.

[14] Alternatives assessment is a process to identify and objectively and rigorously assess the potential impacts and benefits (including environmental, technical and socio-economic aspects) of different options so that an informed decision can be made.

For more on alternatives assessment see: Environment Canada. 2016. Guidelines for the Assessment of Alternatives for Mine Waste Disposal. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter-2.html; and Mining Association of Canada. 2017. Guide to the Management of Tailings Facilities, p. 46. http://mining.ca/sites/default/files/documents/MAC-Guide-to-the-Management-of-Tailings-Facilities-2017.pdf.

		"Use the knowledge base to inform this analysis and to develop . . . inundation studies" 4.1.3.5. Use of predictive tools and models for mine waste facility characterization shall be consistent with current industry best practice, and shall be continually revised and updated over the life of the mine as site characterization data and operational monitoring data are collected.	**Comment on IRMA alignment:** IRMA requires inundation analysis (4.1.3.3.j), but does not explicitly require that mines use the knowledge base gained from the alternatives assessment or other studies. However, we believe we meet the intent of this sub-requirement, as we require that site characterization and operational monitoring data are used to develop and update all models (4.1.3.5), which would include those used to predict inundation.
		"Use the knowledge base to inform this analysis and to develop . . . a monitoring program" 4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices.[15] The assessment shall: a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle. . . 4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: . . .	**Comment on IRMA alignment:** IRMA draws a connection between the need for the alternatives assessment to help identify design specification and performance objectives, and then for the OMS manual, which includes monitoring, to be aligned with these objectives.

[15] Alternatives assessment is a process to identify and objectively and rigorously assess the potential impacts and benefits (including environmental, technical and socio-economic aspects) of different options so that an informed decision can be made.

For more on alternatives assessment see: Environment Canada. 2016. Guidelines for the Assessment of Alternatives for Mine Waste Disposal. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter-2.html; and Mining Association of Canada. 2017. Guide to the Management of Tailings Facilities, p. 46. http://mining.ca/sites/default/files/documents/MAC-Guide-to-the-Management-of-Tailings-Facilities-2017.pdf.

		c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility;	
		"Use the knowledge base to inform this analysis and to develop . . . Emergency Preparedness and Response Plans (EPRP)" 4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: . . . j. Dam breach inundation (if applicable) and waste rock dump runout analyses. 4.1.7.2. Emergency preparedness and response plans or emergency action plans related to catastrophic failure of mine waste facilities shall be discussed and prepared in consultation with potentially affected communities and workers and/or workers' representatives, and in collaboration with first responders and relevant government agencies.[16] Explanatory Notes Re: 4.1.3.3.j, all high-consequence facilities will include a breach inundation and/or runout analysis and it should be applied to an Emergency Preparedness Plan (EPP) or Emergency Response Plan (ERP), addressed in IRMA Chapter 2.5. For example, an operating tailings storage facility (TSF) should include a breach inundation analysis, and a closed TSF no longer containing water, or a waste rock pile considered to be high-consequence, should include a run-out analysis. A breach analysis should be performed consistent with applicable regulations or in the absence of regulations current best practice as identified by Bernedo (2013).[17]	**Comment on IRMA alignment:** In the IRMA Standard EPRP draw on the knowledge base gained from stakeholders (4.1.7.2). Also, IRMA requires that breach inundation/runout analyses feed into the development of EPRP (see Explanatory Note for 4.1.3.3.j).

[16] See also IRMA Chapter 2.5—Emergency Preparedness and Response for related requirements.

[17] Bernedo, C. 2013. "Predictive Models and Available Software," Presentation at USSD Workshop on Dam Break Analysis Applied to Tailings Dams. https://docplayer.net/14116454-Ussd-workshop-on-dam-break-analysis-applied-to-tailings-dams.html

		"Use the knowledge base to inform this analysis and to develop . . . closure and post-closure plans." 4.1.3.4. Facility characterizations shall be updated periodically to inform waste management and reclamation decisions throughout the mine life cycle.[18] 4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices.[19] The assessment shall: a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle, including mine closure objectives and post-closure land and water uses;	
REQUIREMENT 2.2: Engage an Independent Tailings Review Board (ITRB) or an independent senior technical reviewer with no conflicts of interest to assess and review the alternatives analysis for site and technology selection.		4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[20] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[21] 4.1.6.3. Independent reviewers shall be objective, third-party, competent professionals. Explanatory Notes Note for 4.1.6.3: Independent reviews should be carried out by competent professionals and/or internationally recognized subject matter experts who are not employed at the mining project, are not directly involved with the design or operations of the facility, and do not have any other relevant conflict of interest.	**Comment on IRMA alignment:** IRMA Standard requires independent review all key documents and information related to the siting and design of tailings storage facilities. (See footnote for 4.1.6.1) The alternatives assessment would be considered a key documents to be reviewed. As per footnote for requirement 4.1.6.1 " Independent reviewers should not be directly involved

[18] See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.

[19] Alternatives assessment is a process to identify and objectively and rigorously assess the potential impacts and benefits (including environmental, technical and socio-economic aspects) of different options so that an informed decision can be made.

For more on alternatives assessment see: Environment Canada. 2016. Guidelines for the Assessment of Alternatives for Mine Waste Disposal. https://www.canada.ca/en/environment-climate-change/services/managing-pollution/publications/guidelines-alternatives-mine-waste-disposal/chapter-2.html; and Mining Association of Canada. 2017. Guide to the Management of Tailings Facilities, p. 46. http://mining.ca/sites/default/files/documents/MAC-Guide-to-the-Management-of-Tailings-Facilities-2017.pdf.

[20] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that could result in impacts on human health, safety, the environment, or the livelihoods of communities

[21] Independent reviewers should not be directly involved with the design or operations of the facility, but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

			with the design or operations of the facility." Also, these reviewers must be objective, third party professionals (4.1.6.3), and as described in the Explanatory Note " do not have any other relevant conflict of interest." **Recommendation to IRMA:** Consider using the term "conflict of interest" in the requirement, rather than in the Explanatory Note.
REQUIREMENT 2.3: Use the knowledge base to assess the social, economic and environmental impacts of the tailings facility and its potential failure.		2.1.4.1. Baseline data describing the prevailing environmental, social, economic and political environment shall be collected at an appropriate level of detail to allow the assessment of the potential impacts of the proposed mining project. 2.1.2.2. Prior to the implementation of the ESIA process the operating company shall prepare a report . . . The report shall provide: a. A general description of the proposed project, including details on the proposed location, and nature and duration of the project and related activities; b. The preliminary identification of potential significant environmental and social impacts, and proposed actions to mitigate any negative impacts; . . . 2.1.3.1. The operating company shall carry out a scoping process to identify all potentially significant social and environmental impacts of the mining project to be assessed in the ESIA.[22] 2.1.3.3. Scoping shall include the consideration of: a. Social impacts (including potential impacts on communities and workers) and environmental impacts (including potential impacts on wildlife, air, water, vegetation and soils) during all stages of the project life cycle, from pre-construction through post-closure;[23]	**Comment on IRMA alignment:** The IRMA Standard does not require assessment of economic impacts related to tailings facility failure. And although the IRMA Standard does not explicitly require an assessment of social and environmental impacts of tailings facilities in the ESIA, any assessments carried out in relation to waste management (e.g., 4.1.3.1, 4.1.4.1) would be expected to be informed by the knowledge base amassed during the ESIA. **Recommendation to IRMA:** Consider requiring an assessment of potential

[22] Scoping refers to the early, open and interactive process of determining the major issues and impacts that will be important in decision-making on the proposal, and need to be addressed in an ESIA.

[23] See the Notes section at the end of the chapter for a more detailed list of the types of issues that should be included in the scoping process.

		b. Direct, indirect and cumulative impacts; and c. Potential impacts of extreme events. 4.1.3.1. The operating company shall identify all existing and/or proposed mine waste facilities that have the potential to be associated with waste discharges or incidents, including catastrophic failures, that could lead to impacts on human health, safety, the environment or communities. 4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes: a. Identification of potential chemical risks (see 4.1.3.2) and physical risks (see 4.1.3.3) during the project conception and planning phase of the mine life cycle; b. A rigorous risk assessment to evaluate the potential impacts of mine waste facilities on health, safety, environment and communities early in the life cycle; c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c).	economic impacts of a tailings facility failure.
Develop impact mitigation and management plans,		2.1.7.1. The operating company shall develop and maintain a system to manage environmental and social risks and impacts throughout the life of the mine. 2.1.7.2. An environmental and social management plan (or its equivalent) shall be developed that, at minimum: a. Outlines the specific mitigation actions that will be carried out to address significant environmental and social impacts identified during and subsequent to the ESIA process; b. Assigns personnel responsible for implementation of various elements of the plan; and c. Includes estimates for the resources needed to implement the plan.	**Comment on IRMA alignment:** The IRMA Standard generally requires mitigation and management plans for all potential significant risks and impacts related to the mining operation, including those related to tailings facilities (2.1.7.1, 2.1.7.2). For tailings and other waste management facilities the mitigation strategies must be developed (4.1.5.1, 4.1.5.2, 4.1.6.3, 4.1.5.4) are outlined in the Operations, Surveillance and Maintenance Manual (4.1.5.5).

		4.1.5.1. Mine waste facility design and mitigation of identified risks shall be consistent with best available technologies (BAT) and best available/applicable practices (BAP).[24] 4.1.5.2. Mitigation of chemical risks related to mine waste facilities shall align with the mitigation hierarchy as follows: a. Priority shall be given to source control measures to prevent generation of contaminants; b. Where source control measures are not practicable or effective, migration control measures shall be implemented to prevent or minimize the movement of contaminants to where they can cause harm; and c. If necessary, MIW shall be captured and treated to remove contaminants before water is returned to the environment or used for other purposes. 4.1.5.3. For high-consequence-rated mine waste facilities, a critical controls framework shall be developed that aligns with a generally accepted industry framework, such as, for example, the process outlined in Mining Association of Canada's Tailings Management Guide.[25] 4.1.5.4. Mine waste management strategies shall be developed in an interdisciplinary and interdepartmental manner and be informed by site-specific characteristics, modeling and other relevant information. 4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes:	

[24] There are several reference documents that contain useful information on best available technologies (BAT) including, for example: European Commission. 2009. Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining activities. http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf; and MEND Secretariat. 2017. Study of Tailings Management Technologies. Mine Environment Neutral Drainage (MEND) Project Report 2.50.1. Prepared by Klohn Crippen Berger. http://mend-nedem.org/wp-content/uploads/2.50.1Tailings_Management_TechnologiesL.pdf

Best industry design criteria have been used for tailings dams and other structures that may be subject to catastrophic failures, and the criteria have been designed to prevent catastrophic events during operations and post-closure. Examples of industry accepted quality guidelines include: Australian National Committee on Large Dams (ANCOLD), which has information at: www.ancold.org.au; and the Canadian Dam Association's Dam Safety Guidelines (2007) and Application of Dam Safety Guidelines to Mining Dams (2014). Both publications are available at: www.imis100ca1.ca/cda/Main/Publications/Dam_Safety/CDA/Publications_Pages/Dam_Safety.aspx?hkey=52124537-9256-4c4b-93b2-bd971ed7f425

[25] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). Section 4.4.3. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

		a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues and process waters, including the recycling of process waters;[26] b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices; c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility; d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost.	
and meaningfully engage potentially affected communities in the process.		2.1.9.2. The operating company shall encourage and facilitate stakeholder participation, where possible, in the collection of data for the ESIA, and in the development of options to mitigate the potential impacts of the project during and subsequent to the ESIA process.[27] 4.1.7.1. Stakeholders shall be consulted during the screening and assessment of mine waste facility siting and management alternatives (see 4.1.4.2), and prior to the finalization of the design of the facilities. 1.2.2.2. The operating company shall foster two-way dialogue and meaningful engagement with stakeholders by:[28]	**Comment on IRMA alignment** The IRMA Standard does not specifically mention including stakeholders in development of mitigation strategies for tailings impoundments, but the Standard does require that stakeholders be consulted in development of social and environmental mitigation

[26] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

[27] Facilitation of participation may include, e.g., provision of information and explanations in local languages, using materials and approaches designed to be accessible to local communities, and providing capacity building or training on methods. See also Chapter 2.8, Criteria 2.8.3.

[28] "Meaningful engagement" includes a two-way exchange of information between the company and stakeholders, with stakeholders' views being taken into account in decision-making; engagement is conducted in good faith (i.e., the company genuinely intends to understand how stakeholder interests are affected by their actions and address adverse impacts, and stakeholders honestly represent their interests, intentions and concerns); and companies are responsive to stakeholder input and follow through on commitments." (Source: OECD. 2017. *OECD Due Diligence Guidance for Meaningful*

		a. Providing relevant information to stakeholders in a timely manner; b. Including participation by site management and subject-matter experts when addressing concerns of significance to stakeholders; c. Engaging in a manner that is respectful, and free from manipulation, interference, coercion or intimidation; d. Soliciting feedback from stakeholders on issues relevant to them; and e. Providing stakeholders with feedback on how the company has taken their input into account.	strategies more generally in the ESIA Chapter (2.1.9.2), and also that stakeholders be consulted in the assessment of management alternatives for tailings and other mine waste facilities (4.1.7.1).
REQUIREMENT 2.4: Update the assessment of the social, economic and environmental impact best practices,		4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes: . . . c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c). 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.5.5); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.5.3); c. Inform updates to the risk management process (see 4.1.4.1.c) and the OMS manual (see 4.1.5.7); and d. Inform the management review to facilitate continual improvement (see 4.1.5.8).	**Comment on IRMA alignment** The IRMA Standard does include a requirement to update the assessment of risks associated with mine waste facilities. As with requirement 2.3 above, there is only partial alignment because IRMA does not require an assessment of the economic impacts. **Recommendation to IRMA:** Consider requiring an assessment of potential economic impacts of a tailings facility failure, and that this assessment be updated.
and update stakeholder identification and information for any material change to the tailings facility, the social or		1.2.1.2. A stakeholder engagement plan scaled to the mining project's risks and impacts and stage of development shall be developed, implemented and updated as necessary.	**Comment on IRMA alignment** Although IRMA requirement 1.2.1.2 doesn't explicitly require updating of identification of

Stakeholder Engagement in the Extractive Sector. p. 18. Available at: http://www.oecd.org/publications/oecd-due-diligence-guidance-for-meaningful-stakeholder-engagement-in-the-extractive-sector-9789264252462-en.htm)

environmental context or conditions.		Explanatory Notes Note for 1.2.1.2:. . . Re: engagement plans being updated "as necessary." It is important to understand that stakeholders' interests can change or realign as their relationships with the project progress. As a result, stakeholder engagement plans should change over time to reflect this, as well as reflect engagement with new stakeholders over time. At minimum, this should occur when there are major changes to the scope of the mining project (e.g., expansions, proposed resettlement projects, addition of new facilities, major changes in security arrangements, etc.) or the operating environment (e.g., changes in political stability, demographic changes the community, arrival or increase of artisanal mining in the region, etc.).	stakeholders, this is covered in IRMA Guidance/Explanatory Notes. **Recommendation to IRMA:** add "any material change to the tailings facility" as example of a major change to the scope of the mining project in Explanatory Notes.
If new data indicates that the impacts from the tailings facility differ from those assumed in the original assessments, the management of the facility shall be adjusted to reflect the new data using adaptive management		2.1.7.3. The environmental and social management plan shall be implemented, and revised or updated as necessary based on monitoring results or other information. 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.5.5); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.5.3); c. Inform updates to the risk management process (see 4.1.4.1.c) and the OMS manual (see 4.1.5.7); and d. Inform the management review to facilitate continual improvement (see 4.1.5.8). 4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety and prevents or otherwise minimizes harm to the environment and communities.	**Comment on IRMA alignment** There are several IRMA requirements that reflect the adaptive management approach (i.e., continuous updating of management strategies and actions based on information such as operational data and monitoring results, etc.).
REQUIREMENT 2.5: The amount of financial assurance shall be reviewed periodically and updated based on estimated closure and post-closure costs.	✓	2.6.2.3. The reclamation and closure plan shall include a detailed determination of the estimated costs of reclamation and closure, and post-closure, based on the assumption that reclamation and closure will be completed by a third party, using costs associated with the reclamation and closure plan as implemented by a regulatory agency. These costs shall include, at minimum:	**Comment on IRMA alignment** IRMA's financial assurance requirements meet Requirement 2.5.

		a. Mobilization/demobilization; b. Engineering redesign, procurement, and construction management; c. Earthwork; d. Revegetation/Ecological Restoration; e. Disposal of hazardous materials; f. Facility demolition and disposal; g. Holding costs that would be incurred by a regulatory agency if the operating company were to declare bankruptcy. These costs shall be calculated based on the assumption that there would be a two-year period before final reclamation activities would begin, and shall include costs related to: i. Interim process water and site management; and ii. Short-term water treatment; h. Post-closure costs for: i. Long-term water treatment; and ii. Long-term monitoring and maintenance; i. Indirect Costs: i. Mobilization/demobilization; ii. Engineering redesign, procurement and construction management; iii. Contractor overhead and profit; iv. Agency administration; and v. Contingency; and j. Either: i. A multi-year inflation increase in the financial surety; or ii. An annual review and update of the financial surety. 2.6.2.4. The operating company shall review and update the reclamation and closure plan and/or financial assurance when there is a significant change to the mine plan, but at least every 5 years,[29] and at the request of stakeholders provide them with an interim reclamation progress report.	IRMA exceeds by providing additional requirements for the costs that should be included when estimating closure and post-closure costs.

[29] ICMM. 2008. Planning for Integrated Closure: Toolkit. p. 37. Available at: https://www.icmm.com/website/publications/pdfs/mine-closure/310.pdf

REQUIREMENT 2.6: Taking into account actions to mitigate risks, the Operator will consider obtaining appropriate insurance to the extent commercially reasonable or providing other forms of financial assurance if appropriate to address risks relating to the construction, operation, maintenance, and/or closure of a tailings facility.	✓	2.5.3.1. All operations related to the mining project shall be covered by a public liability accident insurance policy that provides financial insurance for unplanned accidental events. 2.5.3.2. The public liability accident insurance shall cover unplanned accidental events such as flood damage, landslides, subsidence, mine waste facility failures, major spills of process solutions, leaking tanks, and other potential accidents. 2.6.7.1. The operating company shall provide sufficient financial surety for all long-term activities, including post-closure site monitoring, maintenance, and water treatment operations. Financial assurance shall guarantee that funds will be available, irrespective of the operating company's finances at the time of mine closure or bankruptcy.	**Comment on IRMA alignment** IRMA exceeds GTS requirements here. Instead of simply "considering obtaining…" we require that companies have accident insurance for tailings facility failures and other unplanned accidental events. Also, one of the IRMA financial security requirements (2.6.7.1) would include, for example, long-term monitoring and maintenance of tailings facilities, especially those deemed to present a risk to public health, safety or the environment.
TOPIC II: AFFECTED COMMUNITIES			
PRINCIPLE 3: Respect the rights of project-affected people and meaningfully engage them at all stages of the tailings facility lifecycle			
REQUIREMENT 3.1: Demonstrate respect for human rights by conducting human rights due diligence to understand how a tailings facility failure may cause or contribute to adverse human rights impacts, including impacts on the individual and collective rights of indigenous peoples and tribal peoples.	✓	1.3.2.1. The operating company shall establish an ongoing process to identify and assess potential human rights impacts (hereafter referred to as human rights "risks") and actual human rights impacts from mining project activities and business relationships. Assessment of human rights risks and impacts shall be updated periodically, including, at minimum, when there are significant changes in the mining project, business relationships, or in the operating environment. 1.3.2.2. Assessments, which may be scaled to the size of the company and severity of human rights risks and impacts, shall: a. Follow a credible process/methodology;[30] b. Be carried out by competent professionals; and	**Comment on IRMA alignment:** IRMA requires that mines understand how their activities may cause or contribute to human rights impacts (1.3.2.1, 1.3.2.2, 1.3.2.3). IRMA doesn't specifically mention human rights risks related to tailings impoundments, but any credible assessment would identify tailings impoundments as a potential source of impacts on human rights.

[30] A "credible" assessment process/methodology would typically include: scoping or identification of the salient human rights, stakeholder consultations; data collection; assessment of the severity of human rights risks and impacts; development of prevention/mitigation measures; and monitoring and evaluation of the effectiveness of implemented measures. This process should be ongoing/updated, as mentioned in 1.3.2.1. For more information see: https://www.humanrights.dk/projects/human-rights-impact-assessment

		c. Draw on internal and/or external human rights expertise, and consultations with potentially affected rights holders, including men, women, children (or their representatives) and other vulnerable groups, and other relevant stakeholders. 1.3.2.3. As part of its assessment, the operating company shall document, at minimum: a. The assessment methodology; b. The current human rights context in the country and mining project area; c. Relevant human rights laws and norms; d. A comprehensive list of the human rights risks related to mining project activities and business relationships, and an evaluation of the potential severity of impacts for each identified human rights risk; e. The identification of rights holders, an analysis of the potential differential risks to and impacts on rights holder groups (e.g., women, men, children, the elderly, persons with disabilities, indigenous peoples, ethnic or religious minority groups, and other disadvantaged or vulnerable groups), and a disaggregation of results by rights holder group; f. Recommendations for preventing, mitigating and remediating identified risks and impacts, giving priority to the most salient human rights issues. Explanatory Notes Note for 1.3.2.2: "Potentially affected rights holders" include affected community members as described in 1.3.2.2.c, as well as workers, and indigenous peoples and others whose rights may be affected by the mining project.	IRMA exceeds Requirement 3.1 by elaborating on the other steps involved in Human Rights Due Diligence, which is more than identification of issues of concern. We devote an entire chapter to the subject (Chapter 1.3).
REQUIREMENT 3.2: Meaningfully engage project-affected people (PAP) throughout the tailings facility lifecycle regarding the matters that affect them.	✓	4.1.7.1. Stakeholders shall be consulted during the screening and assessment of mine waste facility siting and management alternatives (see 4.1.4.2), and prior to the finalization of the design of the facilities. 4.1.7.2. Emergency preparedness and response plans or emergency action plans related to catastrophic failure of mine waste facilities shall be discussed and prepared in consultation with potentially affected communities and workers and/or workers' representatives, and in collaboration with first responders and relevant government agencies.[31]	**Comment on IRMA alignment:** IRMA fully aligns with this, and goes further in that stakeholders are involved in designing engagement processes so that they are accessible, inclusive and culturally appropriate, and that barriers to engagement are

[31] See also IRMA Chapter 2.5—Emergency Preparedness and Response for related requirements.

		4.1.7.3. Emergency and evacuation drills (desktop and live) related to catastrophic failure of mine waste facilities shall be held on a regular basis.[32] 4.1.7.4. If requested by stakeholders, the operating company shall report to stakeholders on mine waste facility management actions, monitoring and surveillance results, independent reviews and the effectiveness of management strategies. 1.2.1.3. The operating company shall consult with stakeholders to design engagement processes that are accessible, inclusive and culturally appropriate,[33] and shall demonstrate that continuous efforts are taken to understand and remove barriers to engagement for affected stakeholders (especially women, marginalized and vulnerable groups). 1.2.2.1. Stakeholder engagement shall begin prior to or during mine planning, and be ongoing, throughout the life of the mine. 1.2.2.2. The operating company shall foster two-way dialogue and meaningful engagement with stakeholders by:[34] a. Providing relevant information to stakeholders in a timely manner; b. Including participation by site management and subject-matter experts when addressing concerns of significance to stakeholders; c. Engaging in a manner that is respectful, and free from manipulation, interference, coercion or intimidation; d. Soliciting feedback from stakeholders on issues relevant to them; and	identified and addressed (1.2.1.3).

[32] Ibid.

[33] See definitions of inclusive and accessible.

"Culturally appropriate" engagement processes (e.g., communications, interactions and conveyance of information) would be those that are aligned with the cultural norms and communication styles of the affected communities and stakeholders. Companies would be expected to use methods, languages, terminology and formats that are respectful of cultural differences (e.g., in some cultures, it is disrespectful to look directly into a person's eyes), and can be easily understood by the affected communities and stakeholders. As per requirement 2.8.1.3, stakeholders can help to define for the company what is considered culturally appropriate.

[34] "Meaningful engagement" includes a two-way exchange of information between the company and stakeholders, with stakeholders' views being taken into account in decision-making; engagement is conducted in good faith (i.e., the company genuinely intends to understand how stakeholder interests are affected by their actions and address adverse impacts, and stakeholders honestly represent their interests, intentions and concerns); and companies are responsive to stakeholder input and follow through on commitments." (Source: OECD. 2017. *OECD Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector.* p. 18. Available at: http://www.oecd.org/publications/oecd-due-diligence-guidance-for-meaningful-stakeholder-engagement-in-the-extractive-sector-9789264252462-en.htm)

		e. Providing stakeholders with feedback on how the company has taken their input into account.	
REQUIREMENT 3.3: Where the risks of a potential tailings facility failure could result in loss of life or sudden physical and/or economic displacement of people, the Operator shall consider in good faith additional measures to minimize those risks or implement resettlement following international standards. The Operator shall communicate these decisions to those affected.	✓	Requirement 3.3 directly relates to risks to human rights (potential loss of life; loss of food, housing, personal security, etc.). IRMA's Chapter 1.3 on Human Rights Due Diligence requires that: 1.3.3.2. Responding to human rights risks related to the mining project: a. If the operating company determines that it is at risk of causing adverse human rights impacts through its mining-related activities, it shall prioritize preventing impacts from occurring, and if this is not possible, design strategies to mitigate the human rights risks. Mitigation plans shall be developed in consultation with potentially affected rights holder(s). . . 2.4.2.1. The operating company shall disclose relevant information and consult with potentially affected people and communities, including host communities, during: a. The assessment of displacement and resettlement risks and impacts, including the consideration of alternative mining project designs to avoid or minimize resettlement; b. The development of resettlement and livelihood options; and c. The development, implementation, monitoring and evaluation of a Resettlement Action Plan (RAP) and/or Livelihood Restoration Plan (LRP). 2.4.2.2. The operating company shall facilitate access, if desired by potentially affected people and communities, including host communities, to independent legal or other expert advice from the earliest stages of project design and assessment, through monitoring and evaluation of the resettlement process.[35]	**Comment on IRMA alignment:** IRMA exceeds this requirement. In the IRMA Standard, avoiding impacts on human rights, including those related to resettlement, is the first priority, but if resettlement must occur (e.g., there is imminent danger of a tailings facility failure) IRMA requires consultation with the potentially affected people (as per 2.4.2.1), and affected persons should have access to independent legal advice during the process (2.4.2.2). The GTS Standard simply requires that its decision be communicated to affected persons. Also, IRMA requires that measures to mitigate potential human rights impacts are developed in consultation with the potentially affected rights holders (as per 1.3.3.2).
REQUIREMENT 3.4: Establish an effective operational-level, non-judicial grievance mechanism that addresses the concerns, complaints and grievances of	✓	1.4.1.1. The operating company shall ensure that stakeholders, including affected community members and rights holders (hereafter referred to collectively as "stakeholders") have access to an operational-level mechanism that allows them to raise and seek resolution or remedy for the range of	**Comment on IRMA alignment:** IRMA exceeds this. IRMA has an entire chapter devoted to Complaints, Grievances and Access to Remedy (Chapter 1.4). It provides greater detail on

[35] This may involve providing funding to enable affected people to select and consult with experts; work with government agencies and/or non-governmental organizations to provide free legal and other services to affected people; or other means.

project-affected people that relate to the tailings facility.		complaints and grievances that may occur in relation to the company and its mining-related activities.[36] 1.4.2.1. The operating company shall consult with stakeholders on the design of culturally appropriate complaints and grievance procedures that address, at minimum: a. The effectiveness criteria outlined in Principle 31 of the United Nations *Guiding Principles on Business and Human Rights*,[37] which include the need for the mechanism to be: (a) Legitimate, (b) Accessible, (c) Predictable, (d) Equitable, (e) Transparent, (f) Rights-compatible, (g) A source of continuous learning, and (h) Based on engagement and dialogue; . . .	what it means for an operational-level grievance mechanism to be effective, and how an effective mechanism is developed.
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			
REQUIREMENT 4.1: Presume the consequence of failure classification of all new tailings facilities as being 'Extreme' (see Annex 2, Table 1: Consequence Classification Matrix) and design, construct, operate and manage the facility accordingly. This presumption can be rebutted if the following three conditions are met:		4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: . . . c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment;. . .	**Comment on IRMA alignment:** IRMA requires that tailings and other waste facilities be classified according to risk level or consequence of failure, but we do not specify a particular classification matrix. Also, IRMA does not require that operators start with a presumption that consequences are extreme. We understand the rationale for assessing consequence

[36] Grievance mechanisms are explicitly stated as requirements with regard to workers (Chapter 3.1), human rights (Chapter 1.3), mine security (Chapter 3.5), stakeholder engagement (Chapter 1.2) and resettlement (Chapter 2.4). However, even when not explicitly stated in a chapter, it is expected that access to the operational-level grievance mechanism and other remedies will be provided throughout the project's life to grievances related to any issues of stakeholder concern with the mining project.

It is possible that one grievance mechanism may be suitable to address all types of grievances raised in relation to the mining project, including workers, although typically labor grievances are dealt with through a separate mechanism established through collective bargaining agreements or human resources policies. The development of workers' grievance mechanism is addressed in Chapter 3.1.

It is also possible that more than one mechanism or approach to addressing complaints and grievances may be deemed necessary to meet the needs of affected communities and stakeholders. If a company decides to create multiple grievance mechanisms, all of them shall meet the requirements of this chapter.

[37] The *Guiding Principles on Business and Human Rights* have identified that access to remedy for grievances is fundamental to ensuring respect and protection of human rights. (Ruggie, J. 2011. Guiding Principles on Business and Human Rights. A/HRC/17/31. Available at: www.ohchr.org/Documents/Issues/Business/A-HRC-17-31_AEV.pdf)

a) The knowledge base demonstrates that a lower classification can be applied for the near future, including no potential for impactful flow failures; and b) A design of the upgrade of the facility to meet the requirements of an 'Extreme' consequence of failure classification in the future, if required, is prepared and the upgrade is demonstrated to be feasible; and c) The consequence of failure classification is reviewed every 3 years, or sooner if there is a material change in any of the categories in the Consequence Classification Matrix, and the tailings facility is upgraded to the new classification within 3 years. This review should proceed until the facility has been safely closed and achieved a confirmed 'landform' status or similar permanent non-credible flow failure state.			classification independent from risk level, and also putting the onus on the operator to prove that consequences are not extreme. **Recommendation to IRMA:** Consider adopting GTS's approach and Table 1 in Annex 2. Review 4.1.a, b and c to determine if all IRMA stakeholders are in agreement with the three sub-requirements.
REQUIREMENT 4.2: The decision to rebut the requirement to design for 'Extreme' Consequence Classification, shall be taken by the Accountable Executive or the Board of Directors (the 'Board'),			**Comment on IRMA alignment:** Although IRMA requires failure classification, IRMA does not have the requirements relating to an Accountable Executive or Board deciding whether or not to rebut the requirement to

			design for Extreme Consequence Classification. **Recommendation to IRMA:** Consider adopting this requirement.
with input from an independent senior technical reviewer or the ITRB. The Accountable Executive or Board shall give written reasons for their decision.		4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[38] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[39] 4.1.6.4. Independent review bodies shall report to the operation's general manager and an accountable executive officer of the operating company or its corporate owner. 4.1.6.5. The operating company shall develop and implement an action plan in response to commentary, advice or recommendations from an independent review, document a rationale for any advice or recommendations that will not be implemented, and track progress of the plan's implementation. All of this information shall be made available to IRMA auditors.[40]	**Comment on IRMA alignment:** Currently we don't specifically mention that independent review is required of facility "consequence classification". However, the requirement that the Accountable Exec or Board give written reasons for decision is aligned with IRMA's requirements regarding how independent review information must be considered and any deviations from IR recommendations documented. So if IRMA does decide to adopt GTS Standard requirements 4.1 and 4.2, they process would align well with other IRMA requirements. **Recommendation to IRMA:** Consider adopting this requirement.

[38] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that could result in impacts on human health, safety, the environment, or the livelihoods of communities

[39] Independent reviewers should not be directly involved with the design or operations of the facility, but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

[40] Non-disclosure agreements will be signed by IRMA auditors, but even so, confidential business information may be withheld as long as the company provides to auditors a description of the confidential information or materials that are being withheld and an explanation of the reasons for classifying the information as confidential; and if a part of a document is confidential, only that confidential part shall be redacted, allowing for the release of non-confidential information. (See IRMA Chapter 1.1, requirement 1.1.6.4)

REQUIREMENT 4.3: Existing facilities shall comply with Requirements 4.1 and 4.2. 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, shall approve the implementation of measures to reduce the risks of a potential failure to the greatest extent possible.			**Comment on IRMA alignment:** Currently we don't include this requirement. **Recommendation to IRMA:** Consider adopting this requirement based on the outcome of discussions on 4.1 and 4.2.
PRINCIPLE 5: Develop a robust design that integrates the knowledge base and minimizes the risk of failure for all stages of the tailings facility lifecycle			
REQUIREMENT 5.1: Consider implementation of alternative options, including but not limited to in-pit disposal and underground tailings placement, and application of the technologies selected according to Requirement 2.1, to minimize the amount of tailings and water placed in external tailings facilities.		2.6.3.1. Open pits shall be partially or completely backfilled if: a. A pit lake is predicted to exceed the water quality criteria in IRMA Chapter 4.2;[41] b. The company and key stakeholders have agreed that backfilling would have socioeconomic and environmental benefits; and c. It is economically viable. 2.6.3.2. Underground mines shall be backfilled if: a. Subsidence is predicted on lands not owned by the mining company; and b. If the mining method allows. 4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices. The assessment shall: a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle, including mine closure objectives and post-closure land and water uses;	**Comment on IRMA alignment:** We do require that mines consider the option of backfilling pits and voids (2.6.3.1, 2.5.3.2). And in the Explanatory Notes for 4.1.4.2.b we mention that efforts to reduce and remove water from containment within tailings facilities should be made. **Recommendation to IRMA:** Consider adding guidance that more explicitly discusses backfilling pits and voids with tailings, and the rationale for why this could/should be considered.

[41] See Chapter 4.2, requirement 4.2.2.2 and 4.2.2.3 for prediction of water quality, and requirement 4.2.3.3 for requirements related to maintaining water quality at baseline/background or at levels protective of current and future end uses of water.

		b. Identify possible alternatives for siting and managing mine wastes, avoiding a priori judgements about the alternatives; c. Carry out a screening or "fatal flaw" analysis to eliminate alternatives that fail to meet minimum specifications; d. Assess remaining alternatives using a rigorous, transparent decision-making tool such as Multiple Accounts Analysis (MAA) or its equivalent, which takes into account environmental, technical, socio-economic and project economics considerations, inclusive of risk levels and hazard evaluations, associated with each alternative; e. Include a sensitivity analysis to reduce potential that biases will influence the selection of final site locations and waste management practices; and f. Be repeated, as necessary, throughout the mine life cycle (e.g., if there is a mine expansion or a lease extension that will affect mine waste management). Explanatory Notes: Re: 4.1.4.2.b, alternatives assessments should identify all possible (i.e., reasonable, conceivable, and realistic) mine waste facility locations, disposal technologies, waste storage options and disposal locations. . . The government of British Columbia, in the wake of the Mt. Polley tailings dam failure, developed the following guidance (Government of BC, 2016, pp. 12, 13), which IRMA strongly recommends companies utilize when assessing options for mine waste management in order to protect human health, safety and the environment: • Physical stability is of paramount importance, and options that require a compromise to physical stability should be discarded, • Facilities should be chemically and biologically stable, or be designed to mitigate transport of contaminants into the receiving environment, • Footprint areas of the facility should be minimized, • In-pit or underground backfill should be maximized, • Impacts to receiving environments should be minimized, • Post-closure land use objectives should be defined, including ecosystems support and productive uses for future generations where possible, • All available technologies should be considered, • Efforts to reduce and remove water from containment within tailings facilities should be made, • Alternatives to water covers should be considered in planning stages.	

REQUIREMENT 5.2: Develop and implement water balance and water management plans for the tailings facility, taking into account the knowledge base, upstream and downstream hydrological basins, the overall mine site, mine planning and operations and the integrity of the tailings facility for all stages of its lifecycle.		4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: . . . i. Facility water balances (See also 4.1.3.2.d); and . . . 4.1.3.4. Facility characterizations shall be updated periodically to inform waste management and reclamation decisions throughout the mine life cycle.[42] 4.2.2.3. Where potential significant impacts on water quantity or quality, or current and future water uses have been identified, the operating company shall carry out the following additional analyses to further predict and quantify the potential impacts: a. Development of a conceptual site model (CSM) to estimate the potential for mine-related contamination to affect water resources; b. Development of a numeric mine site water balance model to predict impacts that might occur at different surface water flow/groundwater level conditions (e.g., low, average and high flows/levels); c. If relevant, development of other numerical models (e.g., hydrogeochemical/hydrogeological) to further predict or quantify potential mining-related impacts on water resources; and d. Prediction of whether water treatment will be required to mitigate impacts on water quality during operations and mine closure/post-closure. 4.2.2.4. Use of predictive tools and models shall be consistent with current industry best practices, and shall be continually revised and updated over the life of the mine as operational monitoring and other relevant data are collected. 4.2.4.4. The operating company shall develop and implement an adaptive management plan for water that: a. Outlines planned actions to mitigate predicted impacts on current and future uses of water and natural resources from changes in surface water and groundwater quality and quantity related to the mining project; and b. Specifies adaptive management actions that will occur if certain outcomes (e.g., specific impacts), indicators, thresholds or trigger levels are reached, and timelines for their completion.	**Comment on IRMA alignment:** IRMA requires a water management plan, which includes mitigation actions related to any predicted impacts on water, and would include potential impacts to water from a tailings facility (4.2.4.4). Both the waste chapter (4.1.3.3) and IRMA's water chapter (4.2.2.3) have requirements related to water balance, including requiring updates (4.1.3.4, 4.2.2.4).

[42] See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.

		4.2.4.5. Annually or more frequently if necessary (e.g., due to changes in operational or environmental factors), the operating company shall review and evaluate the effectiveness of adaptive management actions, and, as necessary, revise the plan to improve water management outcomes. Explanatory Notes: Re: 4.1.3.3.i, facility water balances should indicate critical indicators such as allowable pool volume and level and take into account appropriate probable maximum flood criteria. Note for 4.1.3.4: Initial facility characterizations are based on qualitative and quantitative data that have been collected by the operating company. When new physical, hydrological or geochemical data are collected, or facility monitoring provides information that suggests that previous assumptions / characterizations are no longer valid, or there are changes in the mining project that affect mine waste facilities (e.g., there are changes in waste management practices, changes to materials being disposed, changes in site water management that may affect facility water balance, etc.) the operating company should update the facility's physical, hydrological or geochemical characterizations. Updates to facility characterization information should feed into updates to operating plans and/or reclamation plans or reports. Note for 4.2.2.3: Re: 4.2.2.3.a, a Conceptual Site Model (CSM) is a qualitative description, based on site measurements and observations, of what is known about the sources, release, transport and fate of contaminants at a site. A CSM should include a schematic or diagram and an accompanying narrative description. Re: 4.2.2.3.b, a mine site water balance is an accounting of the inflow to, outflow from, and storage changes of water in a hydrologic unit over a fixed period. Assigning values to these elements helps identify the water surplus or deficit at the site over time. Water balance models should be run for high, average and low surface water flow and groundwater level conditions using baseline/background data or historical data as the basis. It is strongly recommended that water balance calculations incorporate climate change scenarios based on data from regional (or local, if available) climate change models, assuming that such models are based on rigorous scientific methods and reliable data. According to Golder Associates, “the assessment of the impact of	

		climate changes on water quality and quantity involves running the water and mass balance model with scenarios of predicted future air temperature and precipitation. An assessment of climate change impacts may also be incorporated in the water and mass balance uncertainty analysis."[43] Note for 4.2.4.5: A company's evaluation of the effectiveness of its adaptive management plan actions is likely to involve a review of monitoring data, a review of whether any trigger levels/thresholds/outcomes have been reached, a review of changes to site water balance or other operational changes that may influence the effectiveness of mitigation strategies, and review of other relevant information, including feedback from stakeholders or monitoring data from regulatory agencies. If monitoring and/or other information (e.g., updated site mine water balance, updated numerical models) reveals that actions are not being effective (e.g., water quality is degrading or likely to degrade, or impacts to water uses or aquatic ecosystems have occurred), revisions to the AMP should occur and be implemented.	
REQUIREMENT 5.3: Develop a robust design that considers the social, economic and environmental context, the tailings facility Consequence Classification, site conditions, water management, mine plant operations, tailings operational issues, and the construction, operation and closure of the tailings facility.		4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes: a. Identification of potential chemical risks (see 4.1.3.2 f) and physical risks (see 4.1.3.3) during the project conception and planning phase of the mine life cycle; b. A rigorous risk assessment to evaluate the potential impacts of mine waste facilities on health, safety, environment and communities early in the life cycle; c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c). 4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices. The assessment shall: a. Identify minimum specifications and performance objectives for facility performance throughout the mine life cycle, including mine closure objectives and post-closure land and water uses;	**Comment on IRMA alignment:** IRMA does not specifically mention design of the tailings facility in requirements 4.1.4.1 and 4.1.4.2, but both of these assessments feed into the choice of waste management methods, which influences design of waste management facilities (see, e.g., Explanatory Note for 4.1.4.2.d). The risk assessment required in 4.1.4.1 and the alternatives assessment are both required to be rigorous tools that take into consideration the social, economic and environmental context (see 4.1.4.2 d), and

[43] Golder Associates. 2011. Guidance Document on Water and Mass Balance Models for the Mining Industry. (Report prepared for the Yukon Government). p. 30. http://www.env.gov.yk.ca/publications-maps/documents/mine_water_balance.pdf

		b. Identify possible alternatives for siting and managing mine wastes, avoiding a priori judgements about the alternatives; c. Carry out a screening or "fatal flaw" analysis to eliminate alternatives that fail to meet minimum specifications; d. Assess remaining alternatives using a rigorous, transparent decision-making tool such as Multiple Accounts Analysis (MAA) or its equivalent, which takes into account environmental, technical, socio-economic and project economics considerations, inclusive of risk levels and hazard evaluations, associated with each alternative; e. Include a sensitivity analysis to reduce potential that biases will influence the selection of final site locations and waste management practices; and f. Be repeated, as necessary, throughout the mine life cycle (e.g., if there is a mine expansion or a lease extension that will affect mine waste management). Explanatory Notes: Re: 4.1.4.2.d, Multiple accounts analysis (MAA) is a tool that is used to support decision-making related to the tailings planning and design process. For more information on Multiple Accounts Analysis, see MAC Tailings Guide, 2017, Appendix 3.[44]	these are updated throughout the mine lifecycle. **Recommendation to IRMA:** Explicitly mention the design phase.
REQUIREMENT 5.4: Address all credible failure modes of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures to minimize risk. Risk assessments must be used to inform the design.		4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes: a. Identification of potential chemical risks (see 4.1.3.2 f) and physical risks (see 4.1.3.3) during the project conception and planning phase of the mine life cycle; b. A rigorous risk assessment to evaluate the potential impacts of mine waste facilities on health, safety, environment and communities early in the life cycle; c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c). 4.1.5.3. For high-consequence rated mine waste facilities, a critical controls framework shall be developed that aligns with a generally accepted industry	**Comment on IRMA alignment:** IRMA does not specifically mention the failure modes listed in 5.4. IRMA does, however, require risk assessments and consideration of failure modes, and then develop critical controls for potential failure modes at waste facilities with a high-consequence rating. **Recommendation to IRMA:** Consider adding in specific failure modes to review. Draw a clearer linkage between risk assessment and design.

[44] Mining Association of Canada (MAC). 2017. A Guide to the Management of Tailings Facilities (3rd Ed). http://mining.ca/documents/guide-management-tailings-facilities-third-edition

		framework, such as, for example, the process outlined in Mining Association of Canada's Tailings Management Guide.[45] 4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: . . . e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost. 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: . . . b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); . . . **Explanatory Notes:** Note for 4.1.5.3: A critical controls framework should be developed for all mine waste facilities that have a high-consequence rating (see 4.1.3.3.c for a related requirement). These ratings should be based on the consequences of unwanted events or failures, as opposed to the risk (i.e., probability is ignored in the development of the consequence rating). Mine waste facilities with a high consequence rating would include those where the consequences of unwanted events or potential catastrophic failures could lead to unacceptable short or long-term impacts on human health, safety, environmental resources or cultural resources, or lead to economic losses for communities and financial and/or reputational damage to companies. . . The Mining Association of Canada's (MAC) Guide to the Management of Tailings Facilities says that processes for management of critical controls should be implemented, the key elements of which are as follows:[46] • Identify risk controls associated with potential failure modes and causes; • Identify those risk controls deemed to be critical on an owner or facility-specific	

[45] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). Section 4.4.3. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

[46] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). p. 24. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

		basis; • Define the critical controls and their performance criteria, measurable performance indicators, and surveillance requirements; • Identify pre-defined actions to be executed if control is lost; . . .	
REQUIREMENT 5.5: Develop a design for all stages of the facility, including but not limited to start-up, partial raises and interim configurations, final raise, and all closure stages. The design should be reviewed and updated as performance and site data become available and in response to material changes to the risk assessment.		4.1.3.4. Facility characterizations shall be updated periodically to inform waste management and reclamation decisions throughout the mine life cycle.[47] 4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[48] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[49] Explanatory Notes: Note on 4.1.3.4: Updates to facility characterization information should feed into updates to facility designs, operating plans and/or reclamation plans or reports. Updates to facility characterization information may also be used to update permits and/or financial assurance estimates, typically conducted every 3-5 years. See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.	**Comment on IRMA alignment:** Although there is no specific requirement to "Develop a design for all stages of the facility" this is assumed in a couple of IRMA requirements. For example, IRMA requires that facility characterizations be updated throughout the mine life cycle, and the Explanatory Notes clarify that updates to facility characterization should feed int updates to facility designs. Also, IRMA requires review of design and redesign of tailings storage facilities, as seen in 4.1.6.1. **Recommendation to IRMA:** Consider adding in specific language related to developing and updating designs.
REQUIREMENT 5.6: Design the closure stage in a manner that meets all the Requirements of the Standard with sufficient		2.6.2.1. Prior to the commencement of mine construction activities the operating company shall prepare a reclamation and closure plan that is compatible with protection of human health and the environment, and demonstrates how affected areas will be returned to a stable landscape with an agreed post-mining end use.	**Comment on IRMA alignment:** IRMA requires that closure of all facilities, including tailings and waste facilities, be planned such

[47] See also IRMA Chapter 2.6—Planning and Financing Reclamation and Closure, 2.6.2.2.c, g, and l.

[48] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[49] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

detail to demonstrate the feasibility of the closure scenario and allows immediate implementation of elements of the design, as required. The design should include, where possible, progressive closure and reclamation during operations.		2.6.2.2. At a minimum, the reclamation and closure plan shall contain: a. A general statement of purpose; b. Site location and background Information; c. A description of the entire facility, including individual site features; d. The role of the community in reviewing the reclamation and closure plan; e. Agreed-upon (after-ESIA) post-mining land use and facility use; f. Source and pathway characterization including geochemistry and hydrology to identify the potential discharge of pollutants during closure; g. Source mitigation program to prevent the degradation of water resources; h. Interim operations and maintenance, including process water management, water treatment, and mine site and waste site geotechnical stabilization; i. Plans for concurrent or progressive reclamation and revegetation, which should be employed wherever practicable; j. Earthwork: i. Stabilization and final topography of the reclaimed mine lands; . . . q. A schedule for all activities indicated in the plan. 2.6.2.3. The reclamation and closure plan shall include a detailed determination of the estimated costs of reclamation and closure, and post-closure. . . 2.6.2.4. The operating company shall review and update the reclamation and closure plan and/or financial assurance when there is a significant change to the mine plan, but at least every 5 years. . . 2.6.4.1. Financial surety instruments shall be in place for mine closure and post-closure.	that affected areas are returned to a stable landscape. These plans must be updated regularly, and include detailed cost estimates (and be financially assured). Marked this as partially meets because it's unclear if IRMA's requirements meet 5.6 "Design the closure stage in a manner that meets all the Requirements of the [Global Tailings] Standard."
PRINCIPLE 6: Adopt design criteria that minimize risk			
REQUIREMENT 6.1: Select and clearly identify design criteria that are appropriate to reduce risk for the adopted Consequence Classification for all stages of the tailings facility lifecycle and for all credible failure modes.		4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: a. Detailed engineering reports, including site investigations, seepage and stability analyses; b. Independent technical review (See 4.1.5.9);	**Comment on IRMA alignment:** IRMA does not specifically mention design criteria in its requirements, but IRMA does expect that facilities will be designed to prevent catastrophic events during

		c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment; d. Descriptions of facility design criteria; e. Design report(s); . . . 4.1.5.1. Mine waste facility design and mitigation of identified risks shall be consistent with best available technologies (BAT) and best available/applicable practices (BAP).[50] **Explanatory Notes:** Note for 4.1.3.3: Tailings dams, tailings impoundments, waste rock piles and heap leach facilities are all large enough to pose potential physical risks. Not only might they fail during earthquake or flood events, they are also capable of collapsing under their own weight if not properly designed. Re: 4.1.3.3.a, detailed engineering reports, based on site investigations, seepage and stability analyses, should be provided for all relevant site facilities. This information should be used as the basis for facility classification (see 4.1.3.3.c). The level of detail should be based on the project status ranging from 30-70% completion during initial design and project permitting, 90% for projects prior to construction, and based on construction and as-built reports for existing structures. . . Re: 4.1.3.3.d, facility design criteria should be identified as a section and/or table in the detailed engineering reports/design reports. . .	operations and post-closure (see Explanatory Note). **Recommendation to IRMA:** Consider adding in specific language related to design criteria, linking the design criteria to reduction of risk.

[50] There are several reference documents that contain useful information on best available technologies (BAT) including, for example: European Commission. 2009. Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining activities. http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf; and MEND Secretariat. 2017. Study of Tailings Management Technologies. Mine Environment Neutral Drainage (MEND) Project Report 2.50.1. Prepared by Klohn Crippen Berger. http://mend-nedem.org/wp-content/uploads/2.50.1Tailings_Management_TechnologiesL.pdf

Best industry design criteria have been used for tailings dams and other structures that may be subject to catastrophic failures, and the criteria have been designed to prevent catastrophic events during operations and post-closure. Examples of industry accepted quality guidelines include: Australian National Committee on Large Dams (ANCOLD), which has information at: www.ancold.org.au; and the Canadian Dam Association's Dam Safety Guidelines (2007) and Application of Dam Safety Guidelines to Mining Dams (2014). Both publications are available at: www.imis100ca1.ca/cda/Main/Publications/Dam_Safety/CDA/Publications_Pages/Dam_Safety.aspx?hkey=52124537-9256-4c4b-93b2-bd971ed7f425

		Note for 4.1.5.1: . . .Re: BAT, there are several reference documents that contain useful information including, for example: European Commission (2009)[51] and MEND (2017).[52] Best industry design criteria have been used for tailings dams and other structures that may be subject to catastrophic failures, and that the criteria have been designed to prevent catastrophic events during operations and post-closure. Examples of industry accepted quality guidelines include ANCOLD,[53] CDA,[54] or equivalent.	
REQUIREMENT 6.2: Apply factors of safety that consider the variability and uncertainty of geologic and construction materials and of the data on their properties, the parameters selection approach, the mobilized shear strength with time and loading conditions, the sensitivity of the failure modes and the strain compatibility issues, and the quality of the implementation of risk management systems.		4.1.5.1. Mine waste facility design and mitigation of identified risks shall be consistent with best available technologies (BAT) and best available/applicable practices (BAP).[55]	**Comment on IRMA alignment:** IRMA does not have a requirement that specifically mentions factors of safety. Presumably, this is covered in the Guidance from ANCOLD, CDA and others, to whom IRMA refers (see Explanatory Note for 4.1.5.1. But this is not known for sure. **Recommendation to IRMA:** Add specific language around factors of safety.

[51] European Commission. 2009. Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining activities. http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf

[52] MEND Secretariat. 2017. Study of Tailings Management Technologies. Mine Environment Neutral Drainage (MEND) Project Report 2.50.1. Prepared by Klohn Crippen Berger. http://mend-nedem.org/wp-content/uploads/2.50.1Tailings_Management_TechnologiesL.pdf

[53] Australian National Committee on Large Dams (ANCOLD). Visit www.ancold.org.au.

[54] Canadian Dam Association. Dam Safety Guidelines. 2007. See also, Application of Dam Safety Guidelines to Mining Dams. 2014. Both publications are available at: www.imis100ca1.ca/cda/Main/Publications/Dam_Safety/CDA/Publications_Pages/Dam_Safety.aspx?hkey=52124537-9256-4c4b-93b2-bd971ed7f425

[55] There are several reference documents that contain useful information on best available technologies (BAT) including, for example: European Commission. 2009. Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining activities. http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf; and MEND Secretariat. 2017. Study of Tailings Management Technologies. Mine Environment Neutral Drainage (MEND) Project Report 2.50.1. Prepared by Klohn Crippen Berger. http://mend-nedem.org/wp-content/uploads/2.50.1Tailings_Management_TechnologiesL.pdf

Best industry design criteria have been used for tailings dams and other structures that may be subject to catastrophic failures, and the criteria have been designed to prevent catastrophic events during operations and post-closure. Examples of industry accepted quality guidelines include: Australian National Committee on Large Dams (ANCOLD), which has information at: www.ancold.org.au; and the Canadian Dam Association's Dam Safety Guidelines (2007) and Application of Dam Safety Guidelines to Mining Dams (2014). Both publications are available at: www.imis100ca1.ca/cda/Main/Publications/Dam_Safety/CDA/Publications_Pages/Dam_Safety.aspx?hkey=52124537-9256-4c4b-93b2-bd971ed7f425

REQUIREMENT 6.3: Identify and address brittle failure mechanisms with conservative design criteria and factors of safety to minimize the likelihood of their occurrence, independent of trigger mechanisms.		4.1.5.1. Mine waste facility design and mitigation of identified risks shall be consistent with best available technologies (BAT) and best available/applicable practices (BAP).[56]	**Comment on IRMA alignment:** IRMA does not have a requirement that specifically mentions brittle failure mechanisms. Possibly, this is covered in the Guidance from ANCOLD, CDA and others, to whom IRMA refers (see Explanatory Note for 4.1.5.1. But this is not known for sure.
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 senior independent technical reviewer.		4.1.3.3. The operating company shall **identify** the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: a. Detailed engineering reports, including site investigations, seepage and stability analyses; b. Independent technical review (See 4.1.5.9); c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment; d. Descriptions of facility design criteria; e. Design report(s); f. Short-term and long-term placement plans and schedule for tailings and waste rock or other facilities subject to stability concerns; g. Master tailings placement plan (based on life of mine); h. Internal and external inspection reports and audits), including, if applicable, an annual dam safety inspection report; i. Facility water balances (See also 4.1.3.2.d); and j. Dam breach inundation (if applicable) and waste rock dump runout analyses.	**Comment on IRMA alignment:** IRMA does not have a requirement that specifically mentions "Design Basis Report", but IRMA does require that design criteria be included in detailed engineering reports/design reports (see Explanatory Note for 4.1.3.3.d). Also, IRMA does not require that the EOR prepare the design report, however, the EOR is expected to sign off on the report (see Explanatory Note for 4.1.3.3.d). IRMA does require that there be independent review of designs

[56] There are several reference documents that contain useful information on best available technologies (BAT) including, for example: European Commission. 2009. Reference Document on Best Available Techniques for the Management of Tailings and Waste-Rock in Mining activities. http://eippcb.jrc.ec.europa.eu/reference/BREF/mmr_adopted_0109.pdf; and MEND Secretariat. 2017. Study of Tailings Management Technologies. Mine Environment Neutral Drainage (MEND) Project Report 2.50.1. Prepared by Klohn Crippen Berger. http://mend-nedem.org/wp-content/uploads/2.50.1Tailings_Management_TechnologiesL.pdf

Best industry design criteria have been used for tailings dams and other structures that may be subject to catastrophic failures, and the criteria have been designed to prevent catastrophic events during operations and post-closure. Examples of industry accepted quality guidelines include: Australian National Committee on Large Dams (ANCOLD), which has information at: www.ancold.org.au; and the Canadian Dam Association's Dam Safety Guidelines (2007) and Application of Dam Safety Guidelines to Mining Dams (2014). Both publications are available at: www.imis100ca1.ca/cda/Main/Publications/Dam_Safety/CDA/Publications_Pages/Dam_Safety.aspx?hkey=52124537-9256-4c4b-93b2-bd971ed7f425

		4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[57] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[58] Explanatory Notes: Re: 4.1.3.3.a, detailed engineering reports, based on site investigations, seepage and stability analyses, should be provided for all relevant site facilities. This information should be used as the basis for facility classification (see 4.1.3.3.c). . . Re: 4.1.3.3.d, facility design criteria should be identified as a section and/or table in the detailed engineering reports/design reports, and be signed off by the Engineer of Record (EoR).	(including "all key documents and information, analyses, design values and conclusions" – see footnote for 4.1.6.1). **Recommendation to IRMA:** Consider adding some of this into requirements instead of guidance.
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 design intent of all stages of the tailings facility lifecycle		4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: . . . c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility. . . 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e);	**Comment on IRMA alignment:** IRMA does not specifically require that a tailings facility be built or raised according to the design intent, although IRMA does require that the design and operations are subject to independent review (4.1.6.1), and as explained in the Explanatory Note for 4.1.6.3, " Design, construction and operational procedures are reviewed at a level sufficient to develop an independent opinion of the adequacy and efficiency of the designs, construction and operations."

[57] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[58] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

		c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8). 4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[59] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[60] Explanatory Notes Note for 4.1.6.3: Independent reviews should be carried out by competent professionals and/or internationally recognized subject matter experts who are not employed at the mining project, are not directly involved with the design or operations of the facility, and do not have any other relevant conflict of interest. The Mining Association of Canada includes the following description based on Robertson and Shaw (2003): "the reviewer generally reviews all key documents and does at least "reasonableness of results" checks on key analyses, design values, and conclusions. Design, construction and operational procedures are reviewed at a level sufficient to develop an independent opinion of the adequacy and efficiency of the designs, construction and operations. The reviewer generally relies on the representations made to the reviewer by key project personnel, provided the results and representations appear reasonable and consistent with what the reviewer would expect. A review report is produced which documents the reviewer's observations as to the adequacy of the design, construction and operations and indicates any recommendations that flow from these."[61]	Also, there are IRMA requirements to monitor the operations and closure, specifically using both qualitative and quantitative comparisons of actual to expected behavior of each facility (4.1.5.5) and regularly evaluate the performance of mine waste facilities (4.1.5.6). **Recommendation to IRMA:** Consider adding more specific requirements related to ensuring that the building/construction and raising of the tailings facility meet the design intent.

[59] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[60] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

[61] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. p. 57. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

using qualified personnel and appropriate methodology, equipment, procedures, data acquisition, the TMS and the environmental and social management system (ESMS).		4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: . . . c. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; 4.1.3.2. The operating company shall perform a detailed characterization for each mine waste facility that has associated chemical risks. Characterization shall include:62 c. A detailed description of the facility that includes geology, hydrogeology and hydrology, climate change projections, and all potential sources of mining impacted water (MIW);63 d. Source material characterization using industry best practice to determine potential for acid rock drainage (ARD) or metals leaching (ML). . . 4.1.3.5. Use of predictive tools and models for mine waste facility characterization shall be consistent with current industry best practice, and shall be continually revised and updated over the life of the mine as site characterization data and operational monitoring data are collected. 4.1.4.2. The operating company shall carry out and document an alternatives assessment to inform mine waste facility siting and selection of waste management practices. The assessment shall: . . . d. Assess remaining alternatives using a rigorous, transparent decision-making tool such as Multiple Accounts Analysis (MAA) or its equivalent, which takes into account environmental, technical, socio-economic and project economics considerations, inclusive of risk levels and hazard evaluations, associated with each alternative; e. Include a sensitivity analysis to reduce potential that biases will influence the selection of final site locations and waste management practices; . . .	**Comment on IRMA alignment:** IRMA does require that personnel have the competencies necessary to fulfill their responsibilities (4.1.1.2), and that best practice methods and models be used for waste characterization (4.1.3.2), modeling (4.1.3.5), alternatives assessment (4.1.4.2) which are all feed into the appropriate design; and the design itself and mitigation measures must be consistent with best technologies an practices (4.1.5.1). Additionally, mitigation strategies must be developed in an interdisciplinary and interdepartmental manner (4.1.5.4). Regarding the ESMS, this must be designed and carried out by competent professionals (2.1.8.2).

[62] See also IRMA Chapter 4.2, criteria 4.2.2

[63] Mining impacted water, also referred to as mining influenced water or MIW, includes acid rock drainage (ARD), neutral mine drainage, saline drainage, and metallurgical process waters of potential concern. In Australia, the term acid and metalliferous drainage (AMD) is used as a synonym for ARD. A key characteristic of most of these waters is that they contain elevated metals that have leached from surrounding solids (e.g., waste rock, tailings, mine surfaces, or mineral surfaces in their pathways). This fact is commonly acknowledged by the phrase "metal leaching" (ML), frequently resulting in acronyms such as ARD/ML.

		4.1.5.1. Mine waste facility design and mitigation of identified risks shall be consistent with best available technologies (BAT) and best available/applicable practices (BAP). 4.1.5.4. Mine waste management strategies shall be developed in an interdisciplinary and interdepartmental manner and be informed by site-specific characteristics, modeling and other relevant information. 2.1.8.2. The monitoring program shall be designed and carried out by competent professionals.	
REQUIREMENT 7.2: Manage the quality and adequacy of the construction and operation process by implementing Quality Control, Quality Assurance and Construction vs Design Intent Verification (CDIV). CDIV shall be used to ensure that the design intent is implemented and is still being met if the site conditions vary from the design assumptions.		4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: . . . c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility. . . 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: e. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); f. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); g. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and h. Inform the management review to facilitate continual improvement (see 4.1.4.8). 4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human	**Comment on IRMA alignment:** IRMA does not specifically require CDIV. However, there are IRMA requirements to monitor the qualitative and quantitative comparison of actual to expected behavior of each facility (4.1.5.5) and regularly evaluate the performance of mine waste facilities (4.1.5.6). **Recommendation to IRMA:** Consider adding specific requirements related to quality control during construction and operations.

		health and safety and prevents or otherwise minimizes harm to the environment and communities. **Explanatory Notes:** Note for 4.1.5.7: As mentioned in the notes for 4.1.5.6, typically the determination of whether or not mine waste facilities are being effectively operated or maintained is made as a result of internal surveillance (e.g., inspections and monitoring), or external input (e.g., regulatory inspections). According to the Mining Association of Canada (MAC): "Surveillance involves inspection and monitoring of the operation, structural integrity and safety of a facility. It consists of both qualitative and quantitative comparison of actual to expected behaviour. Regular review of surveillance information can provide an early indication of performance trends that, although within specification, warrant further evaluation or action."[64] For example, performance or stability of a waste facility may be affected if tailings characteristics begin to deviate from design specifications. . .	
REQUIREMENT 7.3: Prepare a detailed Construction Records Report 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.		Not addressed in IRMA	**Comment on IRMA alignment:** IRMA does not have a requirement for Construction Records Report. **Recommendation to IRMA:** Consider adding in this requirement.
REQUIREMENT 7.4: 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 follow		4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues, and process waters, including recycling of process waters;[65]	**Comment on IRMA alignment:** IRMA does not require that the OMS be update annually, but in IRMA Explanatory Notes an evaluation should occur at least once per year (with OMS

[64] Mining Association of Canada (MAC). 2011. Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities. Section 7-1. http://mining.ca/sites/default/files/documents/DevelopinganOMSManualforTailingsandWaterManagementFacilities2011.pdf

[65] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

best practices, clearly provide the context and critical controls for safe operations and be reviewed for effectiveness.		b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices; c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility; d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost. 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8). 4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety, and prevents or otherwise minimizes harm to the environment and communities. Explanatory Notes: Note for 4.1.5.6: Re: on a regular basis: "Performance evaluation occurs at various timescales, from hourly or daily, to annual or more, depending on the aspect of	updated accordingly) for high risk facilities.

		performance being evaluated."[66] Performance evaluations related to high risk facilities should occur at least once per year, although for some performance objectives related to these facilities evaluations may need to be more frequent.	
The EOR and RTFE shall provide access to the OMS Manual and training to all personnel involved in the TMS.		4.1.7.4. If requested by stakeholders, the operating company shall report to stakeholders on mine waste facility management actions, monitoring and surveillance results, independent reviews and the effectiveness of management strategies. 4.1.1.1. The operating company shall develop a policy for managing waste materials and mine waste facilities in a manner that eliminates, if practicable, and otherwise minimizes risks to human health, safety, the environment and communities. 4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: a. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; b. Having procedures and/or protocols in place to implement the policy; . . . Explanatory Notes: Re: 4.1.1.2.c and d, procedures and protocols should include a risk management program, with responsible persons assigned and an implemented training program; an Operations, Maintenance and Surveillance (OMS) manual (see 4 1.5.5), with staff adequately trained on its use; a change management system; protocols to elevate all relevant findings of mine managers, consultants and independent reviewers to senior management team, above the general manager level; and an independent review panel or board, with clearly defined scope (see 4.1.6).	**Comment on IRMA alignment:** IRMA does not require that the EOR provide access to the OMS Manual, but does require that stakeholders have access to mine waste facility information from the operating company. Also, IRMA does not specifically require that all personnel involved in the TMS be trained on the OMS, but IRMA does require, in 4.1.1.2, that employees have the competencies necessary to fulfill their responsibilities related to waste management, and Explanatory Notes suggest that staff be adequately trained on use of OMS manual involve training (see Explanatory Note).
REQUIREMENT 7.5: Implement a formal change management system that triggers the evaluation, review, approval and documentation of all changes to design, construction, operation		4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c);	**Comment on IRMA alignment:** IRMA does not require a formal change management system (though it is included as a recommendation in Explanatory Note for 4.1.1.2), nor does it

[66] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. p. 34. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

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.		b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8). 4.1.1.1. The operating company shall develop a policy for managing waste materials and mine waste facilities in a manner that eliminates, if practicable, and otherwise minimizes risks to human health, safety, the environment and communities. 4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: a. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; b. Having procedures and/or protocols in place to implement the policy; . . . Explanatory Notes: Re: 4.1.1.2.c and d, procedures and protocols should include a risk management program, with responsible persons assigned and an implemented training program; an Operations, Maintenance and Surveillance (OMS) manual (see 4 1.5.5), with staff adequately trained on its use; a change management system; protocols to elevate all relevant findings of mine managers, consultants and independent reviewers to senior management team, above the general manager level; and an independent review panel or board, with clearly defined scope (see 4.1.6).	require a Deviance Accountability Report (or similar). But IRMA does require regular evaluation of facility performance to inform/trigger changes to the risk management process. **Recommendation to IRMA:** Consider adding a section specifically on change management and Deviance Accountability Report related to changes in tailings/waste management.
REQUIREMENT 7.6: Refine the design, construction and operation throughout the tailings facility lifecycle by considering the lessons learned from ongoing work and the evolving knowledge base, and by using opportunities for the inclusion of new and emerging technologies and techniques.		4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8).	**Comment on IRMA alignment:** IRMA does require refinement of the tailings facility, especially its management, based on lessons learned from ongoing work and the evolving knowledge base, but does not specifically require review of opportunities related to new and emerging technologies.

		4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety, and prevents or otherwise minimizes harm to the environment and communities. 4.1.5.8. The operating company shall implement an annual management review to facilitate continual improvement of tailings storage facilities and all other mine waste facilities where the potential exists for contamination or catastrophic failure that could impact human health, safety, the environment or communities. The review shall: a. Align with the steps outlined in the Mining Association of Canada's Tailings Management Protocol[67] or a similar framework; and b. Be documented, and the results reported to an accountable executive officer.	**Recommendation to IRMA:** Consider adding a section requiring review of opportunities related to new and emerging technologies
REQUIREMENT 7.7: Ensure that the ESMS is designed and implemented to align decisions about the tailings facility with the changing environmental and social context as identified in the knowledge base, in accordance with the principles of adaptive management.		2.1.7.1. The operating company shall develop and maintain a system to manage environmental and social risks and impacts throughout the life of the mine. 2.1.7.2. An environmental and social management plan (or its equivalent) shall be developed that, at minimum: a. Outlines the specific mitigation actions that will be carried out to address significant environmental and social impacts identified during and subsequent to the ESIA process; b. Assigns personnel responsible for implementation of various elements of the plan; and c. Includes estimates for the resources needed to implement the plan. Explanatory Notes Note for 2.1.7.2: A management plan completed for one IRMA chapter can satisfy the requirements for a management plan completed for another IRMA chapter, as long as the material requirements for each respective chapter are met.	**Comment on IRMA alignment:** In IRMA, the ESMS is expected to be a system that manages environmental and social risks related to the mine throughout the mine life cycle. In IRMA, risks related to tailings would be one component of the ESMS. IRMA's tailings management approach is aligned with the principles of adaptive management in that there are requirements to regularly monitoring and evaluate impacts and performance, and based on that information mines are expected to adapt their strategies and practices to

[67] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

			continually address and minimize impacts. **Recommendation to IRMA:** Consider adding guidance to the ESMS specifically related to tailings management.
REQUIREMENT 7.8: Independent senior technical reviewers, with qualifications and expertise in social and environmental sciences and performance management, shall carry out a full review of the ESMS and monitoring results every 3 years, with annual summary reports provided to relevant stakeholders.		4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[68] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[69] 2.1.8.1. As part of the ESMS, the operating company shall establish a program to monitor: a. The significant environmental and social impacts identified during or after the ESIA process; and b. The effectiveness of mitigation measures implemented to address environmental and social impacts. 2.1.8.3. If requested by relevant stakeholders, the operating company shall facilitate the independent monitoring of key impact indicators where this would not interfere with the safe operation of the project.[70] 2.1.10.4. Summary reports of the findings of the environmental and social monitoring program shall be made publicly available at least annually, and all data and methodologies related to the monitoring program shall be publicly available.	**Comment on IRMA alignment:** In IRMA Chapter 4.1, independent review is only required for waste management system, not the entire ESMS system. As per IRMA Chapter 2.1, however, stakeholders can request that independent monitoring occur as part of the ESMS. **Recommendation to IRMA:** Consider requiring independent review of ESMS monitoring results.
PRINCIPLE 8: Design, implement and operate monitoring systems			
REQUIREMENT 8.1: Design, implement and operate a	?	4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance	**Comment on IRMA alignment:**

[68] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[69] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

[70] For example, by allowing independent experts to have access to sites for monitoring social or environmental indicators, and by allowing access to relevant company records, reports or documentation. If requested by relevant stakeholders (e.g., in particular those who may be directly affected), companies may also facilitate independent monitoring by providing funding to stakeholders to hire experts.

comprehensive performance monitoring program for the tailings facility that allows full implementation of the Observational Method and covers all potential failure modes. ***Observational Method***: A continuous, managed, integrated, process of design, construction control, monitoring and review that enables previously defined modifications to be incorporated during or after construction as appropriate. All of these aspects must be demonstrably robust. The objective is to achieve greater overall safety.		objectives, risk management strategies, critical controls and closure plan for the facility, that includes: a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues, and process waters, including recycling of process waters;[71] b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices; c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility; d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost.	IRMA requires a comprehensive performance monitoring and surveillance, as seen in 4.1.5.5. As per the GTS definition of Observational Method, the monitoring program is supposed to enable "previously defined modifications to be incorporated during or after construction as appropriate." It's unclear if this is the same as IRMA requirement 4.1.5.5.e, where IRMA requires "pre-defined actions to be taken if performance criteria are not met or control is lost." We think this is similar in intent, but this would need to be clarified to know with certainty that we are fully aligned with the Global Tailings Standard.
REQUIREMENT 8.2: Establish performance objectives, indicators, criteria, and performance parameters and include them in the design a monitoring program that measures performance at all stages of the tailings facility lifecycle.		4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues, and process waters, including recycling of process waters;[72] b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices;	**Comment on IRMA alignment:** As part of the OMS manual, IRMA requires establishment of performance measures as indicators of effectiveness of mine waste management (4.1.5.5.d), and the manual must align with the closure plan.

[71] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

[72] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

		c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility; d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost.	
Record, evaluate and publish the results at appropriate frequencies.		4.1.7.4. If requested by stakeholders, the operating company shall report to stakeholders on mine waste facility management actions, monitoring and surveillance results, independent reviews and the effectiveness of management strategies.	**Comment on IRMA alignment:** IRMA does not require monitoring results to be published, but mines are required to make information on monitoring and the effectiveness of management mine waste management strategies available to stakeholders upon request (4.1.7.4). **Recommendation to IRMA:** Consider requiring publication of tailings facility monitoring results.
Based on the data obtained, update the monitoring program throughout the tailings facility lifecycle to confirm that it remains effective.		4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8).	**Comment on IRMA alignment:** IRMA meets this.

		4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety, and prevents or otherwise minimizes harm to the environment and communities.	
REQUIREMENT 8.3: Analyze monitoring data at the frequency recommended by the EOR,			**Comment on IRMA alignment:** IRMA does not require that the EOR recommend how frequently monitoring data be analyzed. **Recommendation to IRMA:** Consider basing analysis of monitoring data review on recommendation from EOR.
and assess the performance of the facility, clearly identifying and presenting evidence on any deviations from the expected performance and any deterioration of the performance over time. Promptly submit evidence to the EOR for review and update the risk assessment and design, if required. Performance outside the expected ranges shall be addressed swiftly through critical controls or trigger response action plans (TARPs).		4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues, and process waters, including recycling of process waters;[73] b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices; c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility;	**Comment on IRMA alignment:** IRMA does require that the performance of waste facilities be regularly evaluated (4.1.5.6), and that the surveillance program include a qualitative and quantitative comparison of actual to expected behavior (i.e., deviations from expected performance) of each facility (4.1.5.5.c). IRMA also requires that mine identify pre-defined actions (i.e., trigger response actions) to be taken if performance criteria are outside of expected ranges (i.e., are not met or control is lost) (4.1.5.5.e). These evaluations

[73] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

		d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost. 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8). 4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety, and prevents or otherwise minimizes harm to the environment and communities. 4.1.5.8. The operating company shall implement an annual management review to facilitate continual improvement of tailings storage facilities and all other mine waste facilities where the potential exists for contamination or catastrophic failure that could impact human health, safety, the environment or communities. The review shall: a. Align with the steps outlined in the Mining Association of Canada's Tailings Management Protocol[74] or a similar framework; and b. Be documented, and the results reported to an accountable executive officer. Explanatory Notes	are expected to inform updates to risk management processes and the OMS manual (4.1.5.6.c), and risk and critical control strategies (4.1.5.7). IRMA does not, however, require that evidence be promptly submitted to EOR for review (just that there be an annual management review – 4.1.5.8), or that action be "swiftly" taken when performance is outside of the expected range. **Recommendation to IRMA:** Consider adding that action be taken swiftly if deviations from expected performance are observed, and also that the EOR review facility performance evaluations in addition to the management staff who undertake the annual management review.

[74] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

		Note for 4.1.5.8: . . . The management review should also provide a summary of significant issues related to the overall performance of the tailings facility and tailings management system, updated since the previous management review."[75]	
REQUIREMENT 8.4: Report the results of the monitoring program at the frequency required to meet company, regulatory and public disclosure requirements, and as a minimum on a quarterly basis. The RTFE and the EOR shall review and approve these reports.		4.1.7.4. If requested by stakeholders, the operating company shall report to stakeholders on mine waste facility management actions, monitoring and surveillance results, independent reviews and the effectiveness of management strategies.	**Comment on IRMA alignment:** IRMA does not require that the results of the monitoring program be published, but mines are required to make information on monitoring and the effectiveness of management mine waste management strategies available to stakeholders upon request (4.1.7.4). **Recommendation to IRMA:** Consider requiring publication of tailings facility monitoring results.
TOPIC IV: MANAGEMENT AND GOVERNANCE			
PRINCIPLE 9: Elevate decision-making responsibility for tailings facilities with a 'Very High' or 'Extreme' Consequence Classification			
REQUIREMENT 9.1: For a proposed new facility where a potential credible failure could have 'Very High' or 'Extreme' consequences, the Board or senior management (as appropriate based on the Operator's organizational structure) shall be responsible for approving the proposal, after deciding what additional steps			**Comment on IRMA alignment:** IRMA does not require that the Board or Senior Management approve new proposed tailings facilities that have a Very High or Extreme consequence rating. **Recommendation to IRMA:** Consider requiring that new proposed tailings facilities with high consequence ratings be

[75] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. Section 7. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

shall be taken to minimize the consequences.			approved by the highest level of the company (Board or Senior Management) as an accountability measure.
REQUIREMENT 9.2: For an existing facility, where a potential credible failure could have 'Very High' or 'Extreme' consequences, the Board or senior management (as appropriate based on the Operator's organizational 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).		4.1.5.3. For high-consequence rated mine waste facilities, a critical controls framework shall be developed that aligns with a generally accepted industry framework, such as, for example, the process outlined in Mining Association of Canada's Tailings Management Guide.[76] 4.1.5.8. The operating company shall implement an annual management review to facilitate continual improvement of tailings storage facilities and all other mine waste facilities where the potential exists for contamination or catastrophic failure that could impact human health, safety, the environment or communities. The review shall: a. Align with the steps outlined in the Mining Association of Canada's Tailings Management Protocol[77] or a similar framework; and b. Be documented, and the results reported to an accountable executive officer. Explanatory Notes Note for 4.1.5.3: A critical controls framework should be developed for all mine waste facilities that have a high-consequence rating (see 4.1.3.3.c for a related requirement). These ratings should be based on the consequences of unwanted events or failures, as opposed to the risk (i.e., probability is ignored in the development of the consequence rating). . . The Mining Association of Canada's (MAC) Guide to the Management of Tailings Facilities says that processes for management of critical controls should be implemented, the key elements of which are as follows:[78] • Identify risk controls associated with potential failure modes and causes; • Identify those risk controls deemed to be critical on an owner or facility-specific basis; • Appoint a "risk owner" and "critical control owner" for that risk; • Define the critical controls and their performance criteria, measurable	**Comment on IRMA alignment:** IRMA does require that steps be developed (i.e., critical controls) for high-consequence rated mine waste facilities (4.1.5.3), and that annual a review take place to evaluate mine waste facilities if the potential exists for catastrophic failure that could impact human health, safety, the environment or communities (4.1.5.8). But IRMA does not require that the Board or Senior Management be responsible for mandating the steps to minimize consequences, nor does IRMA require that reasons for these decisions be published. **Recommendation to IRMA:** Consider requiring that mitigation measures for existing proposed tailings facilities with high consequence ratings be approved by the highest level of the company (Board or Senior

[76] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). Section 4.4.3. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

[77] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

[78] Mining Association of Canada. 2017. A Guide to the Management of Tailings Facilities (Third Ed). p. 24. http://mining.ca/documents/guide-management-tailings-facilities-third-edition

		performance indicators, and surveillance requirements; • Identify pre-defined actions to be executed if control is lost; • Verify execution of critical controls by the critical control owner or designate, at a frequency commensurate with the frequency of control execution; • Report deficiencies in critical controls to the Responsible Person(s) and, where appropriate, the Accountable Executive Officer, and identify actions to address those deficiencies; • Track implementation of actions to address critical control deficiencies, and report to the Responsible Person(s) and, where appropriate, the Accountable Executive Officer; and • Periodically review and update risk controls and critical controls, based on updated risk assessments, risk management plans, and past performance.	Management) as an added accountability measure.
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 or commitment to the safe management of tailings facilities, to emergency preparedness and response, and to recovery after failure that is mandatory for all its subsidiaries and joint ventures. The commitment shall require the Operator to establish a Tailings Management System (TMS), and a governance framework to assure the effective implementation and continuous improvement of the TMS.		4.1.1.1. The operating company shall develop a policy for managing waste materials and mine waste facilities in a manner that eliminates, if practicable, and otherwise minimizes risks to human health, safety, the environment and communities. 4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: d. Having the policy approved by senior management and endorsed at the Director/Governance level of the company; e. Communicating the policy to employees; f. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; g. Having procedures and/or protocols in place to implement the policy; and h. Allocating a sufficient budget to enable the effective implementation of the policy.	**Comment on IRMA alignment:** IRMA largely meets the intent of this requirement, even if missing a few phrases such as "continuous improvement" and recovery after failure. **Recommendation to IRMA:** Consider adding the missing elements.
REQUIREMENT 10.2: A member of senior management shall be accountable for the safety of tailings facilities and for minimizing the social and		4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: a. Having the policy approved by senior management and endorsed at the Director/Governance level of the company; b. Communicating the policy to employees;	**Comment on IRMA alignment:** IRMA largely meets the intent of this requirement but does not make a senior management person accountable for the

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).		c. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; d. Having procedures and/or protocols in place to implement the policy; and e. Allocating a sufficient budget to enable the effective implementation of the policy.	training program, emergency response and recovery after failure, or be the point person for communications with EOR. **Recommendation to IRMA:** Consider adding sub-requirements requiring a senior management staff to be accountable for training programs, emergency response and also a sub-requirement related to communications between the EoR and Accountable Executive Officer.
REQUIREMENT 10.3: Appoint a site-specific Responsible Tailings Facility Engineer (RTFE) who is accountable for the integrity of the tailings facility, liaises with the EOR, the Operations and the Planning teams and who either reports directly to the Accountable Executive, or via a reporting line that culminates with the Accountable Executive. The RTFE will have a dotted reporting line to mine management to represent the delivery of services to the site.			**Comment on IRMA alignment:** IRMA does not have this a requirement that a single person be accountable for the integrity of the tailings facility. **Recommendation to IRMA:** Consider adding this requirement.
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.			**Comment on IRMA alignment:** IRMA does not require this. Some IRMA stakeholders have concerns about performance incentive programs, as they may

			provide a perverse incentive to not report issues. **Recommendation to IRMA:** Discuss this with our stakeholders before considering whether or not to add it to the IRMA Standard.
REQUIREMENT 10.5: 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 qualifications and experience, and develop succession plans for these personnel.		4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: a. Having the policy approved by senior management and endorsed at the Director/Governance level of the company; b. Communicating the policy to employees; c. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; d. Having procedures and/or protocols in place to implement the policy; and e. Allocating a sufficient budget to enable the effective implementation of the policy.	**Comment on IRMA alignment:** IRMA does require that processes are in place to ensure that relevant employees have the competencies necessary to fulfill their responsibilities, but IRMA does not specifically list RTFE, EOR and Accountable Executive, nor does IRMA mention success plans for these personnel. **Recommendation to IRMA:** Consider adding missing elements.
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 with a qualified multi-disciplinary team using best practice methodologies.		4.1.4.1. A risk-based approach to mine waste assessment and management shall be implemented that includes: a. Identification of potential chemical risks (see 4.1.3.2) and physical risks (see 4.1.3.3) during the project conception and planning phase of the mine life cycle; b. A rigorous risk assessment to evaluate the potential impacts of mine waste facilities on health, safety, environment and communities early in the life cycle; c. Updating of risk assessments at a frequency commensurate with each facility's risk profile, over the course of the facility's life cycle; and d. Documented risk assessment reports, updated when risks assessments are revised (as per 4.1.4.1.c).	**Comment on IRMA alignment:** IRMA does require that mines update risk assessments, and if they are revised document the changes. IRMA also requires that mine waste management strategies be developed by interdisciplinary teams, but does not extend this requirement to the assessment itself. That was an oversight.

		4.1.5.4. Mine waste management strategies shall be developed in an interdisciplinary and interdepartmental manner and be informed by site-specific characteristics, modeling and other relevant information.	**Recommendation to IRMA:** Consider extending use of interdisciplinary approach to risk assessment (in addition to risk mitigation).
Transmit risk assessments to the ITRB for review, and address with urgency all risks considered as unacceptable.		4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[79] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[80] The footnote for 4.1.6.1 says: "Independent reviewers should not be directly involved with the design or operations of the facility, but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others." 4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety, and prevents or otherwise minimizes harm to the environment and communities.	**Comment on IRMA alignment:** IRMA does require that independent reviewers be engaged in reviewing all key documents, which would include risk assessments, as these inform the selection and modification of strategies to manage risks. IRMA requires that OMS manual and risk control strategies be revised and implemented if new information (e.g., from an updated risk assessment) reveals risks to human health, safety and the environmental and communities, but here is no specific TSM requirement to "address with urgency all risks considered as unacceptable". **Recommendation to IRMA:** Consider adding that unacceptable risks be addressed "with urgency".

[79] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that could result in impacts on human health, safety, the environment, or the livelihoods of communities

[80] Independent reviewers should not be directly involved with the design or operations of the facility, but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

REQUIREMENT 11.2: Conduct internal audits to verify consistent implementation of company procedures, guidelines and corporate governance requirements consistent with the TMS and the ESMS developed to manage risks.		4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: a. Detailed engineering reports, including site investigations, seepage and stability analyses; b. Independent technical review (See 4.1.5.9); c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment; d. Descriptions of facility design criteria; e. Design report(s); f. Short-term and long-term placement plans and schedule for tailings and waste rock or other facilities subject to stability concerns; g. Master tailings placement plan (based on life of mine); h. Internal and external inspection reports and audits, including, if applicable, an annual dam safety inspection report; i. Facility water balances (See also 4.1.3.2.d); and j. Dam breach inundation (if applicable) and waste rock dump runout analyses.	**Comment on IRMA alignment:** IRMA mentions internal inspections/audits in 4.1.3.3.h, but does not specify that this is required to verify consistent implementation of company procedures, guidelines and corporate governance requirements. **Recommendation to IRMA:** Consider clarifying IRMA's expectations relating to internal audits, and potentially expanding to include corporate governance aspects.
REQUIREMENT 11.3: The EOR or a senior independent technical reviewer shall conduct annual tailings facility construction and performance reviews.		4.1.5.8. The operating company shall implement an annual management review to facilitate continual improvement of tailings storage facilities and all other mine waste facilities where the potential exists for contamination or catastrophic failure that could impact human health, safety, the environment or communities. The review shall: a. Align with the steps outlined in the Mining Association of Canada's Tailings Management Protocol[81] or a similar framework; and b. Be documented, and the results reported to an accountable executive officer. 4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[82] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[83]	**Comment on IRMA alignment:** IRMA requires an annual management review (4.1.5.8), which includes review of changes that may influence tailings management, as well as issues related to overall performance of the tailings facility and management system. And that throughout the life cycle an independent review take place.

[81] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

[82] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[83] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

		Explanatory Notes Note for 4.1.5.8: According to the MAC Guide: "the management review should identify and evaluate the potential significance of changes since the previous management review that are relevant to the tailings management system, including: • Changes to regulatory requirements, standards and guidance, industry best practice, and commitments to communities of interest; • Changes in mine operating conditions (e.g., production rate) or site environmental conditions; • Changes outside the mine property that may influence the nature and significance of potential impacts resulting from the tailings facility on the external environment or vice versa; and • Changes in the risk profile of the tailings facility. The management review should also provide a summary of significant issues related to the overall performance of the tailings facility and tailings management system, updated since the previous management review."[84]	However, IRMA does not specify that an annual review be conducted by the EOR or a "senior independent technical reviewer." **Recommendation to IRMA:** Consider requiring that an annual performance review be carried out by EOR or senior independent reviewer.
REQUIREMENT 11.4: A senior independent technical reviewer 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.		4.1.3.3. The operating company shall identify the potential physical risks related to tailings storage facilities and all other mine waste facilities where the potential exists for catastrophic failure resulting in impacts on human health, safety, the environment or communities. Evaluations shall be informed by the following: a. Detailed engineering reports, including site investigations, seepage and stability analyses; b. Independent technical review (See 4.1.5.9); c. Facility classification based on risk level or consequence of a failure, and size of the structure/impoundment; d. Descriptions of facility design criteria; e. Design report(s); f. Short-term and long-term placement plans and schedule for tailings and waste rock or other facilities subject to stability concerns; g. Master tailings placement plan (based on life of mine); h. Internal and external inspection reports and audits), including, if applicable, an annual dam safety inspection report;	**Comment on IRMA alignment:** IRMA requires annual dam safety inspections (4.1.3.3.h), and independent reviews of independent reviews of tailings facilities over the course of the mine's life cycle (4.1.6.1), but there is no requirement that specifically mentions that an independent DSR of technical, operational and governance aspects must take place periodically. This is only generally mentioned in the Explanatory Notes for 4.1.3.3.h.

[84] Mining Association of Canada (MAC). 2017. Tailings Management Protocol. Towards Sustainable Mining. Section 7. http://mining.ca/sites/default/files/documents/TSM-Tailings-Management-Protocol-2017.pdf

		i. Facility water balances (See also 4.1.3.2.d); and j. Dam breach inundation (if applicable) and waste rock dump runout analyses. 4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[85] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[86] Explanatory Notes Re: 4.1.3.3.h, all high-consequence facilities require regular (daily, weekly, monthly, quarterly) inspections by the operators consistent with their operations, maintenance and surveillance manuals, an annual dam safety inspection report by the Engineer of Record, and independent review/inspections every 3-5 years or similar as per ANCOLD, CDA, or similar.	**Recommendation to IRMA:** Consider clarifying in the actual requirement (4.1.6.1.h) that independent reviews also include periodic dam safety reviews, not just inspections, and that the reviews include technical and operational elements.
REQUIREMENT 11.5: For tailings facilities with 'Very High' or 'Extreme' Consequence Classification, the ITRB, reporting to the Accountable Executive and/or the Board, shall provide ongoing senior independent review of the planning, siting, design, construction, operation, maintenance, monitoring, performance and risk management at appropriate intervals across all stages of the tailings facility lifecycle. For facilities with other consequence	?	4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[87] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[88] 4.1.6.2. Reviews shall be carried out by independent review bodies, which may be composed of a single reviewer or several individuals. At high-risk mine waste facilities a panel of three or more subject matter experts shall comprise the independent review body.	**Comment on IRMA alignment:** IRMA requires independent review of tailings facilities during siting, design, redesign, risk management and throughout the mine life cycle. For high-risk facilities IRMA requires a review body, while reviews for lower risk facilities can be carried out by a single reviewer.

[85] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[86] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

[87] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that could result in impacts on human health, safety, the environment, or the livelihoods of communities

[88] Independent reviewers should not be directly involved with the design or operations of the facility, but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

classifications, the ongoing senior independent review can be done by a single person.			
PRINCIPLE 12: Appoint and empower an Engineer of Record			
REQUIREMENT 12.1: 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. Alternatively, the Operator may appoint an employee with expertise and experience in comparable facilities as the EOR. In this instance, the EOR may delegate the design to a firm ('Designer of Record') but shall remain thoroughly familiar with the design in executing their responsibilities as EOR.		Explanatory Notes Re: 4.1.1.2.c and d, procedures and protocols should include a risk management program, with responsible persons assigned and an implemented training program; an Operations, Maintenance and Surveillance (OMS) manual (see 4 1.5.5), with staff adequately trained on its use; a change management system; protocols to elevate all relevant findings of mine managers, consultants and independent reviewers to senior management team, above the general manager level; and an independent review panel or board, with clearly defined scope (see 4.1.6). Design engineers or Engineer of Record should be in place, and be qualified licensed professional engineers with sound technical knowledge. Other employees should have either formal education or sufficient training and experience to carry out tasks such as construction, maintenance, surveillance, monitoring, emergency response, etc.). Re: 4.1.3.3.d, facility design criteria should be identified as a section and/or table in the detailed engineering reports/design reports, and be signed off by the Engineer of Record (EoR). Re: 4.1.3.3.h, all high-consequence facilities require regular (daily, weekly, monthly, quarterly) inspections by the operators consistent with their operations, maintenance and surveillance manuals, an annual dam safety inspection report by the Engineer of Record, and independent review/inspections every 3-5 years or similar as per ANCOLD, CDA, or similar. (See references in 4.1.3.3.c).	**Comment on IRMA alignment:** There is no IRMA requirement that specifically mentions Engineer of Record, but the Explanatory Notes assume that there is an Engineer of Record for tailings facilities. **Recommendation to IRMA:** Consider adding a requirement that specifically requires that there be an EOR for the tailings facility that is approved by an Accountable Executive (See requirement 12.4).
REQUIREMENT 12.2: Empower the EOR through a written agreement that clearly describes their authority, role and responsibilities throughout the lifecycle of all facilities, including closed facilities, and during			**Comment on IRMA alignment:** No comparable IRMA requirement. **Recommendation to IRMA:** Consider adding this requirement.

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 in the tailings facility lifecycle as necessary to confirm that both the implementation of the design and the design intent are met in all cases.		4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility; 4.1.6.1. The siting and design or re-design of tailings storage facilities and other relevant mine waste facilities,[89] and the selection and modification of strategies to manage chemical and physical risks associated with those facilities shall be informed by independent reviews throughout the mine life cycle.[90]	**Comment on IRMA alignment:** No IRMA requirement that specifically requires a system to manage the quality of all engineering work, and interactions between the EOR and RTFE and Accountable Executive. However, some of the quality control would be carried out by the independent reviewers, and the Operations, Maintenance and Surveillance system. **Recommendation to IRMA:** Consider being mores specific with our language, incorporating quality control terminology; and specifically mentioning a systemic approach.
REQUIREMENT 12.4: Given its potential impact on the risks associated with a tailings facility, the selection of the EOR shall be decided by the Accountable Executive and not influenced or decided by procurement personnel.			**Comment on IRMA alignment:** No comparable IRMA requirement.

[89] Relevant facilities would be other mine waste facilities where the potential exists for catastrophic failure that would result in impacts on human health, safety, the environment, or the livelihoods of communities

[90] Independent reviewers should not be directly involved with the design or operations of the facility; but rather, should review all key documents and information, analyses, design values and conclusions related to the decisions made by others.

REQUIREMENT 12.5: Where it becomes necessary to change the EOR firm, develop a detailed plan for the comprehensive transfer of data, information, knowledge and experience with the construction procedures and materials.			**Comment on IRMA alignment:** No comparable IRMA requirement. **Recommendation to IRMA:** Consider adding a requirement that specifically requires that an EOR be assigned.
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 about the reason for and importance of their job procedures for the prevention of a tailings facility failure.		4.1.1.1. The operating company shall develop a policy for managing waste materials and mine waste facilities in a manner that eliminates, if practicable, and otherwise minimizes risks to human health, safety, the environment and communities. 4.1.1.2. The operating company shall demonstrate its commitment to the effective implementation of the policy by, at minimum: a. Having the policy approved by senior management and endorsed at the Director/Governance level of the company; b. Communicating the policy to employees; c. Having a process in place to ensure that relevant employees understand the policy to a degree appropriate to their level of responsibility and function, and that they have the competencies necessary to fulfill their responsibilities; d. Having procedures and/or protocols in place to implement the policy; and e. Allocating a sufficient budget to enable the effective implementation of the policy.	**Comment on IRMA alignment:** 4.1.1.2 requires that relevant employees understand the waste management policy, which is focused on minimizing risks to human health, safety, the environment and communities.
REQUIREMENT 13.2: Incorporate workers' experience-based knowledge into planning for all stages of the tailings facility lifecycle.	?	4.1.5.5. The operating company shall develop an Operation, Maintenance and Surveillance (OMS) manual (or its equivalent) aligned with the performance objectives, risk management strategies, critical controls and closure plan for the facility, that includes: a. An operations plan that documents practices that will be used to transport and contain wastes, and, if applicable, effluents, residues, and process waters, including recycling of process waters;[91]	**Comment on IRMA alignment:** IRMA doesn't specifically mention "workers' experienced-based knowledge", but it is assumed that in evaluating the performance of tailings facilities workers' input would be included in surveillance and

[91] Some of the water-related issues may be covered in the Adaptive Management Plan for water (or its equivalent) as per IRMA Chapter 4.2 (see requirement 4.2.4.4).

		b. A documented maintenance program that includes routine, predictive and event-driven maintenance to ensure that all relevant parameters (e.g., all civil, mechanical, electrical and instrumentation components of a mine waste facility) are maintained in accordance with performance criteria, company standards, host country law and sound operating practices; c. A surveillance program that addresses surveillance needs associated with the risk management plan and critical controls management, and includes inspection and monitoring of the operation, physical and chemical integrity and stability, and safety of mine waste facilities, and a qualitative and quantitative comparison of actual to expected behavior of each facility; d. Documentation of facility-specific performance measures as indicators of effectiveness of mine waste management actions; and e. Documentation of risk controls and critical controls (see also 4.1.5.3), associated performance criteria and indicators, and descriptions of pre-defined actions to be taken if performance criteria are not met or control is lost. 4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8). 4.1.5.7. The OMS manual shall be updated and new or revised risk and critical control strategies implemented if information reveals that mine waste facilities are not being effectively operated or maintained in a manner that protects human health and safety, and prevents or otherwise minimizes harm to the environment and communities.	monitoring reports. This information then gets fed into an evaluation of whether or not the facility is performing as expected, and also informs what, if any, changes may need to be made.
REQUIREMENT 13.3: Establish mechanisms that promote cross-functional collaboration to ensure data and knowledge		4.1.5.4. Mine waste management strategies shall be developed in an interdisciplinary and interdepartmental manner and be informed by site-specific characteristics, modeling and other relevant information.	**Comment on IRMA alignment:** IRMA largely aligns with Requirement 13.3. However, greater emphasis could be placed on establishment of

integration and communication across the TMS and the ESMS.			ongoing mechanisms for communications between relevant departments and systems.
REQUIREMENT 13.4: Identify and implement lessons from internal incident investigations and relevant external accident reports, paying particular attention to human and organizational factors.		4.1.5.6. On a regular basis, the operating company shall evaluate the performance of mine waste facilities to: a. Assess whether performance objectives are being met (see 4.1.4.2.a and 4.1.4.5.c); b. Assess the effectiveness of risk management measures, including critical controls (see 4.1.4.5.e); c. Inform updates to the risk management process, (see 4.1.4.1.c) and the OMS (see 4.1.4.7); and d. Inform the management review to facilitate continual improvement (see 4.1.4.8).	**Comment on IRMA alignment:** This should be partially captured by IRMA requirement 4.1.5.6, as any incidents would be reason for assessing the effectiveness of risk management measures and controls. IRMA does not, however, including reviewing external accident reports, or that attention be paid to human or organizational factors. **Recommendation to IRMA:** Consider specifically mentioning review of internal and external incidences as part of performance evaluation, and also that attention be paid to human and organizational factors.
REQUIREMENT 13.5: Develop procedures to recognize and reward employees and contractors who speak up about problems or identify opportunities for improvement. Respond in a timely manner and communicate actions taken and their outcomes.			**Comment on IRMA alignment:** No comparable IRMA requirement. **Recommendation to IRMA:** Consider adding a requirement that rewards employees and contractors for identifying problems.

PRINCIPLE 14: Respond promptly to concerns, complaints and grievances			
REQUIREMENT 14.1: Establish a formal written complaint process that provides the Operator and the appropriate regulatory authority with information about possible permit violations or other conditions relating to the tailings facility that pose a risk to public health, safety, or the environment.	✓	1.4.1.1. The operating company shall ensure that stakeholders, including affected community members and rights holders (hereafter referred to collectively as "stakeholders") have access to an operational-level mechanism that allows them to raise and seek resolution or remedy for the range of complaints and grievances that may occur in relation to the company and its mining-related activities.[92] 1.4.2.1. The operating company shall consult with stakeholders on the design of culturally appropriate complaints and grievance procedures that address, at minimum: a. The effectiveness criteria outlined in Principle 31 of the United Nations *Guiding Principles on Business and Human Rights*,[93] which include the need for the mechanism to be: (a) Legitimate, (b) Accessible, (c) Predictable, (d) Equitable, (e) Transparent, (f) Rights-compatible, (g) A source of continuous learning, and (h) Based on engagement and dialogue; b. How complaints and grievances will be filed, acknowledged, investigated, and resolved, including general timeframes for each phase; c. How confidentiality of a complainant's identity will be respected, if requested; d. The ability to file anonymous complaints, if deemed necessary by stakeholders; e. The provision of assistance for those who may face barriers to using the operational-level grievance mechanism, including women, children, and marginalized or vulnerable groups; f. Options for recourse if an initial process does not result in satisfactory resolution or if the mechanism is inadequate or inappropriate for handling serious human rights grievances; and g. How complaints and grievances and their resolutions will be tracked and recorded.	**Comment on IRMA alignment:** The IRMA Standard does not fully align with Requirement 14.1 as currently written, because IRMA does not require that tailings-related complaints be provided to the regulatory authority. Nor does IRMA require that complaints from stakeholders or workers be written. However, it is possible that IRMA actually exceeds the GTS Standard in this respect, as IRMA allows for the most appropriate methods of filing complaints (as determined by the stakeholders themselves) which increases the likelihood that complaints will actually be filed (see 1.4.2.1). IRMA also requires that the Operating Company document all complaints.

[92] Grievance mechanisms are explicitly stated as requirements with regard to workers (Chapter 3.1), human rights (Chapter 1.3), mine security (Chapter 3.5), stakeholder engagement (Chapter 1.2) and resettlement (Chapter 2.4). However, even when not explicitly stated in a chapter, it is expected that access to the operational-level grievance mechanism and other remedies will be provided throughout the project's life to grievances related to any issues of stakeholder concern with the mining project.

It is possible that one grievance mechanism may be suitable to address all types of grievances raised in relation to the mining project, including workers, although typically labor grievances are dealt with through a separate mechanism established through collective bargaining agreements or human resources policies. The development of workers' grievance mechanism is addressed in Chapter 3.1.

It is also possible that more than one mechanism or approach to addressing complaints and grievances may be deemed necessary to meet the needs of affected communities and stakeholders. If a company decides to create multiple grievance mechanisms, all of them shall meet the requirements of this chapter.

[93] The *Guiding Principles on Business and Human Rights* have identified that access to remedy for grievances is fundamental to ensuring respect and protection of human rights. (Ruggie, J. 2011. Guiding Principles on Business and Human Rights. A/HRC/17/31. Available at: www.ohchr.org/Documents/Issues/Business/A-HRC-17-31_AEV.pdf)

		1.4.2.2. The operating company shall ensure that all complaints and grievance procedures are documented and made publicly available. 3.1.5.1. The operating company shall provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The mechanism, at minimum: a. Shall involve an appropriate level of management and address concerns promptly, without any retribution, using an understandable and transparent process that provides timely feedback to those concerned; b. Shall allow for anonymous complaints to be raised and addressed; c. Shall allow workers' representatives to be present, if requested by the aggrieved worker; and d. Shall not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.	**Recommendation to IRMA:** Consider adding a requirement that tailings-related complaints be forwarded to the regulatory authority.
REQUIREMENT 14.2: Establish an effective pathway that guarantees anonymity for employees and contractors to express concerns about tailings facility safety.	✓	3.1.5.1. The operating company shall provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The mechanism, at minimum: a. Shall involve an appropriate level of management and address concerns promptly, without any retribution, using an understandable and transparent process that provides timely feedback to those concerned; b. Shall allow for anonymous complaints to be raised and addressed; c. Shall allow workers' representatives to be present, if requested by the aggrieved worker; and d. Shall not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements. 1.4.2.1. The operating company shall consult with stakeholders on the design of culturally appropriate complaints and grievance procedures that address, at minimum: a. The effectiveness criteria outlined in Principle 31 of the United Nations *Guiding Principles on Business and Human Rights*,[94] which include the need for the mechanism to be: (a) Legitimate, (b) Accessible, (c) Predictable, (d) Equitable, (e)	**Comment on IRMA alignment:** IRMA requires ability for workers to file anonymous complaints (3.1.5.1.b), but exceeds GTS Standard by also expanding this to stakeholders if so requested (see 1.4.2.1.d).

[94] The *Guiding Principles on Business and Human Rights* have identified that access to remedy for grievances is fundamental to ensuring respect and protection of human rights. (Ruggie, J. 2011. Guiding Principles on Business and Human Rights. A/HRC/17/31. Available at: www.ohchr.org/Documents/Issues/Business/A-HRC-17-31_AEV.pdf)

		Transparent, (f) Rights-compatible, (g) A source of continuous learning, and (h) Based on engagement and dialogue; b. How complaints and grievances will be filed, acknowledged, investigated, and resolved, including general timeframes for each phase; c. How confidentiality of a complainant's identity will be respected, if requested; d. The ability to file anonymous complaints, if deemed necessary by stakeholders; e. The provision of assistance for those who may face barriers to using the operational-level grievance mechanism, including women, children, and marginalized or vulnerable groups; f. Options for recourse if an initial process does not result in satisfactory resolution or if the mechanism is inadequate or inappropriate for handling serious human rights grievances; and g. How complaints and grievances and their resolutions will be tracked and recorded.	
REQUIREMENT 14.3: Initiate prompt investigations of all credible employee and stakeholder complaints and grievances, swiftly resolve concerns and complaints and provide remedy as required.		1.4.1.1. The operating company shall ensure that stakeholders, including affected community members and rights holders (hereafter referred to collectively as "stakeholders") have access to an operational-level mechanism that allows them to raise and seek resolution or remedy for the range of complaints and grievances that may occur in relation to the company and its mining-related activities.[95] 1.4.3.1. No remedy provided by an operational-level grievance mechanism shall require aggrieved parties to waive their right to seek recourse from the company for the same complaint through other available mechanisms, including administrative, non-judicial or judicial remedies. 3.1.5.1. The operating company shall provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The mechanism, at minimum: a. Shall involve an appropriate level of management and address concerns promptly, without any retribution, using an understandable and transparent process that provides timely feedback to those concerned;	**Comment on IRMA alignment:** This is covered by IRMA requirements 1.4.1.1, 1.4.3.1 and 3.1.5.1.

[95] Grievance mechanisms are explicitly stated as requirements with regard to workers (Chapter 3.1), human rights (Chapter 1.3), mine security (Chapter 3.5), stakeholder engagement (Chapter 1.2) and resettlement (Chapter 2.4). However, even when not explicitly stated in a chapter, it is expected that access to the operational-level grievance mechanism and other remedies will be provided throughout the project's life to grievances related to any issues of stakeholder concern with the mining project.

It is possible that one grievance mechanism may be suitable to address all types of grievances raised in relation to the mining project, including workers, although typically labor grievances are dealt with through a separate mechanism established through collective bargaining agreements or human resources policies. The development of workers' grievance mechanism is addressed in Chapter 3.1.

It is also possible that more than one mechanism or approach to addressing complaints and grievances may be deemed necessary to meet the needs of affected communities and stakeholders. If a company decides to create multiple grievance mechanisms, all of them shall meet the requirements of this chapter.

		. . . d. Shall not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.	
REQUIREMENT 14.4: In accordance with international best practices for whistleblower protection, the Operator shall not discharge, 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.		3.1.5.1. The operating company shall provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The mechanism, at minimum: a. Shall involve an appropriate level of management and address concerns promptly, without any retribution, using an understandable and transparent process that provides timely feedback to those concerned; b. Shall allow for anonymous complaints to be raised and addressed; . . .	**Comment on IRMA alignment:** IRMA prohibits retribution against workers that raise workplace concerns (3.1.5.1.a).
TOPIC V: EMERGENCY RESPONSE AND LONG-TERM RECOVERY			
PRINCIPLE 15: Prepare for emergency response to tailings facility failures and support local level emergency preparedness and response using best practice methodologies			
REQUIREMENT 15.1: 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 closure.		4.1.7.2. Emergency preparedness plans or emergency action plans related to catastrophic failure of mine waste facilities shall be discussed and prepared in consultation with potentially affected communities and workers and/or workers' representatives, and in collaboration with first responders and relevant government agencies. (See also IRMA Chapter 2.5)	**Comment on IRMA alignment:** IRMA does not specifically mention "credible tailings facility failure scenarios" but does require emergency panning related to potential catastrophic failure, which we think meets the intent of 15.1. IRMA also addresses emergency response planning for water contamination scenarios in Chapter 4.2, and general emergency response planning in Chapter 2.5.
REQUIREMENT 15.2: Meaningfully engage employees		4.1.7.2. Emergency preparedness and response plans or emergency action plans related to catastrophic failure of mine waste facilities shall be discussed and	**Comment on IRMA alignment:**

and/or employee representatives, site contractors, public sector agencies, first responders and at-risk communities to participate in emergency planning and implementation, including development of specific ERPs for at-risk communities.		prepared in consultation with potentially affected communities and workers and/or workers' representatives, and in collaboration with first responders and relevant government agencies.[96] 2.5.1.1. All operations related to the mining project shall have an emergency response plan conforming to the guidelines set forth in *United Nations Environment Programme, Awareness and Preparedness for Emergencies at the Local Level (APELL)* for Mining.[97] Explanatory Notes Note for 2.5.1.1: . . . In general terms, the APELL Process aims at creating a cohesive and resilient community in the face of technological or natural hazards through raising awareness and agreement on roles and responsibilities of all community stakeholders in potential preparedness and response measures. The specific goals of the implementation of the APELL Process are to:[98] • Provide information to concerned members of the community on the hazards involved with nearby industrial operations, and the measures taken to reduce these risks • Review, update, or establish emergency response plans in local areas • Increase local industry involvement in community awareness and emergency response planning • Integrate industry emergency plans with local emergency response plans into one overall plan for the community to handle all types of emergencies • Involve members of the local community in the development, testing and implementation of the overall emergency response plan.	IRMA addresses the development of specific EPRs for communities in Chapter 2.5. IRMA requires that emergency response plans conform with guidelines set forth in UN APELL, which includes working with communities to integrate industry (e.g., mine site) emergency response plans with local community emergency response plans (see Explanatory Note for 2.5.1.1).
REQUIREMENT 15.3: Meaningfully engage with public sector agencies and first responders, and other organizations involved in		4.1.7.2. Emergency preparedness and response plans or emergency action plans related to catastrophic failure of mine waste facilities shall be discussed and prepared in consultation with potentially affected communities and workers and/or	**Comment on IRMA alignment:** IRMA largely addresses this requirement, but does not include an assessment of

[96] See also IRMA Chapter 2.5—Emergency Preparedness and Response for related requirements.

[97] United Nations Environment Programme. 2001. Awareness and Preparedness for Emergencies at the Local Level (APELL) for Mining, (Technical Report 41). www.unep.fr/shared/publications/pdf/WEBx0055xPA-APELLminingEN.pdf See Appendix 1 for Components of an emergency response plan. See also, http://apell.eecentre.org/Modules/GroupDetails/UploadFile/APELL_Handbook_2016_-_Publication.pdf

[98] United Nations Environment Programme website: "Awareness and Preparedness for Emergencies at the Local Level (APELL)." https://www.unenvironment.org/explore-topics/disasters-conflicts/what-we-do/preparedness-and-response/awareness-and-preparedness

emergency response for the purpose of developing and implementing a site-specific Emergency Preparedness and Response Plan (EPRP). The plan shall assess the capacity and capability of emergency response services and the Operator shall act accordingly.		workers' representatives, and in collaboration with first responders and relevant government agencies.[99]	emergency response providers' capacity to implement the EPRP. **Recommendation to IRMA:** Consider adding a requirement to assess capacity of local emergency response providers to carry out identified responses.
REQUIREMENT 15.4: Maintain a state of readiness at the mine site and within at-risk communities by training all appropriate personnel, public sector agencies, first responders and at-risk communities and by testing emergency response plans and procedures with all involved stakeholders.		4.1.7.3. Emergency and evacuation drills (desktop and live) related to catastrophic failure of mine waste facilities shall be held on a regular basis.[100]	**Comment on IRMA alignment:** IRMA prohibits retribution against workers that raise workplace concerns (3.1.5.1.a).
PRINCIPLE 16: Prepare for long term recovery in the event of catastrophic failure			
REQUIREMENT 16.1: Meaningfully engage with public sector agencies and other organizations that would participate in medium- and long-term social and environmental post-failure response strategies.		1.3.3.2. Responding to human rights risks related to the mining project: a. If the operating company determines that it is at risk of causing adverse human rights impacts through its mining-related activities, it shall prioritize preventing impacts from occurring, and if this is not possible, design strategies to mitigate the human rights risks. Mitigation plans shall be developed in consultation with potentially affected rights holder(s). . .	**Comment on IRMA alignment:** IRMA requires engagement with these agencies as part of the Emergency Response Planning (see 4.1.7.2), and in the design of strategies to prevent or mitigate potential risks to human rights (which would include rights affected by a catastrophic tailing failure) but does not specifically require

[99] See also IRMA Chapter 2.5—Emergency Preparedness and Response for related requirements.

[100] Ibid.

			engagement related to "post-failure response strategies." **Recommendation to IRMA:** Consider adding a requirement that requires engagement related to post-failure response strategies.
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.		1.3.3.3. Responding to actual human rights impacts related to the mining project: a. If the operating company determines that it has caused an actual human rights impact, the company shall: i. Cease or change the activity responsible for the impact; and ii. In a timely manner, develop mitigation strategies and remediation in collaboration with affected rights holders. If mutually acceptable remedies cannot be found through dialogue, the operating company shall attempt to reach agreement through an independent, third-party mediator or another means mutually acceptable to affected rights holders; . . .	**Comment on IRMA alignment:** Any tailings facility disaster that affects communities would infringe on a variety of human rights, and therefore, would be covered by IRMA's Human Rights Due Diligence chapter, in particular, requirement 1.3.3.3.
REQUIREMENT 16.3: 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.		1.3.3.2. Responding to human rights risks related to the mining project: a. If the operating company determines that it is at risk of causing adverse human rights impacts through its mining-related activities, it shall prioritize preventing impacts from occurring, and if this is not possible, design strategies to mitigate the human rights risks. Mitigation plans shall be developed in consultation with potentially affected rights holder(s). . . 1.3.3.3. Responding to actual human rights impacts related to the mining project: a. If the operating company determines that it has caused an actual human rights impact, the company shall: i. Cease or change the activity responsible for the impact; and ii. In a timely manner, develop mitigation strategies and remediation in collaboration with affected rights holders. If mutually acceptable remedies cannot be found through dialogue, the operating company shall attempt to reach agreement through an independent, third-party mediator or another means mutually acceptable to affected rights holders; . . .	**Comment on IRMA alignment:** Any tailings facility disaster that affects communities would infringe on a variety of human rights, and therefore, would be covered by IRMA's Human Rights Due Diligence chapter. In particular, requirement 1.3.3.2 requires that if risks to human rights (e.g., in relation to catastrophic tailings failures) are identified, the mine and rights holders should proactively attempt to prevent such an event from occurring, but if risks remain, should develop strategies and plans to mitigate the risks to human rights. This

			might involve developing a Reconstruction and Recovery Plan. Similarly, as per 1.3.3.3, if an event has occurred mitigation and remediation strategies are also developed with affected rights holders.
REQUIREMENT 16.4: Enable the participation of affected people in restoration, disaster recovery works and ongoing monitoring activities. Design and implement plans that take an integrated approach to remediation, reclamation and the re-establishment of functional ecosystems.		1.3.3.3. Responding to actual human rights impacts related to the mining project: a. If the operating company determines that it has caused an actual human rights impact, the company shall: i. Cease or change the activity responsible for the impact; and ii. In a timely manner, develop mitigation strategies and remediation in collaboration with affected rights holders. If mutually acceptable remedies cannot be found through dialogue, the operating company shall attempt to reach agreement through an independent, third-party mediator or another means mutually acceptable to affected rights holders; . . . 1.3.4.1. The operating company shall monitor whether salient human rights risks and impacts are being effectively addressed. Monitoring shall include qualitative and quantitative indicators, and draw on feedback from internal and external sources, including affected rights holders.	**Comment on IRMA alignment:** If a tailings disaster were to occur, IRMA, through its Human Rights requirements, requires that affected rights holders be involved in developing mitigation strategies and remediation (1.3.3.3), and also in monitoring. IRMA, however, does not specifically mention an integrated approach to remediation, reclamation and the re-establishment of functional ecosystems post-tailings failure. **Recommendation to IRMA:** Consider adding a requirement for an integrated approach to remediation, reclamation and the re-establishment of functional ecosystems post-tailings failure. This may need to be an addition to the Waste Chapter, rather than relying on the requirements in the Human Rights chapter.

REQUIREMENT 16.5: Facilitate the monitoring and public reporting of post-failure outcomes that are aligned with the thresholds and indicators outlined in the plans and adapt recovery activities in response to findings and feedback.		1.3.4.1. The operating company shall monitor whether salient human rights risks and impacts are being effectively addressed. Monitoring shall include qualitative and quantitative indicators, and draw on feedback from internal and external sources, including affected rights holders. 1.3.5.1. The operating company or its corporate owner shall periodically report publicly on the effectiveness of its human rights due diligence activities. At minimum, reporting shall include the methods used to determine the salient human rights issues, a list of salient risks and impacts that were identified, and actions taken by the operating company to prevent, mitigate and/or remediate the human rights risks and impacts.	**Comment on IRMA alignment:** IRMA is missing the adaptive management piece here. **Recommendation to IRMA:** Consider adding a requirement to adapt remediation approaches based on monitoring results.
TOPIC VI: PUBLIC DISCLOSURE AND ACCESS TO INFORMATION			
PRINCIPLE 17: Provide public access to information on tailings facility decisions, risks and impacts, management and mitigation plans, and performance monitoring			
REQUIREMENT 17.1: Publicly disclose relevant data and information about the tailings facility and its consequence classification in order to fairly inform interested stakeholders.			**Comment on IRMA alignment:** IRMA does not require public disclosure of relevant data and information about the tailings facility and its consequence classification. IRMA does require that information be provided to stakeholders upon request (see response to 17.1). **Recommendation to IRMA:** Consider adding this requirement after more information is provided on what is meant by "relevant data and information."
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 fairly	✓	4.1.7.4. If requested by stakeholders, the operating company shall report to stakeholders on mine waste facility management actions, monitoring and surveillance results, independent reviews and the effectiveness of management strategies.	**Comment on IRMA alignment:** IRMA does require disclosure of information to stakeholders regarding waste management and an information related to performance against the IRMA

inform the interested party making the request.		1.2.4.1. Any information that relates to the mine's performance against the IRMA Standard shall be made available to relevant stakeholders upon request, unless the operating company deems the request to be unreasonable[101] or the information requested is legitimate confidential business information. If part of a document is confidential only that confidential part shall be redacted, allowing for the release of non-confidential information. 1.2.4.2. If original requests for information are deemed unreasonable, efforts shall be made by the operating company to provide stakeholders with overviews or summaries of the information requested. 1.2.4.3. Communications shall be carried out and information shall be provided to stakeholders in a timely manner, and shall be in formats and languages that are culturally appropriate and accessible to affected communities and stakeholders.[102] 1.2.4.4. If requests for information are not met in full, or in a timely manner, the operating company shall provide stakeholders with a written justification for why it has withheld information.	Standard more generally., and includes the requirements to be timely (1.2.4.3), to respond to all reasonable requests (1.2.4.1), and responding to the fullest extent possible (1.2.4.2). Additionally, IRMA exceeds Requirement 17.2 by requiring that information be in formats and languages that are understandable to stakeholders (1.2.4.3), and if requests are not met in full, or in a timely manner, that the company provide written justification for it (1.2.4.4). **Recommendation to IRMA:** Consider adding these elements to 4.1.7.4, after more information is provided on what is meant by "relevant data and information."
REQUIREMENT 17.3: Commit to transparency and participate in credible global initiatives led by qualified independent organizations to create			**Comment on IRMA alignment:** IRMA does not have a similar requirement.

[101] Companies are not expected to release information that is culturally inappropriate, compromises the safety of any individual, is confidential employee information, or legitimate confidential business information. Culturally inappropriate information may include that which is sensitive to particular groups or communities, and therefore should not be freely released to all requesting parties (e.g., locations of indigenous peoples' sacred sites). Stakeholders can help to define what is considered culturally inappropriate.

[102] ""in a timely manner" will likely vary based on the operating company's resources and procedures (e.g., some companies may have due diligence procedures in place for releasing data publicly) and also the size/nature of the request. As a general rule of thumb, however, requests should be fulfilled within 1 to 3 months, although for particularly large requests or requests made to companies with limited capacity to fulfill information requests, some flexibility may be needed. Also, some companies have stringent quality assurance procedures that must be followed in order to share data publicly, and so may require more time to prepare materials for release. (See also 1.2.4.4 for requests that are not responded to in what seems like a "timely manner.") See footnote 9 for more on culturally appropriate communications.

standardized, independent, industry-wide and publicly accessible databases, inventories or other information repositories about tailings facilities.			**Recommendation to IRMA:** Consider adding this requirement to the IRMA Standard.