

Leveraging Knowledge and Experience of a Well-Formed Independent Tailings Review Board to Enhance Tailings Facility Safety

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ABSTRACT: Independent tailings review boards (ITRBs) have been used for tailings storage facilities (TSFs) by the authors for over 30 years under a variety of naming conventions. ITRBs have been recommended in several national and international guidelines, such as in the International Council on Mining and Metals (ICMM) Tailings Management Good Practice Guide and are now a requirement in the voluntary Global Industry Standard on Tailings Management (GISTM) published by ICMM, Principles for Responsible Investment, and United Nations Environment Program.

This paper draws on the experiences and lessons learned and discusses key features of successfully implementing ITRBs to support resilient designs and operational excellence. The paper focuses on the interaction between the Operator’s team, the Engineer of Record (EoR), and the ITRB. It also discusses the need for a range of experiences, expertise, traits, and skills in forming effective ITRBs are described and the expectations of all involved parties to achieve an effective team with a shared purpose. Guidance on organizing, supporting, evaluating, and managing expectations of the ITRB are included. The need for strategic planning and formalizing the Independent Review process of this part of a Tailings Management System is emphasized.

1 INTRODUCTION

The Global Industry Standard on Tailings Management (GISTM), issued in June 2020 by the Global Tailings Review (GTR) initiative, has focused the mining industry’s attention on the need for independent technical review of tailings storage facilities (TSFs) worldwide. Mining companies, referred to herein as Operators, who adhere to the GISTM must engage an Independent Tailings Review Board (ITRB) for all facilities with a consequence classification of Very High or Extreme. Even for those Operators who do not fully implement the GISTM, using an ITRB is considered a best practice (e.g., Morgenstern, 2018; ICM, 2021; MAC, 2021). As a result, the demand for qualified professionals to serve on ITRBs has ballooned in recent years as the practice has become more widespread among responsible mining companies.

ITRBs for TSFs have been used for several decades, especially for very large, highly complex, or high-risk facilities. The first major application of a geotechnical ITRB began in the early 1970s at Syncrude’s oil sands facilities in Alberta, Canada, as described by Burnett and McKenna (2022) and McKenna (1998) and cited by Morgenstern (2011). Some of the authors have worked under the oversight of an ITRB at Rio Tinto’s Kennecott Utah Copper in the United States, which was initiated in 1991. Freeport-McMoRan engaged its first ITRB in 2004.

However, the practice has been limited until recently. A year after the Mt. Polley failure in British Columbia, Robertson and Caldwell (2015) stated that “peer review of tailings facilities is still not common practice.” Historically, a limited number of highly experienced ITRB members have developed informal rules and guidelines for implementing the process on high-consequence or high-risk facilities, and the amount of formal guidance was limited. Today, most reputable Operators have some form of independent review, although practices vary widely. With the GISTM becoming more widely adopted, the demand for ITRB members nearly rivals the demand for Engineers of Record (EoR) and Responsible Tailings Facility Engineers (RTFE), while the supply of experienced ITRB members is dwindling.

McKenna (2022), Davidson (2019), Robertson & Caldwell (2015), and Morgenstern (2011) have provided guidance on typical expectations and practices for ITRBs based on their extensive experience serving on ITRBs for some of the largest TSFs in the world. The authors wish to build on the excellent work by these experts based on our own experiences. The emphasis of this paper is on the interactions between ITRB members, the Operators’ teams, and EoRs.

2 PURPOSE AND RESPONSIBILITIES OF AN ITRB

2.1 Purpose

McKenna (2022) has stated that the purpose of an ITRB is to “to help a mine minimize the risk of a catastrophic failure of a dam or mine waste structure.” Davidson (2019) states that “the most important contribution [an ITRB] can make ... is to bring their experience and expertise to constructively challenge the project team to meet the 3R’s of resilience, robustness, and reliability.” ITRBs conduct periodic reviews of the TSF during various stages of design and construction, during operations, and as appropriate for any subsequent changes or new discoveries. They ask questions and advise the project team to ensure that failure modes have been recognized, evaluated, and either eliminated or mitigated to avoid catastrophic failure of the TSF and associated systems. Generally, the purpose of an ITRB is not to bring local or site-specific knowledge to a project (a function that is fulfilled by the site team, the RTFE, and the EoR), but to challenge the assumptions of the design, construction, and operational team and offer experience in internationally recognized good practices.

2.2 Responsibilities and Expectations

The ITRB provides independent opinions and guidance on the physical integrity, safety, engineering design, construction, hydrogeological, geochemical, geotechnical, and hydrotechnical performance of TSFs, their associated structures, and management systems. The ITRB also provides opinions and guidance on additions, expansions, modifications, and closure plans. The ITRB considers their experience and understanding of worldwide failure root cause information when providing guidance. The ITRB’s primary focus is assessing the EoR’s work and then assessing the soundness of the design implementation into operations through the Tailings

Management System (TMS) and Operations, Maintenance, and Surveillance (OMS) manual.

The ITRB is provided site background information (historical reports and relevant design reports), with an understanding that a comprehensive review of this material may not be possible. The main sources of information for the ITRB are presentations, tours of the facilities, and discussions during the meetings.

The ITRB is expected to use broad professional judgement and supported where appropriate with the provided information, other standards, guidelines, and their experience. The ITRB does not provide independent investigations nor analyses.

The ITRBs are advisory groups and will follow good practices for engineers in avoiding conflicts of interest. The ITRB does not replace the role of the EoR. The ITRB provides advice and opinions on TSF planning, design, and performance based on information provided to them and their observations from site visits. Their advice should be considered by the Operator’s tailings team—including the RTFE and EoR responsible for TSF design, construction, operation, monitoring, and closure and the Operator’s corporate site matter experts.

The responsibility for adopting or applying any ITRB recommendations remains with the Operator, RTFE, and EoR. Specifically, the ITRB is typically made aware of the Operator’s tailings policy, governance framework, TMS, and site-specific application of the TMS over the TSF’s lifecycle. Detailed review is done at the Operator’s request or the ITRB’s discretion. Examples of technical information that may be provided to the ITRB are included in Table 1.

Table 1. Types of Information that may be Provided to an ITRB.

<ul style="list-style-type: none"> • Multi-criteria alternatives analyses and outcomes • Consequence classification • Risk assessments and failure modes descriptions and assessments • Plans for future mine development and associated tailings management • Analytical techniques for evaluating TSF structural stability, including scope and method of conducting geotechnical investigations and laboratory testing • Methods, procedures, and QA/QC practices for TSF construction and modification • Performance and engineering monitoring programs and objectives • Seismic characterization and response • Hydrologic methodology and stormwater management features, including water balance as it relates to the TSFs • Annual construction report, including QA/QC summary • Closure Plan • Tailings governance framework, TMS description, Tailings Management policy, and relevant aspects of the environmental and social management systems 	<ul style="list-style-type: none"> • Site characterization, geologic model, and material characterization • Design basis information, including design criteria and key parameters • Design documentation of TSFs and key associated infrastructure considering lifecycle stages • Ability to upgrade an existing facility to “Extreme” external loading criteria • Hydrogeologic characterization and water quality aspects related to TSFs, such as methods of seepage management and operational and closure procedures to minimize impacts to local groundwater and surface water systems. • Operational procedures and plans for tailings deposition and water management • Instrumentation coverage and trends / relationships in instrumentation data • Geochemical stability • Material changes to the design, construction, operation, or monitoring during the tailings lifecycle • Annual performance report, including other technical reviews • Emergency response and preparedness plans and community engagement • Other relevant data, analysis, and operational information
<ul style="list-style-type: none"> • The following expectations should be considered with the ITRB communications: ITRB should provide advice clearly and concisely and be able to communicate complex issues to the Operator’s stakeholders. Performance criteria can be included in the ITRB review and assessment tools(s). 	

- Reporting should be done concisely and efficiently; some operators may opt to provide the ITRB with a template.
- It is desirable for the ITRB to rank their recommendations, i.e., indicate which are “must haves” and “nice to haves.”
- The ITRB should speak with “one voice.”

The following limitations should also be understood when establishing an ITRB:

- The ITRB reviews and advises; they do not approve or sign off. No matter how tempting, the Operator should refrain from putting the ITRB in the position where this power could be implied or inferred.
- The ITRB does not direct work, perform analyses, or provide reports or other documents, except for the ITRB report.

2.3 Authority and Reporting

While each Operator is structured differently, typically an ITRB’s mandate is to the Accountable Executive (AE), and the ITRB’s report should typically be directed to the AE or their representative (e.g., the RTFE or equivalent), who will distribute the report to the EoR and other appropriate recipients. The roles and responsibilities of ITRBs are to draw on their experience to make high-level recommendations on tailings and water management. In turn, the Operator’s team and EoR are responsible for following up with ITRBs on their recommendations and outcomes of related actions. In such situations, the Operator’s team will follow their Terms of Reference (ToR) or Standard Operating Procedures for interpreting and addressing recommendations received from ITRBs.

ITRBs typically do not have the authority to enforce or implement changes in the operations, including the cessation of tailings operation. Implementation of ITRB suggestions or recommendations are normally under the authority of the AE, the site general manager, the RTFE and the EoR, as defined by the Operator’s policy and tailings management system. Implementation of the ITRB’s recommendation should rely heavily on the interpretations of the RTFE and EoR, who have detailed knowledge of the design, construction, operation, and closure of the TSF. However, it is appropriate for the Operator to empower the ITRB members to communicate any concerns directly to the Operator’s highest levels of management (i.e., the CEO) if the ITRB is ever concerned that critical safety issues are not being adequately addressed by the individuals with whom they directly interact.

It is considered good practice to have an organizational chart and/or reporting structure as part of the ITRB Charter/Scope/Contract to ensure lines of communications are clearly defined.

3 ASSEMBLING THE ITRB

When assembling an ITRB, the Operator should consider the following:

- Determining who is responsible for coordination and approval
- Identifying ITRB team skills required to ensure a well-rounded team.
- Establishing ITRB expertise required for the TSF, e.g., for seismically active areas, ensure seismic expertise
- Ensuring compatibility—can the ITRB members effectively work together?
- Determining who is available and what they can commit to.
- Establishing how to assess and review the ITRB performance.

3.1 Appointment

As stated previously, the ITRB should comprise highly experienced tailings experts who can cover the key disciplines relevant to the site or TSF. Given the limited pool of experienced ITRB candidates, sourcing ITRB members can be difficult and will likely become more difficult in the immediate future because many current ITRB members are winding down their careers. To assemble an effective ITRB, the Operator should be clear on who is leading the search for candidates and discussions about and interviews for candidates. The person(s) responsible for pre-selecting potential members should be well-connected in the tailings community and have technical responsibility for the TSF within the Operator’s relevant product group, company or specific asset, depending on the organization structure. This person should be closely engaged with the ITRB as

Operator representative and be identified as the main contact for ITRB communication.

It is important to confirm all ITRB members can commit to the engagement: some current ITRB practitioners have more than 10 and up to 20 concurrent ITRB engagements. It is unlikely that a prospective ITRB member with such a level of involvement on other projects can effectively commit to another TSF.

3.2 *Suggested Expertise and Skills*

Based on the authors’ experience, we believe the following factors should be considered when determining the ITRB composition:

- The ITRB should have members with expertise in different disciplines. A geotechnical engineer with a solid foundation of advanced soil mechanics and TSF experience is a must, but a hydrogeologist with geochemistry expertise and a hydrology/hydraulics expert with dam break and water balance experience are usually required. Having two geotechnical engineers is preferred for more complex geotechnical projects. Depending on the TSF, other expertise could also be required, such as seismic hazard analysis and earthquake engineering, risk assessment, or other specialized fields.
- It is valuable to have a member with a background in academia and research to further the state of practice.
- At least one ITRB member should have design experience, especially in construction and operations.
- The Operator should be willing to change or add ITRB members depending on the stage of the operations, e.g., when moving into closure, a closure expert may be added.
- ITRB members should be able to see the big picture and have a high-level and long-term risk-focused approach to the facility.
- ITRB members should understand the current mine business case to appreciate how the risks for the TSF might affect the viability of the mining operation
- It is recommended to have at least one ITRB member with international expertise outside the regulatory environment of the site that is being reviewed.

Aside from the obvious technical expertise, it is important to ensure that at least some ITRB members have appropriate traits for the position, which should translate into the following:

- Effective communication
- Reporting and writing skills
- Presentation skills
- Awareness of value engineering
- Ability to work within a team
- Appreciates skills and expertise outside of their own
- Pro-active engagement
- Thinking on their feet
- Empathy and messaging (especially when engaging with the EoR and RTFE)

The above skills are not necessarily all present in each proposed or desired ITRB candidate; however, they should be considered collectively in part or as the sum of the ITRB team. Without these traits, there is an inherent risk that the ITRB will not function effectively and will be met with resistance, resulting in an adversarial relationship between the Operator, ITRB, and EoR.

3.3 *Frequency of Meetings*

Meeting frequencies vary depending on the complexity, associated risks, and the rate of changes made to the facility. Bi-annual meetings are common during design and early construction, but typically, these meetings will be held less frequently but not less than once every four years. The Operator, in consultation with the EoR, will determine the timing and need for ITRB meetings. Increasingly, scheduling ITRB members’ time can be a limiting factor in the depth of their engagements, so Operators must plan and secure ITRB members’ calendars well in advance.

4 INTERACTION BETWEEN OWNER AND ITRB

4.1 *General Support*

As a first priority when establishing and managing an ITRB, the Operator should develop and

maintain a ToR for the ITRB that defines ITRB aspects described in this report: purpose; structure of board; level of detail for information provided to ITRB and level of review ITRB will provide; authorities and responsibilities, including topics that are considered in-scope; how the Operator will manage the ITRB engagements; how the Operator will address ITRB recommendations for transparency; and the obligations of the Operator to the ITRB. Further, the Operator should support the ITRB in executing their responsibilities by:

- Providing timely and appropriate contractual agreements and budgets.
- Maintaining a site knowledge base, including design, construction, as-built reports, inspection, change management documentation, request for information records, risk assessment results, and all manuals and plans associated with tailings management.
- Providing all relevant information in scope and content to be covered in each engagement session in a timely manner.
- Beyond the agreed in-scope topics, informing the ITRB about relevant topics for context, such as the Operator's business case around the TSF that they are reviewing; applicable human rights aspects and engagement with people affected by the project; and the applicable social, environmental, and local economic context for the TSF.
- Providing the ITRB with specific questions for their input, as well as open-ended scope.
- Updating the ITRB on the status of and results of work performed to address previous ITRB recommendations. A tracking process is helpful for the Operator to fulfil this function.
- Providing an avenue for the ITRB to escalate concerns or issues related to TSF stability or management as needed. This kind of planning could be a proactively established meeting with Operator's executive leadership team and/or introducing ITRB member(s) to the same.

4.2 *Coordination and Planning of Meetings*

Scheduling ITRB meetings can quickly become complex due to availability of the ITRB, Operator, RTFE, EoR, and other key participants. Many times, the main challenge is matching the schedules and availability of the ITRB, Operator, and the EoR that aligns with project decision points, especially when the project schedules may be changing. Frequently, ITRB meetings are scheduled in advance (a year or more is common) to accommodate schedules, especially when a longer meeting is needed or additional time for travel needs to be considered. Recent experiences have shown that ITRB meetings can be performed remotely, but in-person meetings and site visits are still needed and should be considered as part of a mixed-format plan when looking at long-range ITRB meetings.

Several months before the meeting approaches, the EoR and RTFE/Operator work together to prepare a draft agenda. For longer meetings, the authors have found that having a dedicated closed-door session for the ITRB to discuss and review each day's sessions privately should be included. The EoR team and RTFE/Operator should be available during these times if questions arise.

4.3 *Preparing and Delivering ITRB Presentations*

Presentations to the ITRB during meetings may be delivered by members of the EoR's team, the Operator's team, or all. To have a meaningful meeting, the presentations should:

- Be prepared and delivered in advance (preferably 2 weeks) for the ITRB to review and prepare for the topics to be discussed.
- Be comprehensive and refer to previous meetings/discussions (e.g., don't assume that support for the chosen design parameters is fresh in memory and never present stability analysis with just a table of material parameters without also including material characterization information).
- Summarize previous ITRB action items and how recommendations have been addressed or will be addressed at the current meeting.

Clear responsibilities and expectations need to be established and communicated between the EoR and the Operator's team for preparing and transmitting documents and presentations to the ITRB members. Oftentimes, a shared file server is used to facilitate this process.

4.4 *Evaluation of Board Performance and Effectiveness*

Once an ITRB is established, a way to gauge or measure the ITRB's effectiveness may be useful for the Operator, particularly if the ITRB is managed by a site-based team. ITRB engagements

can continue for extended periods without any turnover. Often, the ITRB and EoR can be in their respective positions much longer than the Operator’s site personnel. Furthermore, to ensure that the ITRB and EoR have a healthy working relationship and that the ITRB remains a force for good, an Operator could develop an evaluation matrix to assess the ITRB such that emotive and “in the moment” observations are removed. Evaluation criteria for ITRB members could include:

- Meeting frequency and adherence to scheduled meetings
- Availability and capacity, last minute and planned
- Being prepared for the meeting and having read the documentation provided by the EoR and Site
- Level of contribution
- Level of guidance and commentary during visits and presentations
- Reporting quality and efficiency of submission
- Consideration and recognition of the value proposition of recommendations which may be resource intensive
- Impact of recommendation on production and operation
- Relevance of expertise to site-specific challenges (which may change over time)

These and other Operator-specific criteria could be used to periodically assess performance. This assessment could be managed by the Operator’s ITRB coordinator (likely the same as the person responsible for assembling the ITRB and providing ongoing company-specific guidance). Input during the assessment would be required from the EoR, RTFE, and others who participate in the ITRB meetings or report reviews. If implemented, the process should be well-defined and communicated transparently to the ITRB. The assessment criteria should be considered against site conditions and maturity of the ITRB and TMS, including the Operator’s governance processes.

4.5 *Receiving Feedback from the ITRB*

A question that may come up occasionally, usually from the EoR or the Operator’s team, is: “what if we don’t want to implement recommendations?” Most experienced ITRBs make it clear to the project team that they provide advice and not instruction or directives, which may be misunderstood by the members of the EoR team and/or the Operator’s team. To avoid confusion among the Operator’s and EoR’s teams, the Operator’s ToR should clearly outline its approach to handling ITRB observations and recommendations. While an Operator may not choose to require automatic acceptance and implementation of all ITRB recommendations, all recommendations need to be seriously considered. If the EoR and the Operator’s team decides to “reject” the ITRB’s advice, the decision to do so should follow the Operator’s ToR processes. At a minimum, decisions should be justified and documented.

It is further considered to be good practice to have an action tracker in a format that works for the Operator and EoR that lists the recommendations of the ITRB over time and keeps track of which recommendations have been closed out, which ones are still open, and why open items have not been closed. The action tracker provides transparency to the ITRB and enables efficient reporting to the site General Manager and AE if a particular TSF is performing effectively.

4.6 *Succession Planning and Transitions*

Succession planning and changes to an ITRB should be managed with care, not in the least because of the people involved and the reputation to the Operator. Below are some reasons to change an ITRB:

1. The ITRB member in question resigns (potentially due to age or availability) and the vacant position requires filling.
2. The ITRB requires a different discipline or experience due to beginning a different operational stage, for example, from operations to closure.
3. The ITRB is no longer functioning effectively.
4. A restructuring of the Operator’s governance program (such as what might occur after an acquisition).

Succession is important when considering the limited pool of suitably experienced people to sit on ITRBs. There are two components to succession: first, replacing a member of an existing board because that member retires or otherwise steps down, and second, increasing the pool of suitable candidates and ensuring that there are opportunities to develop the skills required to serve

on an ITRB. In the first case, finding a new member should be conducted as previously discussed in Section 3.1.

A possible approach for increasing the pool of ITRB candidates may be to appoint less experienced individuals in “apprentice” roles under the guidance of experienced and established ITRB members. These apprentice members would participate in ITRB deliberations but would likely initially serve as observers rather than formal members of the Board(s). Similarly, introducing experienced ITRB candidates from other industries (e.g., water dams or other large civil works projects) could be considered, provided that the majority of the ITRB have sufficient experience with TSFs. This concept may require coordination between varied Operators; regardless, each operator would need to clearly define the role of and pathway for such appointed persons. Further developing this concept is beyond the scope of this paper.

5 INTERACTION BETWEEN ENGINEER OF RECORD AND ITRB

The relationship and interaction between the EoR and ITRB are important, complex, and may sometimes result in some confusion. Some degree of conflict—productive, non-productive or both—may be expected. The EoR is accountable for the design of the facility, and a large part of the ITRB’s role is to review the design, probe into the rationale and support for major decisions evidenced in the design, and provide assurance to the Owner that the design is sound and consistent with good international practice. A capable EoR will naturally have strong opinions on the design and how to properly construct and operate the facility. In some cases, the EoR, as well as members of the EoR’s team, may feel threatened by the ITRB’s probing and questioning or may disagree with opinions expressed by the ITRB members. In other situations, the EoR may tend to over-rely on the ITRB for technical direction, especially on complicated or high-risk challenges. Throughout these interactions, it is important that the EoR demonstrate respect and a sense of collaboration with the ITRB, and the reverse should also be true. Furthermore, the ToR of the ITRB should be clearly understood by all parties, and it may be necessary to occasionally remind the team of the ITRB’s purpose and scope.

It must be clear in these interactions that the ITRB is not directing the EoR team’s work. Using the ITRB as a sounding board and posing questions for the ITRB’s deliberation is desirable but looking to the ITRB to direct the work is not. While it may seem obvious, the EoR should not interpret an ITRB’s comments or requests as authorization to proceed on any particular action; authorization must come through the Operator’s normal processes. An ITRB should be viewed as providing advice to the entire team, generating thoughtful discussions, and potentially challenging assumptions or paradigms used for the design and how these components are implemented during construction and operation. The advice or recommendations from the ITRB need to be seriously considered by the EoR and their team, but they are generally not to be viewed as prescriptive requirements. The EoR and Owner will typically need to convene after an ITRB meeting to agree on how to respond to the ITRB’s recommendations. ITRB recommendations should be handled according to the Operator’s ToR. For example, if an Operator (and by extension, its EoR) decide not to implement an ITRB recommendation, a valid justification should be documented and discussed with the ITRB. An Operator’s ToR may require that the AE be informed in such a scenario. If this scenario occurs, an ITRB may determine that their advice is not being taken seriously, and they may rightfully question the purpose of their engagement. Depending on the significance of the recommendation or number of times this occurs, an ITRB or some of its members may seek to sever the relationship with the Owner.

Sometimes, an ITRB will identify that the EoR team (or the EoR individually) is struggling. The ITRB has an obligation to discuss the EoR’s performance with the Operator. Ethically and professionally, the ITRB should not seek to gain financially at the expense of the EoR Company during this type of interaction. This concern may become more problematic in the future as the number of review boards continues to expand and there may be more ITRB members reviewing their direct competitors. Establishing trust between the Owner’s personnel, the EoR team, and the ITRB members is crucial, and the ITRB needs to be careful not to develop an adversarial relationship with the EoR team. However, the EoR team must in turn be open and responsive to constructive feedback when the ITRB identifies a concern with the quality of the engineering work.

6 CONCLUSIONS AND ACKNOWLEDGMENTS

The authors, who have all worked with ITRBs as members of EoR teams and/or technical experts for major mining companies, have gained tremendous value from our experiences with ITRBs on a number of world-class TSFs. The GISTM requirement to include Independent Review on all TSFs is an important step toward the goal of eliminating failures. However, the introduction of this requirement has highlighted the importance of strategic planning and developing consistent guidelines for implementing ITRBs to meet the growing demand for experienced practitioners to fill these roles. Based on the experiences and discussions above, the Authors present the following conclusions:

1. Implementing an ITRB within the tailings governance process has not yet happened with all Operators, and Operators should continuously review and identify opportunities for improving the process of engaging and interacting with ITRBs.
2. Operators should consider formalizing the various processes in relation to the ITRB. This paper, McKenna (2022), Davidson (2019), Morgenstern (2011), and Robertson and Caldwell (2015) provide guidance on formalizing the ITRB aspect of an effective tailings governance program.
3. The emphasis and guiding principle of the tailings governance process should be collaboration. It is critical that the ITRB, Operator’s team, and EoR work as a coherent team, focusing on the safety of the TSF.
4. The primary purpose of an ITRB is to use the members’ experience and expertise to pose thoughtful questions that challenge the project team to ensure all failure modes have been identified, thoroughly evaluated, and either eliminated or mitigated to the extent practicable. The ITRB’s role is not to provide directives, but to provide advice for the EoR and Operator’s Team to seriously consider. Advice from an ITRB must not be ignored, and if the EoR and Operator’s Team agreed to disregard an ITRB’s suggestion, this decision should be justified and thoroughly documented (and any further actions completed as defined by the Operator’s ToR).
5. When establishing an ITRB, it is important to consider Experience, Expertise, and Skills. A highly experienced ITRB may not be effective if its traits or individual members are not compatible or actively engaged.
6. Including ITRB members with an academic background is recommended, especially when combined with members with strong design, construction, and operational experience.
7. It is important for the industry to think strategically in developing succession planning pathways and approaches to meet the growing demand for experienced ITRB members and to be able to absorb sudden changes in membership.

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