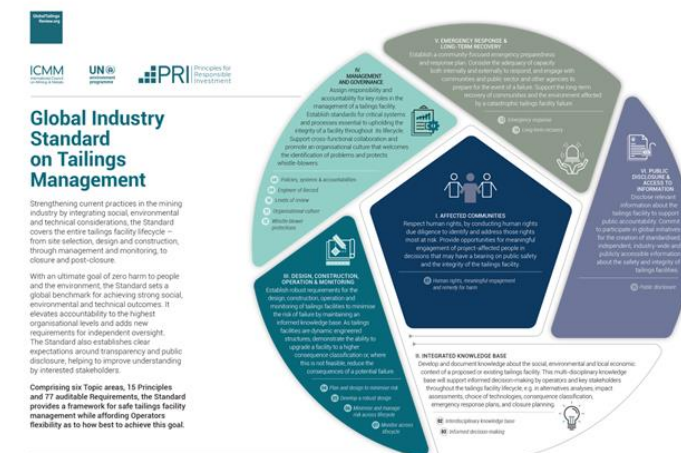


24th January 2024, 12.30pm-2.15pm

Global Roundtable Investor Mining & Tailings Safety Initiative

Convening on the eve of the 5th Anniversary of the
Brumadinho disaster

Investor Mining & Tailings
Safety Initiative



Mining & Tailings Safety Initiative Investor Roundtable

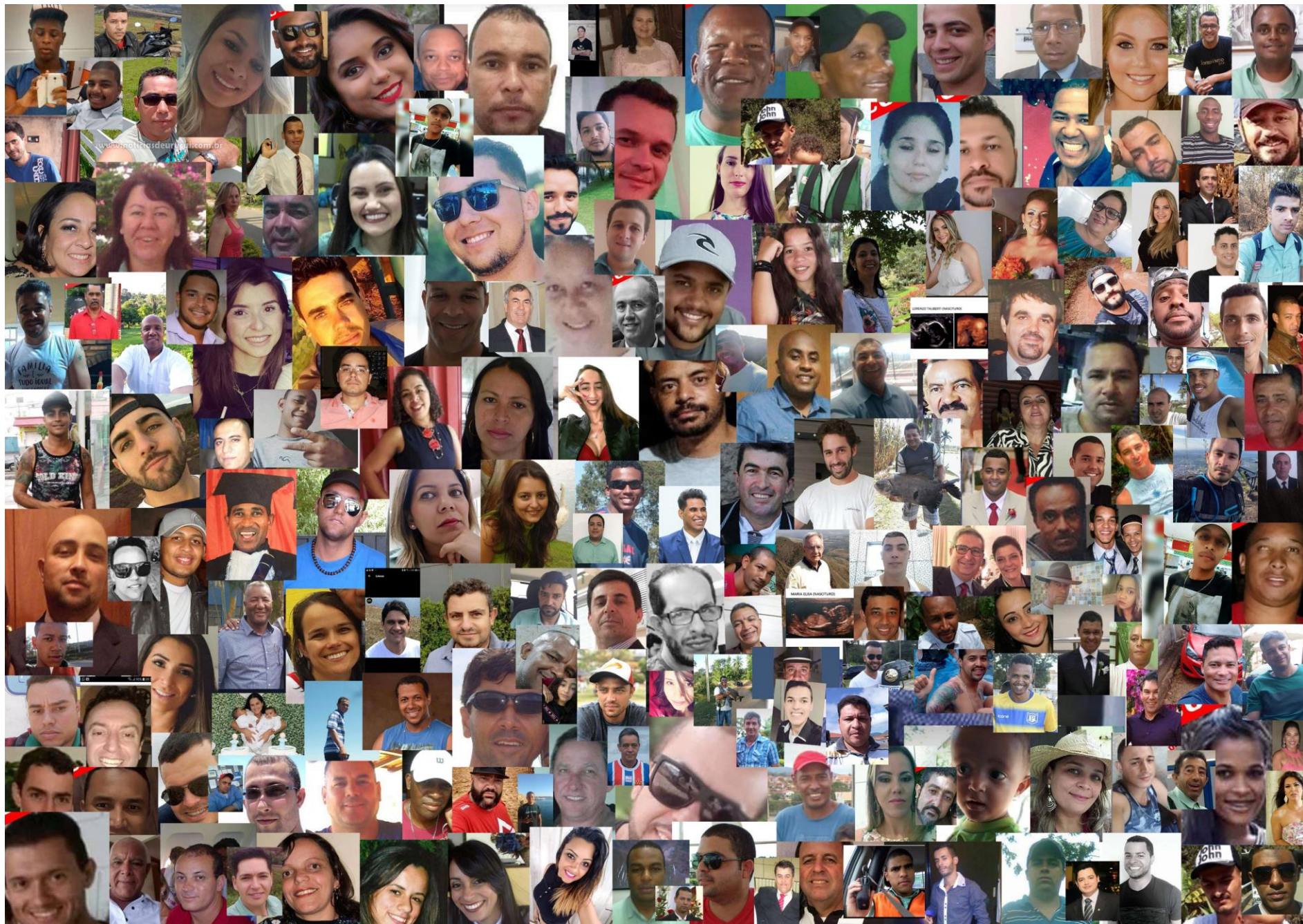
- | | |
|--|----------------|
| 1. Welcome and Introduction | 12.30pm |
| 2. Act of Remembrance | 12.35pm |
| 3. Community Perspective from Brumadinho | 12.40pm |
| 4. Progress on Implementing a Global Industry Standard on Tailings Management | 12.50pm |
| 5. Establishing a Global Tailings Management Institute | 1.35pm |
| 6. Addressing the legacy of Tailings Waste | 1.40pm |
| 7. Concluding Session | 2.05pm |

Investor Mining & Tailings
Safety Initiative



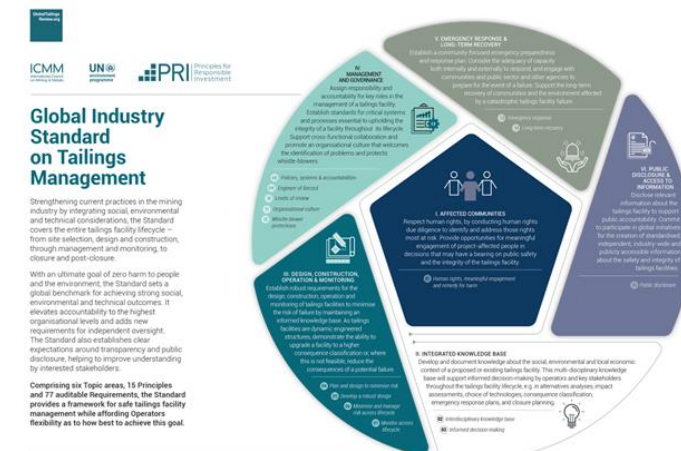
Act of Remembrance

Led by the Rt Revd Dr David Walker
The Bishop of Manchester



Community Perspective: Vagner Diniz Camila and Luiz Taliberti Institute

Investor Mining & Tailings
Safety Initiative



Progress on Implementing a Global Standard:

Investor Mining & Tailings Safety Initiative



GISTM Disclosures for Extreme and Very High Consequence Category TSF's

Summary Presentation

David Cooling, UNEP & PRI Tailings Expert
24/01/2024

Background

- Following the 2019 Tailings Storage Facility failure at Brumadinho, Brazil, UNEP, ICMM and PRI co-convened the Global Tailings Review, lead by Dr Bruno Oberle, who acted as Independent Chair.
- This review culminated in the formal release of the Global Industry Standard on Tailings Management (GISTM) in August 2020.
- ICMM members committed to implement the standard, placing a priority on all ‘Extreme’ and ‘Very High’ potential consequence tailings storage facilities, with the aim of having these facilities in conformance with the Standard by August 2023. This would then be followed with all other facilities by August 2025.
- Following is a summary of the progress toward conformance by the ICMM member companies as reported in their disclosure summaries released on or before 04th August 2023. A desk-based review of the disclosures was undertaken by UNEP and PRI’s Tailings Expert. The results have been shared with companies in advance through ICMM and individual company feedback sought on the presentation of this information.

General Overview of ICMM Member Disclosures

- The release by ICMM members represents a major step forward in transparency, with companies providing details of the relevant TSFs along with the level of conformance, gaps and summary of actions/timing for closing the gaps.
- Progress toward Conformance represents a very significant volume of work by many companies, particularly those with a large inventory of TSF's.
- Main gaps seem to be associated with Principles 4 and 5 (assembly of design/design criteria/knowledge base), understandable given the long history of some facilities.
- All have provided summary information against the GISTM disclosure Requirement 15.1 – level of detail varies, but basic information has been provided.

General Overview of ICMM Member Disclosures

Aspect	Summary
Number of ICMM Member Companies	25
Number of TSFs reported as Extreme or Very High Consequence Category	Extreme = 113 , Very High = 125
Number of Companies who have reported their level of conformance with the GISTM	23*
Number of Companies to have had their reported conformance independently verified	8
Number of TSF's reported with Requirements that are in Conformance	~60%
Number of TSFs reported with some Requirements that require some further work	~40%**

* Two companies do not have any Extreme or Very High TSF

** Reported as not yet in full conformance, but in most cases, gaps have been identified and plans in place to close gaps

Compilation of Data

For a member of the public looking for information related to a specific TSF, it is quite easy to find a specific TSF and associated disclosure, but compiling and comparing disclosure data has been quite a challenge given the very different approaches to disclosures taken by the different companies.

Aspect	Different approaches taken
Approach and format of reporting	Excel spreadsheets PDF for each TSF Single PDF covering a number or all TSFs Web based detail (not downloadable) Map location with drill downs – some with web data, others with downloadable PDFs PDF Exec Summary with links to further detail
Interpretation of Conformance	No Gaps identified = conforming Gaps identified but actions to address these in progress = conforming Gaps identified but with plans to address these = conforming for some, partially conforming for others
Reporting of Conformance	Meets, Partially Meets, Does Not Meet Meets with a plan # of requirements that meet, # of requirements that partially meet % of requirements that meet, % of requirements that partially meet Further breakdown of the requirements into specific deliverables and whether these have been met

Compilation of Data (Continued)

Aspect	Different approaches taken
Assignment of Consequence	Majority based failure on Physically Possible Some have chosen to excluded TSF's based on no credible failure mode (adoption of Physically Possible and Credible) Some have chosen to excluded TSF's based on declaration of Safe Closure
Definition of Tailings Facility (TF)	Majority report on each individual Tailings Storage Facility (TSF) Some have grouped a number of TSFs and report on them as a single TF
Independent Verification of Conformance	Self-Assessment only Independent check of Self-Assessment Independent verification of selected TSFs Full independent verification of all Requirements
Observations related to 2019 Church of England disclosure request	Good alignment by some companies – updates would be required by others for alignment (timing of updates) Exclusion of Non-Operated Joint Ventures Re-classification of TSFs (some to higher/lower consequence, others aligning Consequence Categories with GISTM)

Overall Summary of Disclosures

ICMM Member Company	Included in Disclosures		Total # of TSFs	Level of Conformance		Independent Verification of Conformance
	Extreme TSFs	Very High TSFs		# TSFs that have been declared as in conformance by companies*	# TSFs that some companies have identified as requiring further work**	
Alcoa	1	11	12	10	2	Yes
African Rainbow Minerals	5	1	6		6	Yes
Anglo American	7	5	12	5	7	No
Anglo Gold Ashanti	9	7	16		16	No
Antofagasta	1	0	1	1		No
Barrick	5	9	14	14		No
BHP	2	20	22	22		No
Boliden	1	1	2		2	No
Codelco	11	0	11	11		No
Glencore	8	7	15		15	Yes
Goldfields	1	3	4		4	No
Hydro	0	3	3	3		No
Freeport	3	0	3	3		Yes
Minera San Cristóbal	No Very High or Extreme TSFs					
MMG	2	1	3		3	Yes
Newcrest	1	8	9		9	No
Newmont	7	4	11	1	10	No
Minsur	No Very High or Extreme TSFs					
Rio Tinto	6	8	14		14	Yes for 6
Orano	1	1	2		2	No
Sibanye-Stillwater	14	8	22	22		No
South 32	0	4	4	4		Yes
Sumitomo Metal Mining	1	1	2		2	No
Tech	3	6	9	4	5	No
Vale	24	17	41	41		Yes
	113	125	238	141	97	

* Some requirements may require further work, but declared as conforming if plans in place to meet requirement ("Meets with a Plan")

** Although some requirements noted as "Partially Meets", most will have plans in place to close identified gaps.

Disclaimers

- Summary Table may not truly reflect the individual company status of the TSF data provided, given the different impenetrations companies have placed on aspects of their Disclosures and Levels of Conformance
- Readers should conduct their own review and interpretation of the disclosure data provided by the companies, and if necessary, contact the companies directly for any clarifications

Reflections by UNEP & PRI on these first GISTM disclosures:

Overarching reflection from UNEP and PRI's assessment is that there has been considerable efforts and investments by ICMM member companies to meet this first reporting commitment. Inevitably with a new global Standard there will be variations in interpretation. However, this has strongly reinforced the need to establish an independent **Global Tailings Management Institute** to support the industry to further develop greater consistency in application/conformance with the Standard in future reporting. Specifically:

- There is a need for stronger guidance on the format of reporting and the level of detail to be included in disclosures.
 - Strive for greater consistency in reporting
 - Focus on the key detail, particularly with the number of TSF to be reported on by Aug 2025.
- The need for independent auditing/verification to be a part of the conformance assessment.
- Review of audit protocols that continue to drive toward a cultural change in tailings management.
- Need for the Institute to provide independent assessment of coherence between GISTM and MAC-TSM.
- Continued promotion of the Standard and its adoption by the many companies who are yet to commit to applying the GISTM.

Company and Industry Reflections on Implementing the Standard:

**Investor Mining & Tailings
Safety Initiative**





Implementation of the Global Industry Standard on Tailings Management – Social Impact

January 2024

2023 GISTM Disclosure

2023 Disclosure

- Disclosed information on 12 TSFs in August 2023, located in Chile, Brazil, South Africa
- Disclosure reports for each individual TSF, covering TSF-specific technical information; the TSF risk management system; the emergency management system; and level of GISTM conformance by requirement.

GISTM Disclosure Report: Minas-Rio Tailings Storage Facility – Barragem de Rejeitos

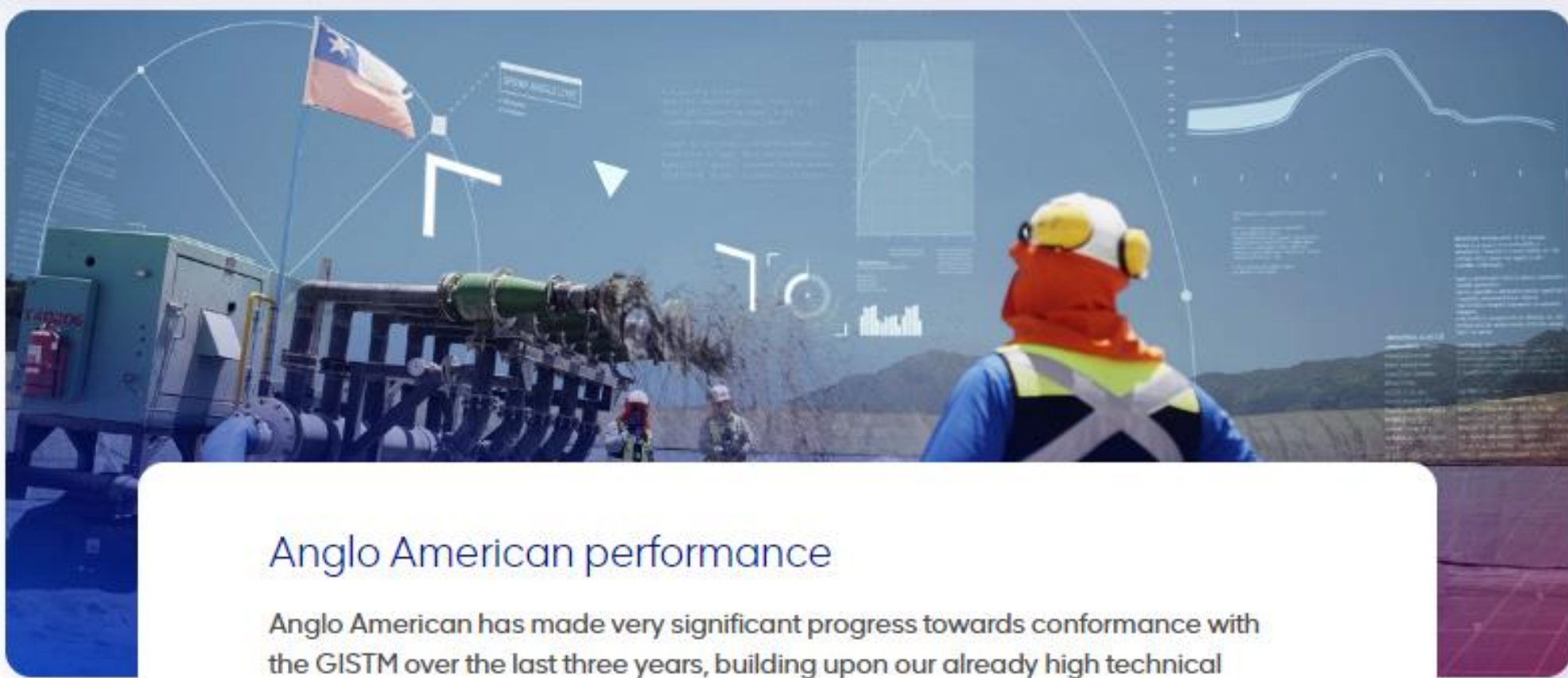


This Report summarises information related to the Minas-Rio Tailings Storage Facility (TSF), Barragem de Rejeitos, including data specified by the Global Industry Standard on Tailings Management (GISTM)¹ Requirement 15.1 as well as a summary of current GISTM conformance levels.

This Report is organised in four sections, as follows:

- 1 – Minas-Rio TSF Description
- 2 – Minas-Rio TSF Risk Management
- 3 – Minas-Rio TSF Emergency Management
- 4 – Minas-Rio TSF GISTM Conformance Summary

Appendix A includes a concordance table that maps the sections of this Report with each of the GISTM Requirement 15.1 disclosure criteria.



Anglo American performance

Anglo American has made very significant progress towards conformance with the GISTM over the last three years, building upon our already high technical standards.

We continue our prudent approach to align with a number of specific GISTM requirements, as well as the social and community aspects that are already encompassed in our comprehensive Social Way management system. We are addressing the few outstanding areas and have set out the work needed to get us there.

Anglo American is continuing to work towards conformance in respect of its TSFs that are within the other three lower consequence categories by August 2025, in line with the commitment made by all ICMM member companies.

Social performance aspects of GISTM implementation

There are grey areas in the social performance-related requirements and what good looks like is not always clear...

- Meaningful engagement
- Knowledge base
- Free Prior and Informed Consent
- Pre-emptive resettlement
- Emergency response
- Recovery planning

...a risk-based approach informed by knowledgeable experts must be applied on a case-by-case basis

Solving for an audit or for effective tailings management and emergency response?

- Is GISTM improving cross-functional collaboration, better assessment and management of off-site social and environmental impacts, better emergency preparedness? *YES*
- Are efforts too focused on developing evidence for audits, and can this be unreasonably expensive and distracting from a risk-based approach that improves tailings management and emergency response? *YES*

Thank you!

Non-ICMM company adoption of the Standard:

Investor Mining & Tailings
Safety Initiative



Companies Confirming Status of Commitment to Global Tailings Standard			
GISTM Category	Number	Market Cap (USD, M)	Percentage
ICMM Companies	24	677,610.88	38.15%
Non ICMM Companies Commitment to Implement GISTM	53	241,792.05	13.61%
Reviewing / Engaging re GISTM	13	27,076.07	1.52%
Applying MAC/TSM (Also Reviewing/Engaging GISTM)	5	32,217.61	1.81%
Applying MAC/TSM (Not GISTM) (Confirmed by MAC)	17	164,698.96	9.27%
Applying MAC/TSM (Not GISTM) (Confirmed by Correspondence)	1	1,157.00	0.07%
Imminent Response (Disclosure Expected)	5	7,372.48	0.42%
No Formal Response / Alternative Standard (Not GISTM/MAC)	126	624,027.90	35.14%
Total	244	1,775,952.95	
Notes: <ol style="list-style-type: none"> 1. ICMM Member companies committed to implement the Standard in Aug 2020 2. Investor Engagement has been led by the Church of England Pensions Board with non-ICMM companies 3. GISTM is the Global Industry Standard on Tailings Management 4. MAC-TSM is the Minerals Council of Canada Towards Sustainable Mining Standard which is viewed as close to the requirements of the GISTM, but subject to review by the independent Global Tailings Institute once it is formally operational 5. Some companies have identified they are seeking to operate to both GISTM globally and to MAC TSM specifically for their Canadian operations 			

Summary of Results:

- **77 major publicly listed mining firms**, representing over **half of the market capitalisation of listed mining companies**, have now committed to adopt the tailings safety standard initiated by UNEP, ICMM and the PRI (represented by the Church of England Pensions Board and Swedish Public Pension Funds).
- The 77 mining companies include **24 ICMM member companies** which committed to implementing the Standard when it was launched in August 2020.
- In addition to the 77 a further **36 companies** are either committed to reviewing the [Global Industry Standard on Tailings Management](#) (GISTM) with a view to implementing it or are implementing the [Mining Association of Canada Towards Sustainable Mining Standard](#) (MAC-TSM). Taken together these **113 companies represents 64.43% of the market by capitalisation of all listed mining companies**. Of which those committed to GISTM are 51.76 of the market.
- The names of **126 largely smaller mining companies** have yet to confirm they will adopt the Global Industry Standard. These have today been published on the website of the Church of England Pensions Board.

Next Steps:

- List of non-responding companies now publicly available and will be updated monthly.
- Those that have made commitments will be tracked as to when they will seek to conform to the Standard.
- Investor engagement by the initiative with the 126 companies.
- Members of the initiative will individually determine if they will use proxy voting at company AGMs – some funds have indicated already they will.
- The Church of England Pensions Board is to consider a shareholder resolution on tailings risk management.
- Engagement with banks and insurers by the initiative related to their support for the Standard.

Approaches of Governments/Regulators:

Investor Mining & Tailings Safety Initiative

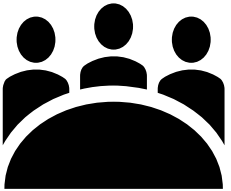


Environmental Aspects of Minerals and Metals Management

Mining & Tailings Safety Initiative Investor Roundtable
24 January 2024

Elisa Tonda, Chief, Resources and Markets Branch
UNEP

UNEA Intergovernmental Process



United Nations Environment Assembly (UNEA) resolutions

- **UNEA 4/19** resolution on mineral resource governance adopted in 2019
- **UNEA 5/12** resolution on environmental aspects of minerals and metals management adopted in 2022
- **Follow-up UNEA-6 draft resolution** submitted by Senegal and Switzerland, along with Armenia, Armenia, Burkina Faso, Cameroon, Democratic Republic of Congo, Gambia, Haiti, Sierra Leone, and Tchad submitted in 2023, to be negotiated at UNEA-6

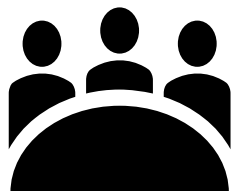


The main elements of the UNEA 5/12 are:

- Focus on improving the **environmental aspects of minerals and metals along their full life cycle**
- Requests UNEP to convene **intergovernmental consultations with the aim of developing non-prescriptive proposals** to enhance the environmental sustainability of minerals and metals along their full life cycle, in line with the 2030 Agenda for Sustainable Development (OP2)
- To strengthen scientific, technical and policy knowledge with regard to **sand** (OP 3)
- to compile a report on knowledge gaps in relation to the environmental aspects of **tailings management** (OP5)

UNEA Intergovernmental Process (continued)

Results from UNEA 5/12 intergovernmental consultations:



- **24 non-prescriptive proposals** emerged from five intergovernmental regional consultations + one global intergovernmental meeting held between April – September 2023
- Grouped thematically:
 - A) Policies and Tools including:**
 - *Produce a global collection and assessment of existing instruments and standards*
 - *Capacity-building, technical assistance to improve environmental sustainability of mining*
 - *Establishment of a Global Sand Observatory*
 - B) Minerals and Metals along the Entire Value Chain including:**
 - *Circular economy, sustainable consumption and production*
 - *Tailings (inventory, technical assistance, implementation of the GISTM)*
 - *Closure (inventory, guidelines and technical assistance)*
 - C) Platforms for International Cooperation, including:**
 - *Establishment of an open-ended working group to follow-up on non-prescriptive proposals*
 - *Collaboration with international organizations, Multilateral Agreements*

Report on Knowledge Gaps in Relation to Environmental Aspects of Tailings Management

Key issues raised:

- **Legacy tailings sites** are a problem globally
- **Long-term monitoring, restoration or re-mining of old tailings hindered** by:
 - Poor practices in terms of costing and securing sufficient financial guarantees for mine closure, and
 - Poor record-keeping of site locations and tailings composition.
- **Multiplicity of existing voluntary standards** (without enforcement mechanisms), from different sources, with different focuses, which can undermine adherence and effectiveness.
- **Re-mining, re-processing and re-purposing of tailings present interesting opportunities**, but need more research to understand feasibility, potential impacts, and regulatory barriers.
- **Circularity approaches could be incentivised** at consumer level through public education programmes, traceability schemes with focus on mine waste.

Report on knowledge gaps in relation to the environmental aspects of tailings management (continued)

Recommendations from the Tailings Gap Report included:

1. A ***global assessment*** of existing tailings management instruments, to assist streamlining and consolidation, to assess gaps, and to compare costs and effectiveness.
2. **Wider adoption of GISTM**, including within national legal frameworks and by smaller-scale companies.
3. **Establishment of independent Global Tailings Management Institute**, focused on oversight of GISTM, capacity-building, and technical and legislative support.

Resources

Initiative page on UNEA 5/12 implementation:

<https://www.greengrowthknowledge.org/initiatives/environmental-aspects-minerals-and-metals-management>

UNEA resolution 5/12 on environmental aspects of minerals and metals management:

<https://wedocs.unep.org/bitstream/handle/20.500.11822/39927/ENVIRONMENTAL%20ASPECTS%20OF%20MINERALS%20AND%20METALS%20MANAGEMENT.%20English.pdf?sequence=1&isAllowed=y>

Co-Chairs' Summary Report of the UNEA 5/12 Global Intergovernmental Meeting (7-8 September 2023):

<https://www.greenpolicyplatform.org/sites/default/files/downloads/tools/Report-UNEA%20512%20Global%20Intergovernmental%20Meeting-V2.pdf>

Tailings Report (available soon) here: UNEP/EA.6/INF/8

<https://www.unep.org/environmentassembly/unea6/unea-6-documents>

UNEP's work on extractives: <https://www.unep.org/explore-topics/extractives>

Compendium of papers prepared for the Global Tailings Review:

<https://globaltailingsreview.org/compendium/>

Thank you



United Nations Avenue, Gigiri
PO Box 30552 – 00100 GPO Nairobi, Kenya

www.unep.org

OVERVIEW OF TAILINGS DAMS IN BRAZIL

BRAZILIAN MINING AGENCY

MINING DAM SAFETY SUPERINTENDENCE (SBM)

Luiz Paniago Neves
SBM Superintendent

January 2024



ANM

Agência
Nacional de
Mineração

SCHEDULE

Overview on mining dams
in Brazil

Mining Dam Safety
Superintendence (SBM)

Brazilian regulation

Field and remote dam
inspection

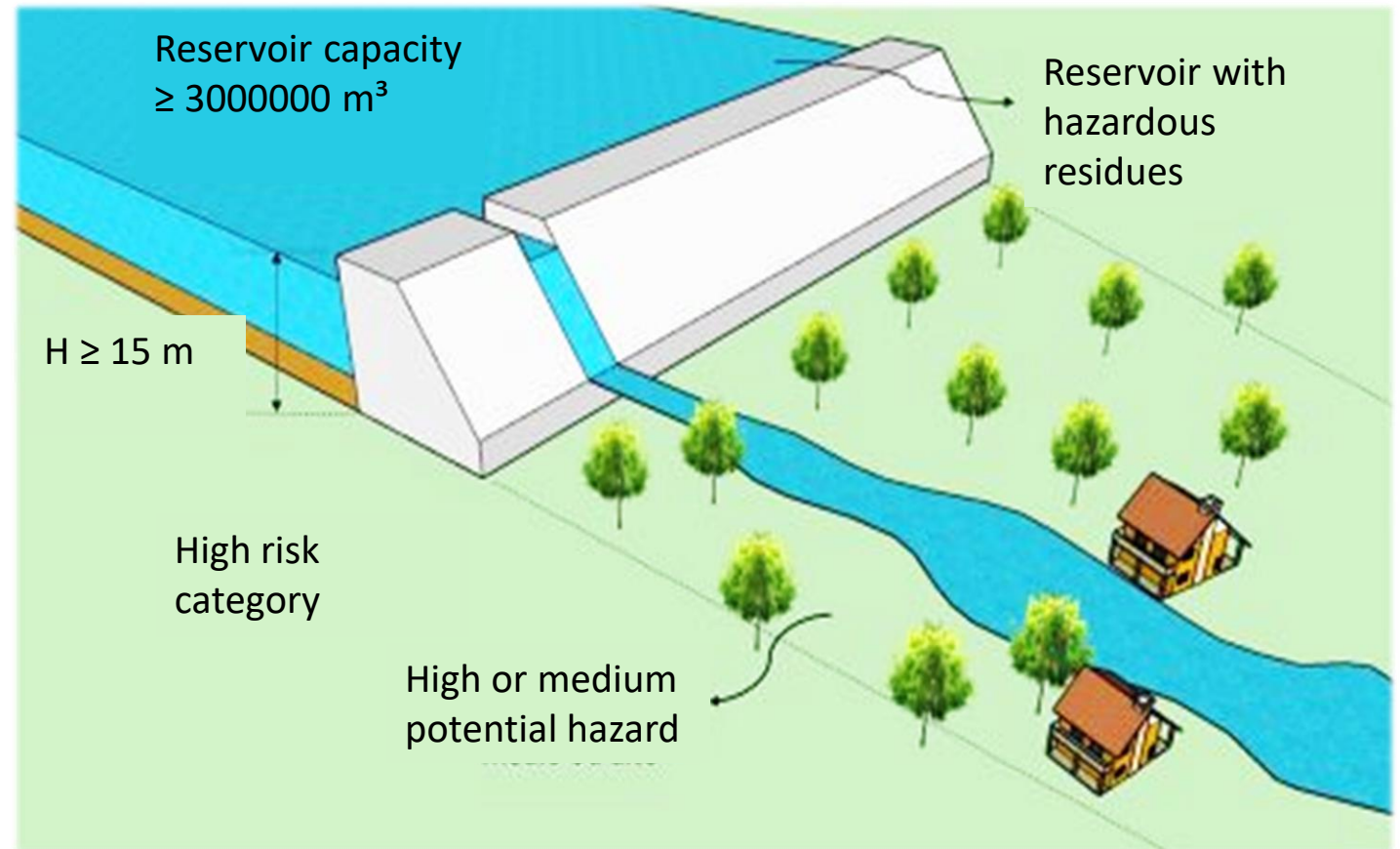
NATIONAL DAM SAFETY POLICY (PNSB)

NATIONAL DAM SECURITY POLICY

- Brazilian law n. 12,334/2010

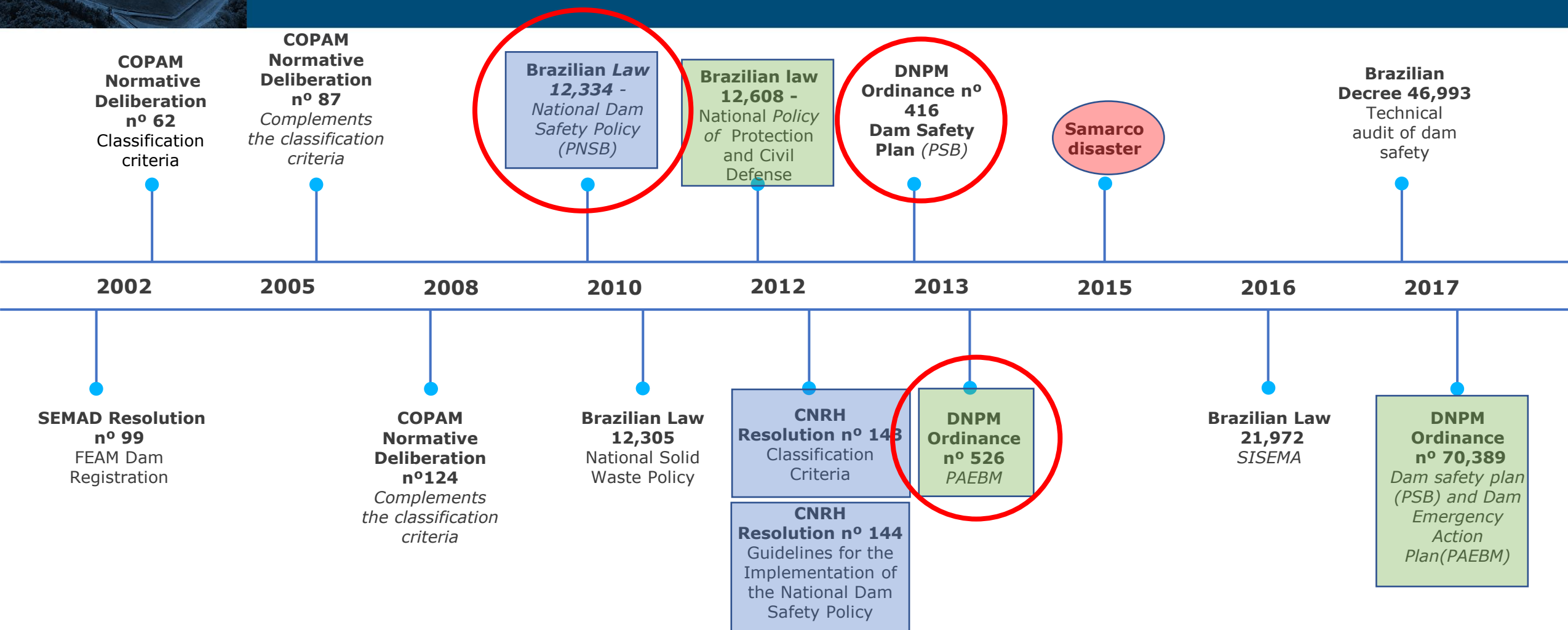
Presents the obligations that must be followed by owners of tailing dams that meet at least one of the following criteria:

- Dam height $\geq 15\text{m}$;
- Reservoir volume $\geq 3000000\text{ m}^3$;
- High or medium potential hazard;
- Hazardous Residues; or
- High risk category.



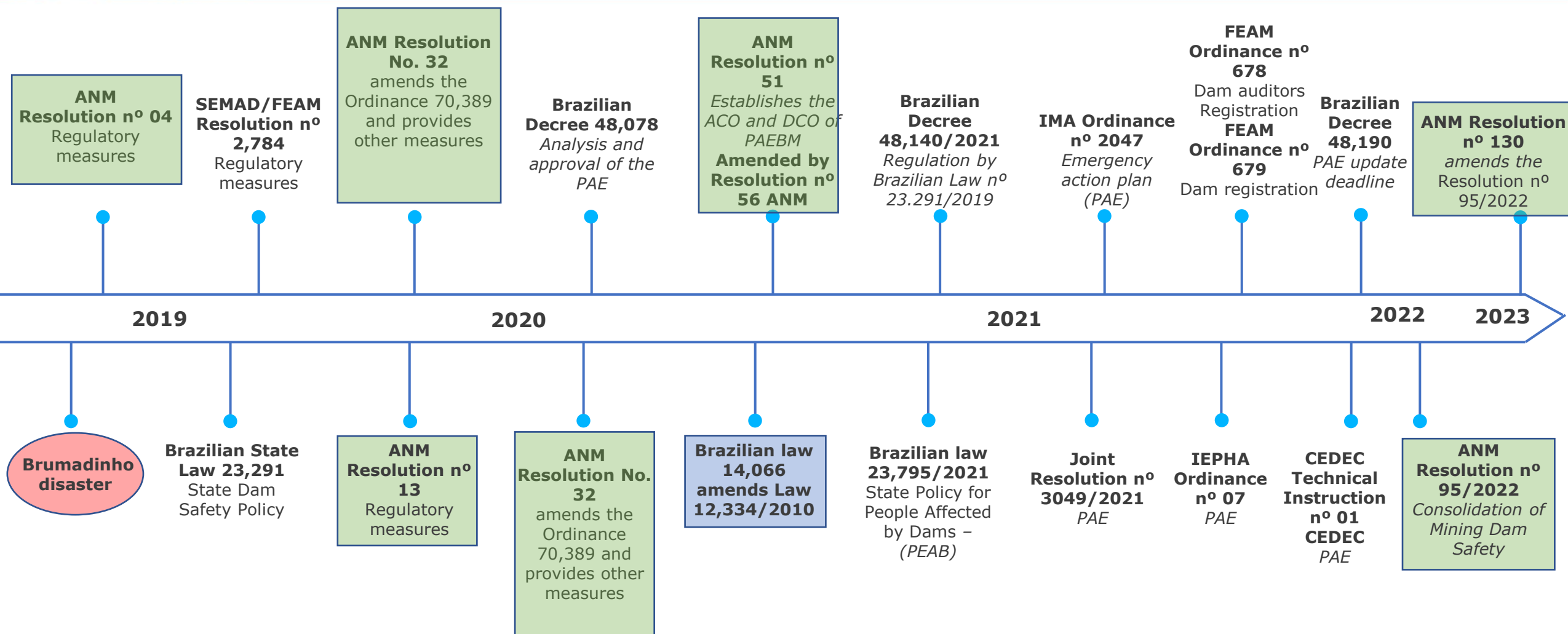


DAM REGULAMENTATION

**ANM**Agência
Nacional de
Mineração

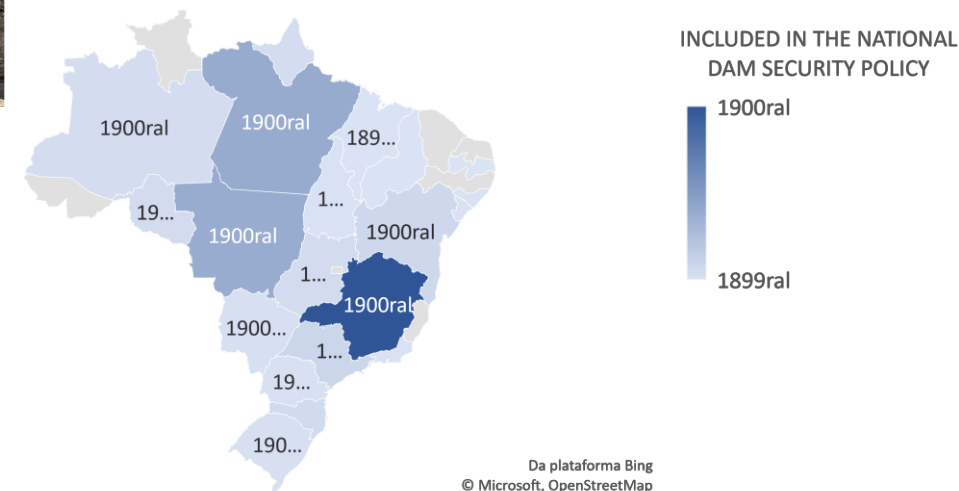
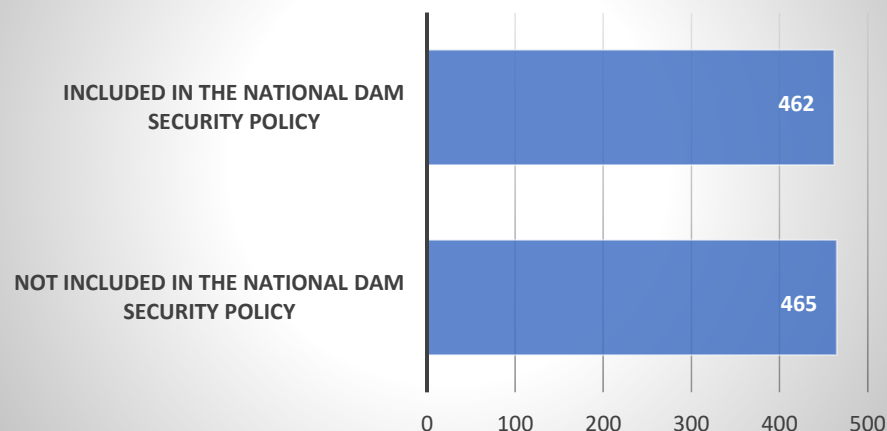


DAM REGULAMENTATION

**ANM**Agência
Nacional de
Mineração

MINING DAM SECTOR IN NUMBERS IN BRAZIL

MINING DAMS



Total: 927 Mining Dams in Brazil



MINING DAM CLASSIFICATION IN BRAZIL



Risk Category (CRI)

Relates to aspects that may influence the possibility of an accident or disaster occurring, taking into account the **technical characteristics**, the construction method, the **state of conservation**, the age of the dam, and compliance with the **Dam Safety Plan**.

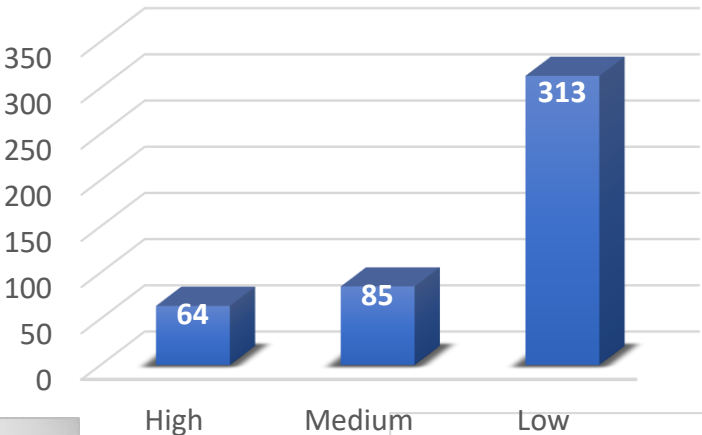
Associated Hazard Potential (DPA)

Relates to the hazard that may occur due to the breach, leakage, seepage into the ground or malfunction of a dam, regardless of its probability of occurrence, to be graded according to the loss of human life, social, economic and environmental impacts.

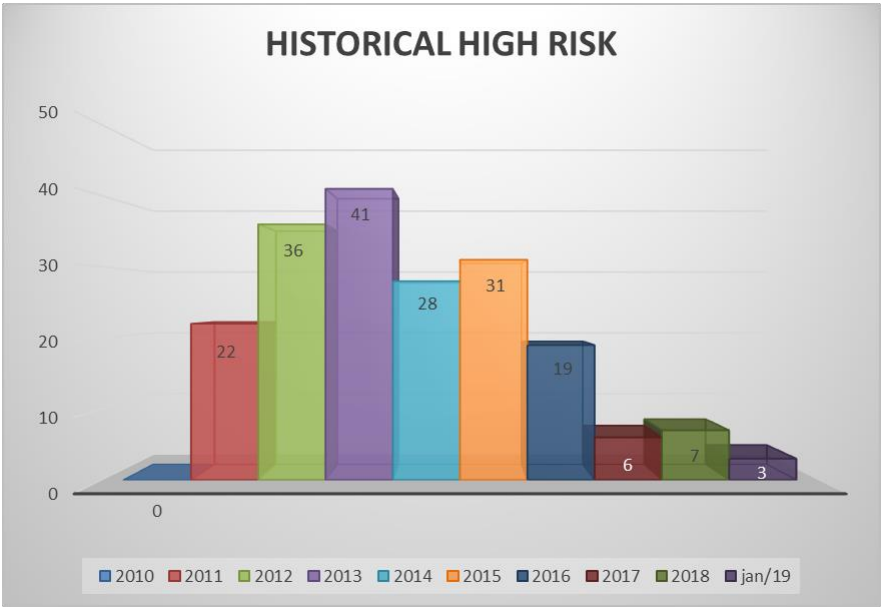


SECURITY OVERVIEW OF DAMS IN BRAZIL

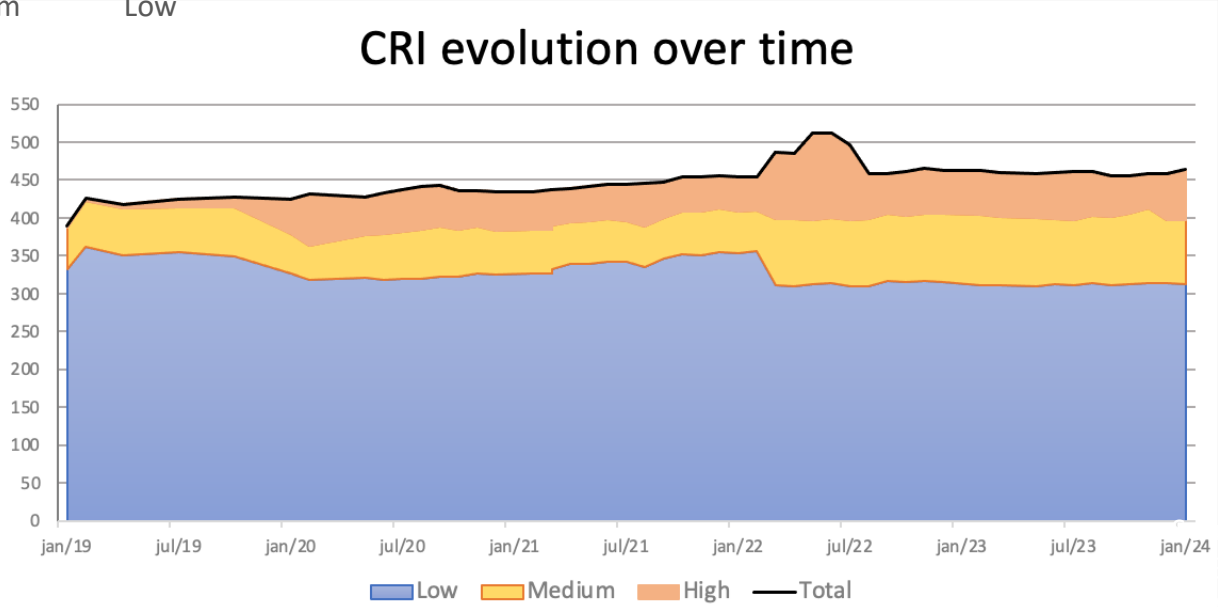
Risk Category - CRI



HISTORICAL HIGH RISK



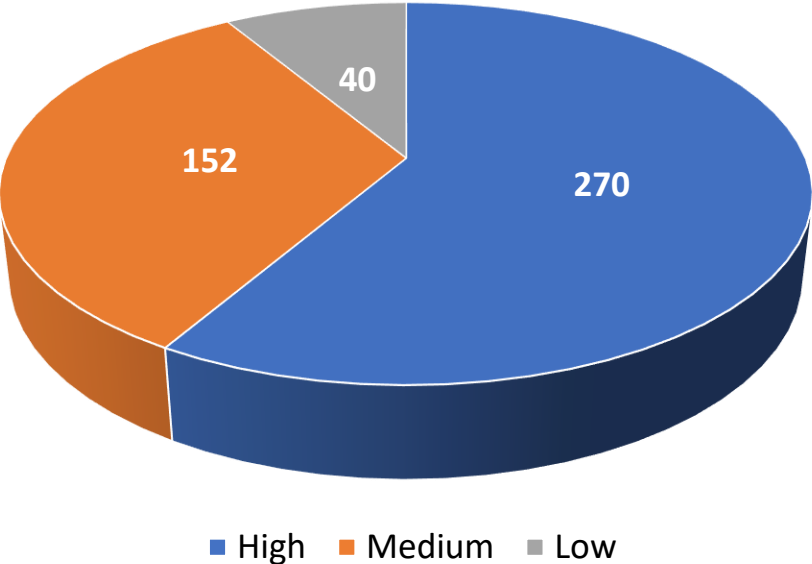
CRI evolution over time



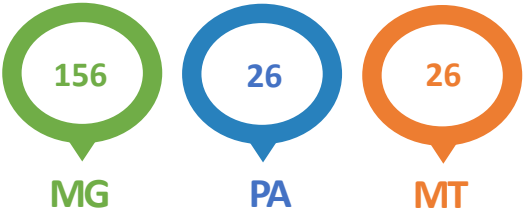


SECURITY OVERVIEW OF DAMS IN BRAZIL

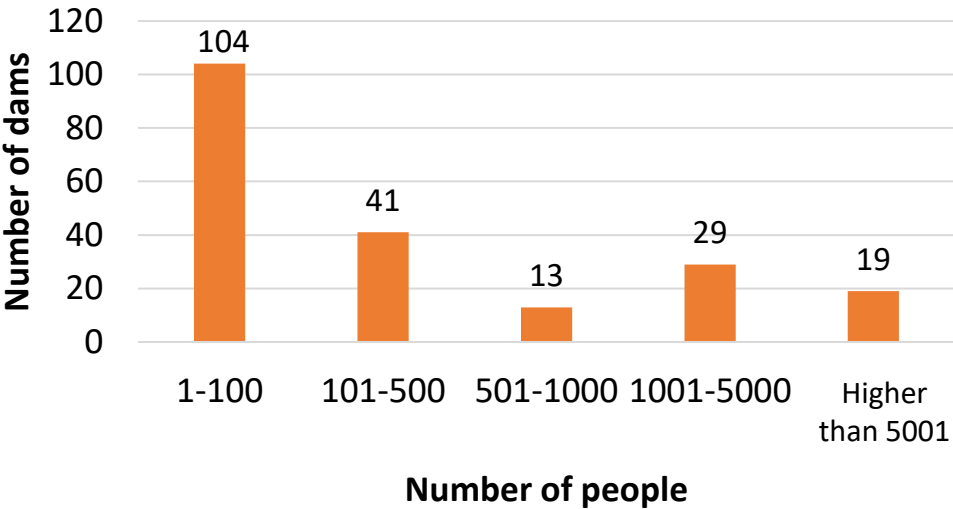
DPA
Associated Hazard Potential



HIGH DPA /STATE



POTENTIALLY AFFECTED POPULATION





SECURITY OVERVIEW OF DAMS IN BRAZIL

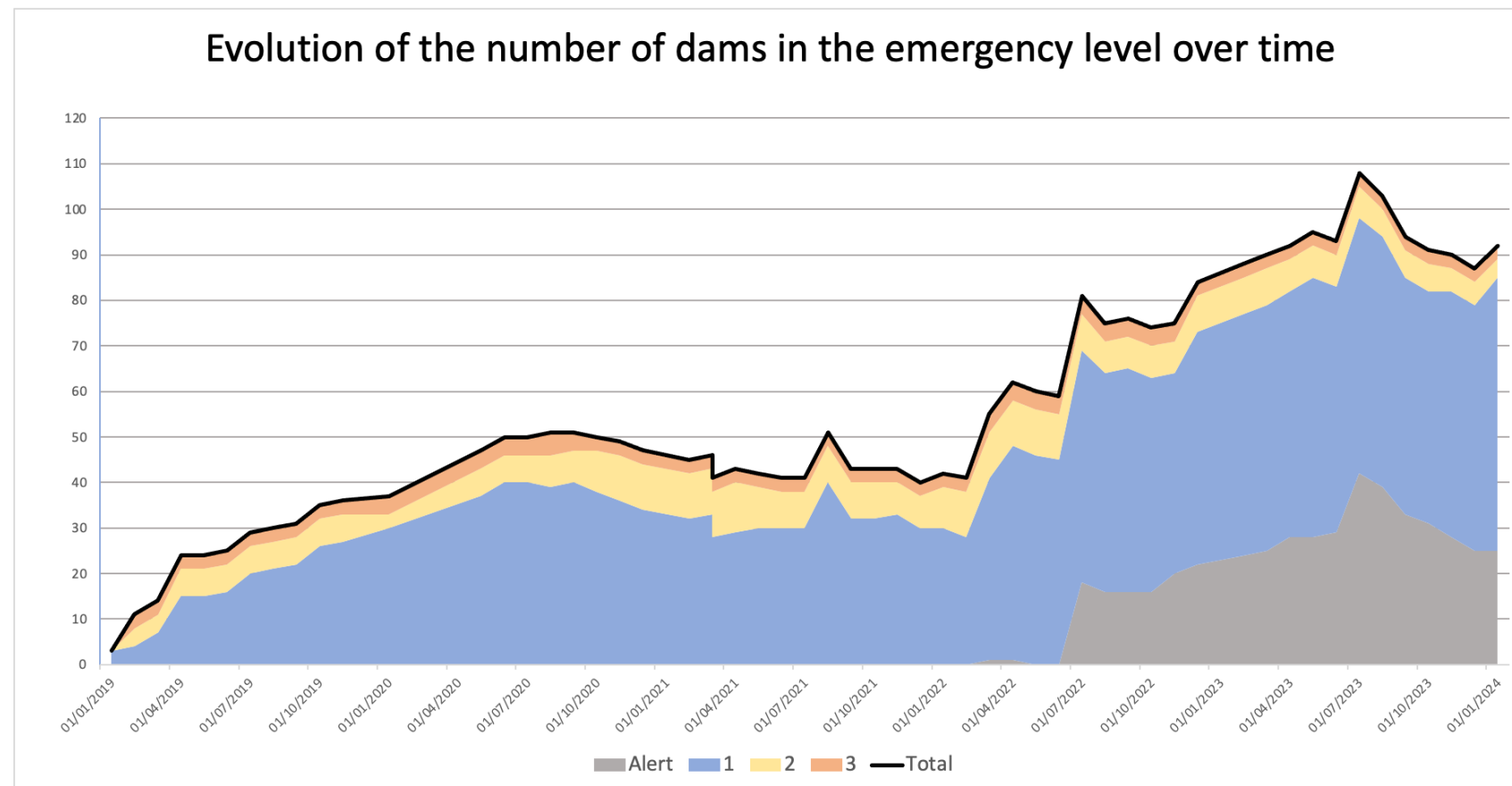
Emergency Level

Dams (1, 2 and 3)

Used to classify potential emergency situations that may compromise dam safety (anomalies, factor of safety, hydraulic safety)

They require routine actions by the SBM team.

Ex.: Level 3 is inspected quarterly.



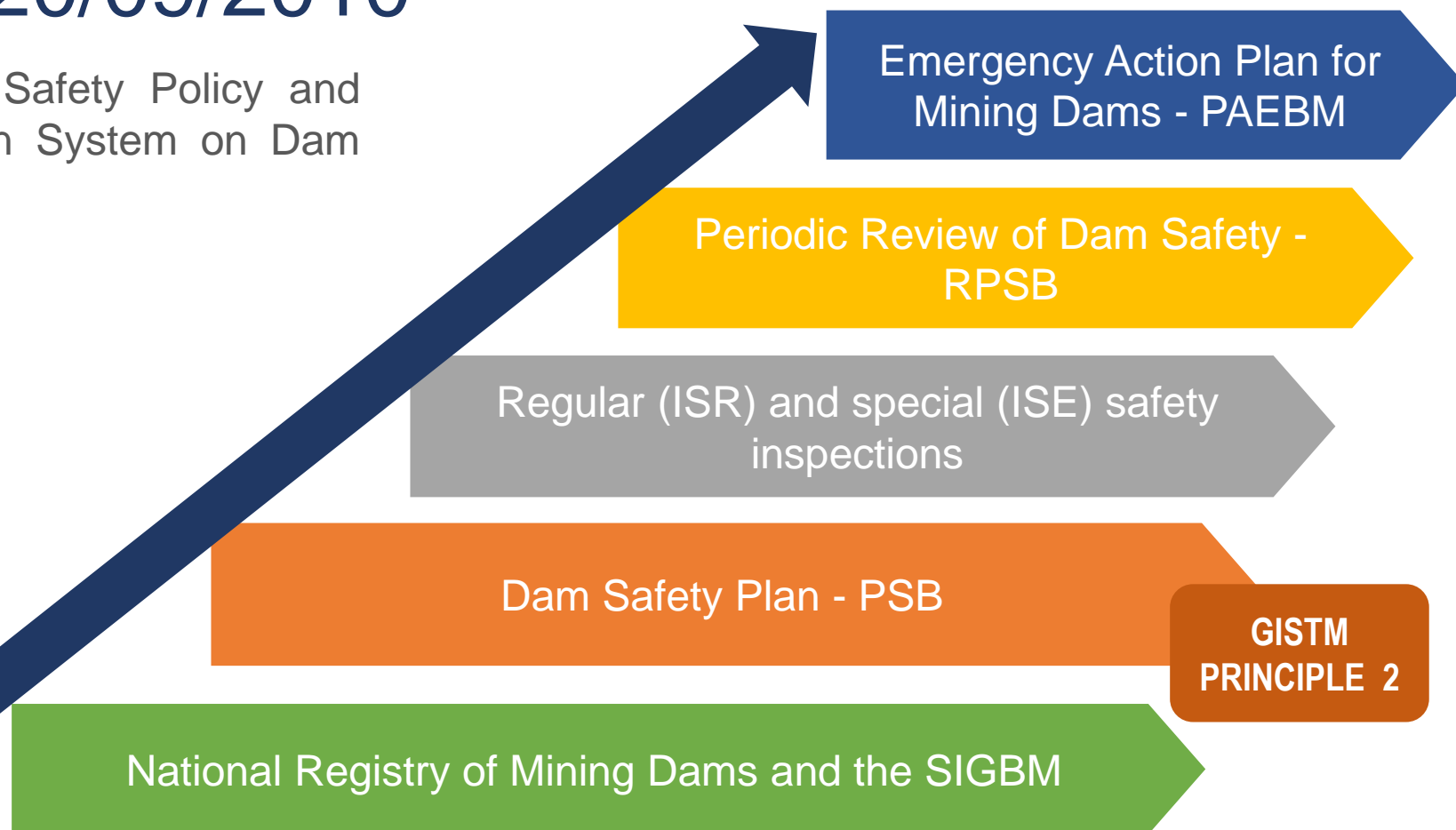


REGULATION

Law 12.334, de 20/09/2010

Establishes the National Dam Safety Policy and creates the National Information System on Dam Safety.

Resolution
ANM nº
95/2022





RESOLUTION ANM Nº 95/2022

01

Breach analysis and
Emergency Response Plan
mandatory for all mining
dams

GISTM
PRINCIPLE 13

02

Mandatory Risk Assessment
and Management
for all dams with high DPA
(Consequence Classification)

GISTM
PRINCIPLE 6

03

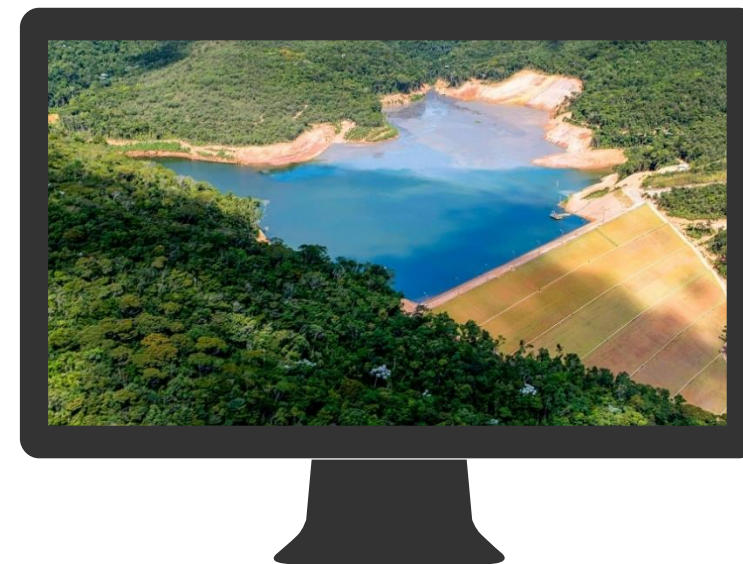
EoR mandatory for all dams with
high DPA (Consequence
Classification)

GISTM
PRINCIPLE 9

04

Minimum qualification for the
professional engineers
responsible for technical
documents

GISTM
PRINCIPLE 8





ANM Nº 95/2022 RESOLUTION

GISTM Principle 06

RISK MANAGEMENT PROCESS - PGRBM (Chapter VII)

IMPROVEMENT OF THE ENTREPRENEUR'S MANAGEMENT SYSTEM

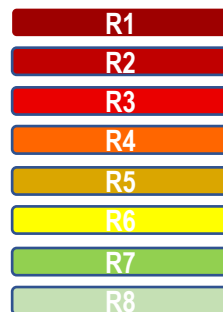


Risk Analysis

- **Anticipate each phase of the life cycle**



Update in maximum 2 years,
in cases of Art. 53.



- Identification;
- Analyze;
- Evaluation; and
- Classification

Acceptable

ALARP



Unacceptable

Stop the release of effluents/tailings and
maintain monitoring



Multidisciplinary team with a leader
with experience in risk analysis
(EoR must be part of a team)

Existing dams with community in self-rescue zone (ZAS)

GISTM Principle 01

Study of alternatives

(cost, risk, and benefit ratio)

De-characterization;
Pop relocation. + rescue of cultural
heritage;
Reinforcement works – effective stability.



06/30/22

1

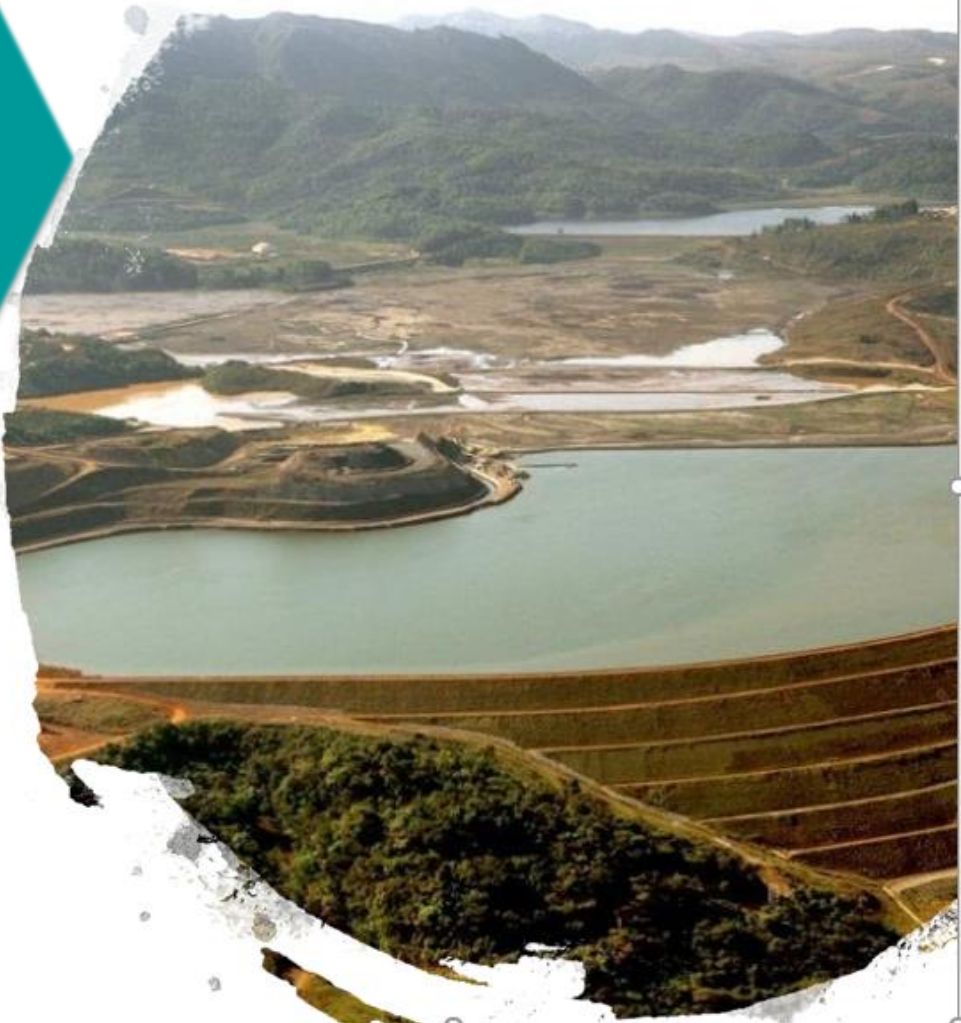
$FS_{und} \geq 1.5$ (peak)

2

Free edge ≥ 1 m or
according to project
(whichever is bigger)

3

CMG 24h/day



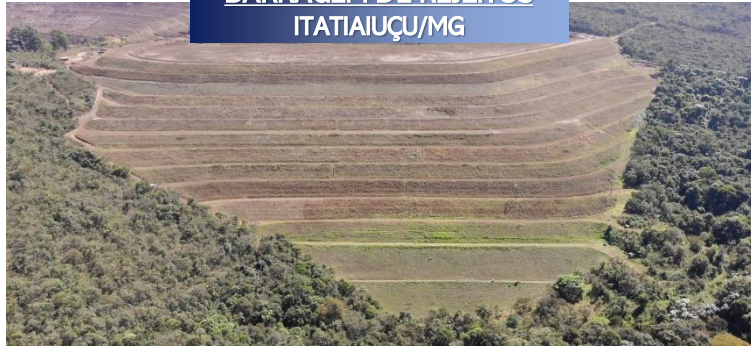
UPSTREAM TAILINGS DAMS DECHARACTERIZATION CHALLENGES

B2 - AUXILIAR
RIO ACIMA/MG



- Decharacterization concept:** excavation of the whole reservoir volume – store the excavated tailings in the form of tips/piles;
- Complex engineering work:** Large volume excavation in an upstream dam located immediately above another tailings dam;
- Geological and geotechnical risk:** lack of reliable information before the beginning of the works. Presence of contractive tailings;
- Environmental and social risk:** In the case of failure the tailings could contaminate important sources of fresh water.

BARRAGEM DE REJEITOS
ITATIAIUÇU/MG



- Decharacterization concept:** excavation of the whole reservoir volume – Tailings contain some grades of iron ore;
- Geological and geotechnical risk:** Poor geological-geotechnical information, lack of information about the freatic level (unreliable geotechnical instrumentation), very low FoS for undrained condition;
- Complex engineering work:** Construction of a back up dam located 2 km downstream using stored stainless steel piles, rockfill and concrete blocks before the beginning of the (de facto) decharacterization of the tailings dam.

UNIDADE IA IB
OUVIDOR/GO



- Decharacterization concept:** reduction of the hight of the dam, of the tailings volume and of the global slope angles. Reservoir closure and hydraulic adequations (drainage);
- Environmental and social risk:** Very rich fluoride tailings can contaminate watercourses around the mine. The mining beneficiation plants would be severely hit/damaged in the case of failure;
- Advanced decharacterization works.** Monitoring phase. Reduction of the risk of failure (significant increment of the FoS);



Operational Management Classification

What factors don't contribute to the increase in the score of operational management?

- Delivery of Declarations
- Existence of a Registration Engineer
- Management Program Risk for Dams Mining – PGRBM
- Certification and/or industry standards
 - The certification applies to the company that have ISO 31,000 or adopt the rules of International Council on Mining and Metals (ICMM)

OPERATIONAL MANAGEMENT		Points
CLASSIFICATION BANDS	Operational Management	GOP
	AA	0
	A	1 to 7
	B	8 to 35
	C	36 to 60
	D	>= 60

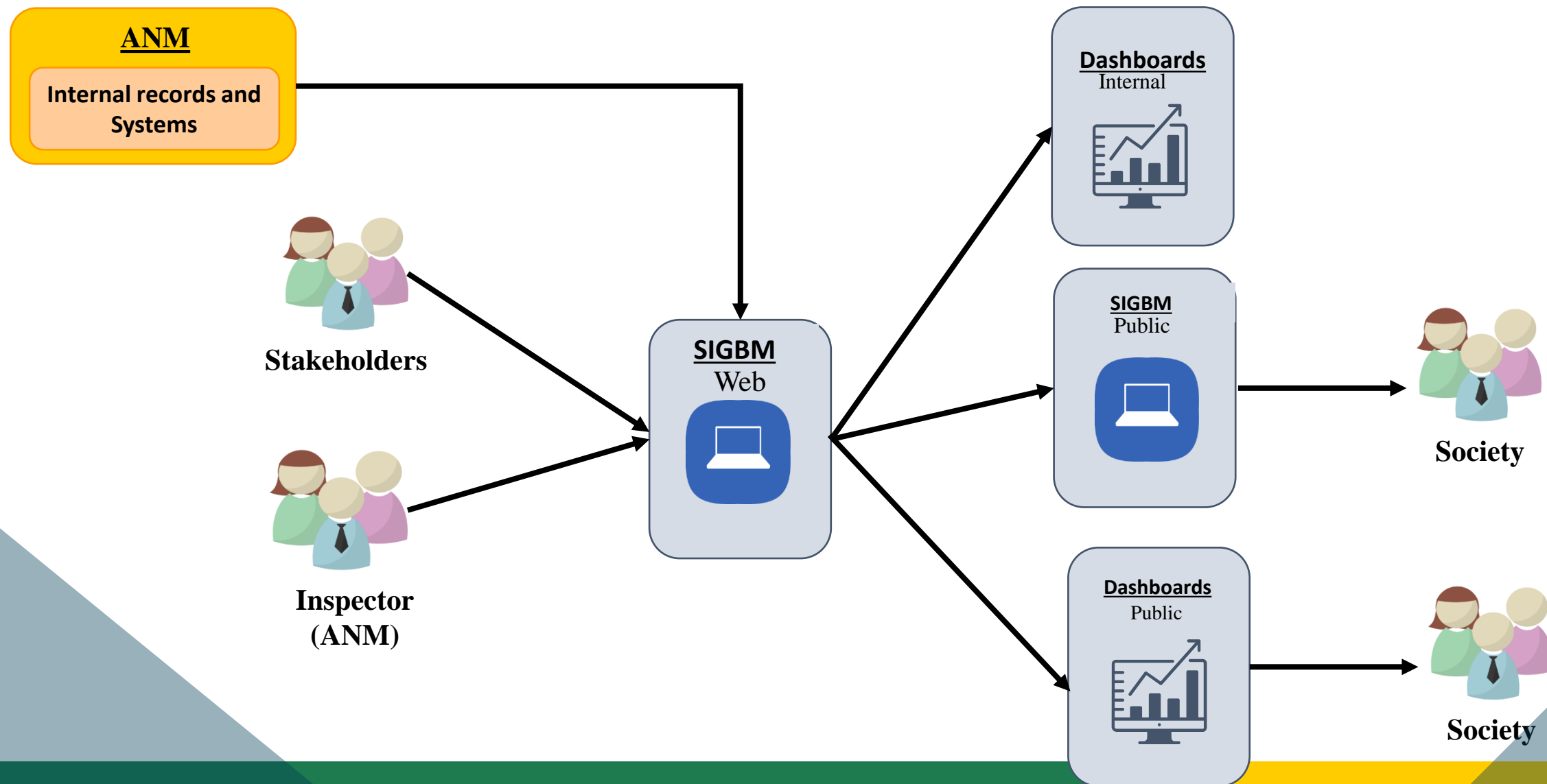
SIGBM

Integrated Management System for Mining Dams





SIGBM AND DASHBOARDS OPERATIONS



SIGBM WEBSITE VISITS

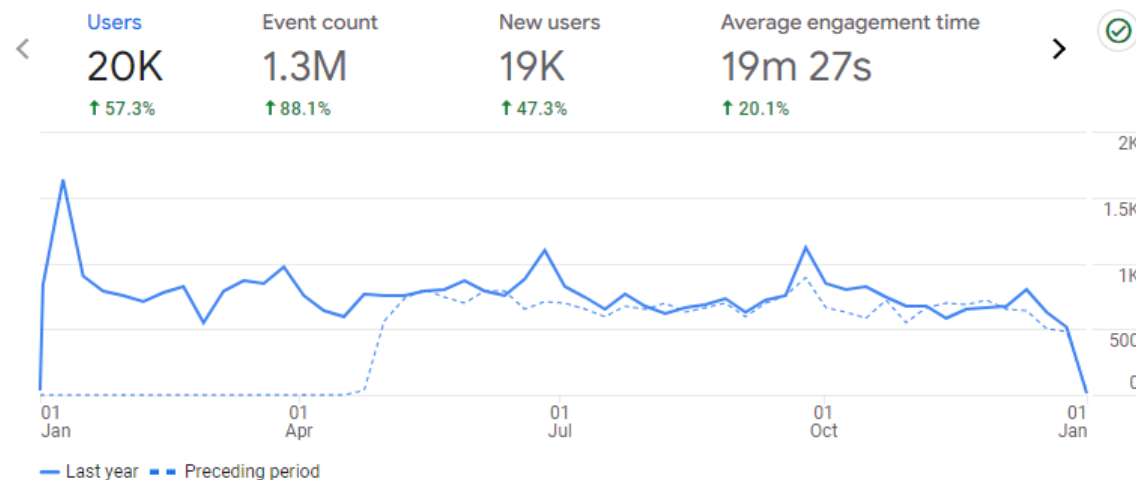
Users▼ by Country ID▼



COUNTRY		USERS
Brazil	19K	↑56.8%
United States	365	↑116....
Canada	57	↑159....
United Kingdom	40	↑5.3%
France	38	↑90.0%
Australia	31	↑244....
Netherlands	25	↑31.6%

Last year ▼ (nov/22 - nov/23)

[View countries →](#)



Last year ▼

[View reports snapshot →](#)



SIGBM



1

Unique Dam Safety Management System in Brazil and the World

2

Presents technical characteristics, geospatial location, inspection, accident, incident and safety information on all mining dams in Brazil

3

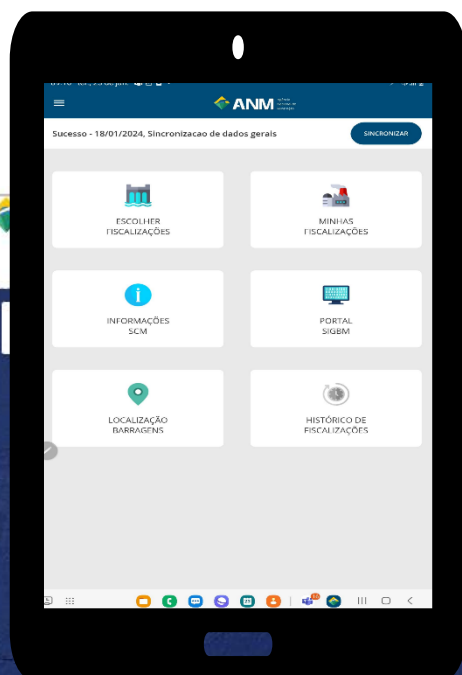
Information received: every 15 days by the entrepreneur

4

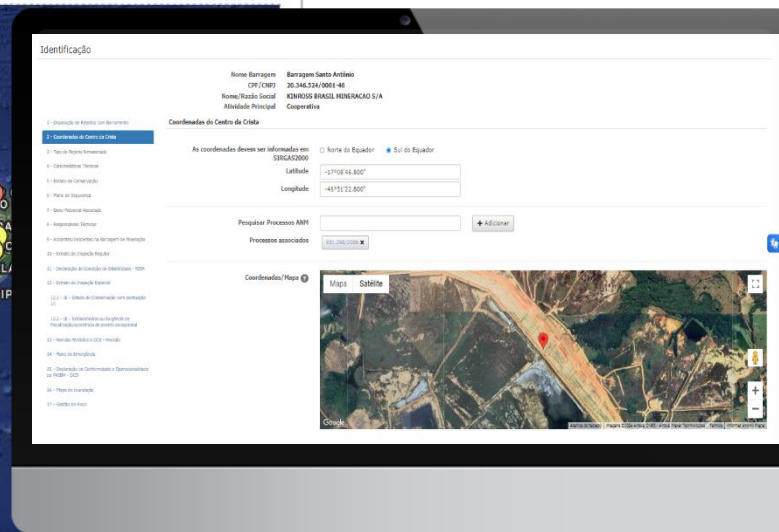
Update of dam information in real time

SIGBM- Objective

Increase the safety of structures



NACIONAL DE SEGURANÇA DE BARRAGENS - PNSB



Dam

Under construction
In Operation
In Decharacterization



Follow-up

Inspection and
management procedures



Benefits

Homogeneity and
standardization



PUBLIC SIGBM



SIGBM database with public access



Registration and technical information for all registered dams



Released in January 2020



Website: <https://app.anm.gov.br/sigbm/publico>

Public disclosure and access to information: Freedom of Information Act (Brazilian Law n. 12.527/2011) - gives individuals the right to request access to government-held information



REMOTE INSPECTION

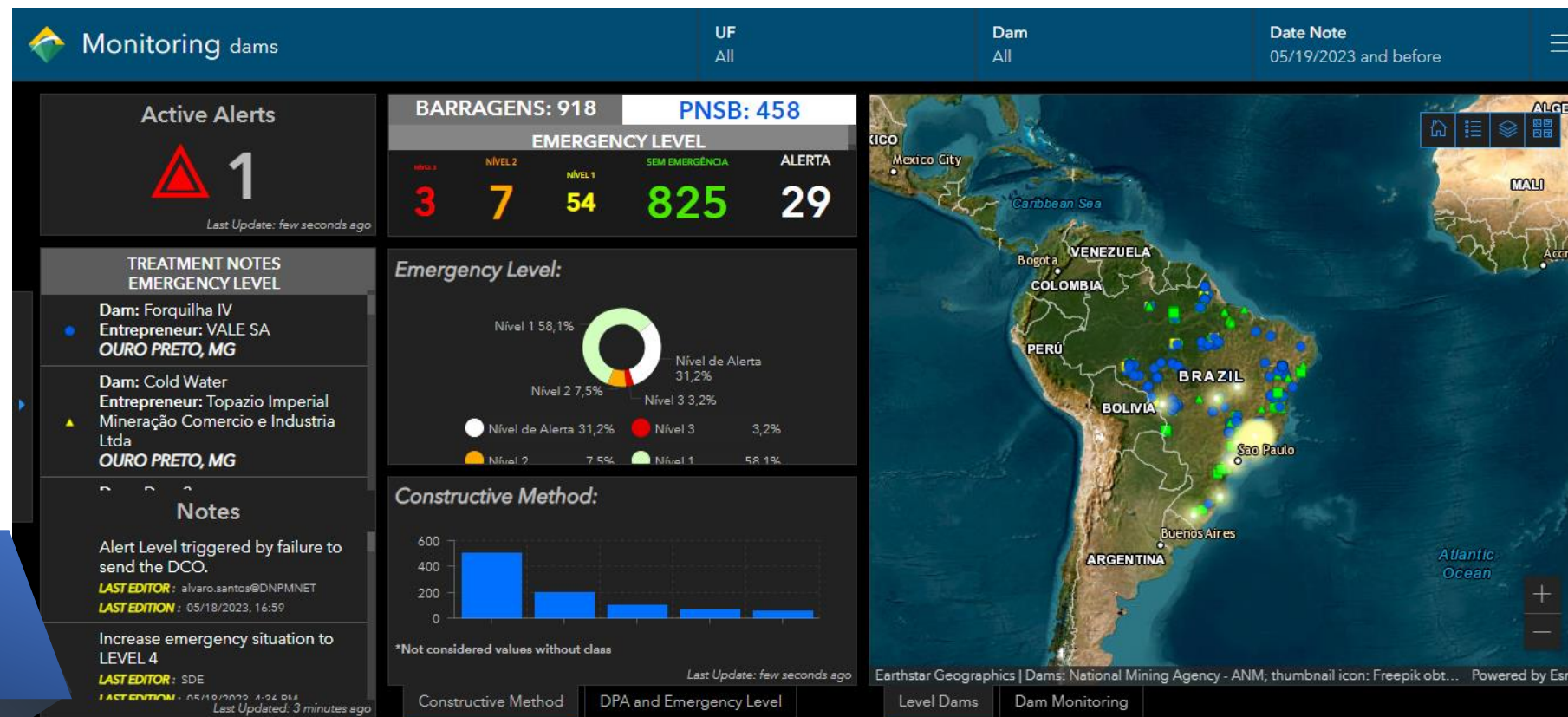


Integration with SIGBM

Real-time follow-up

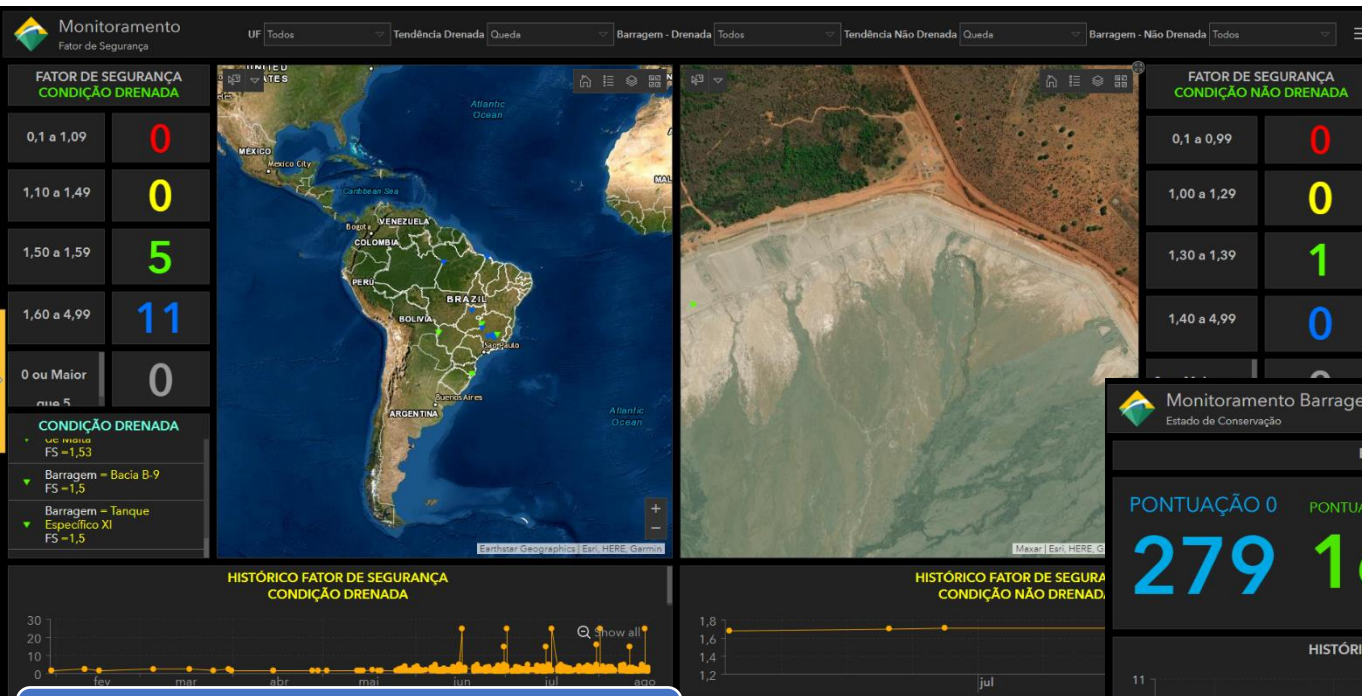
Security alerts

ESRI ArcGIS Platform



SMART FISCALIZATION

REMOTE INSPECTION



Factors of Safety

Drained condition

Undrained condition

Variation of the last 4 EIR

Tendency of Fall, Rise or Maintenance

Classifies number of dams by range of Factor of Safety

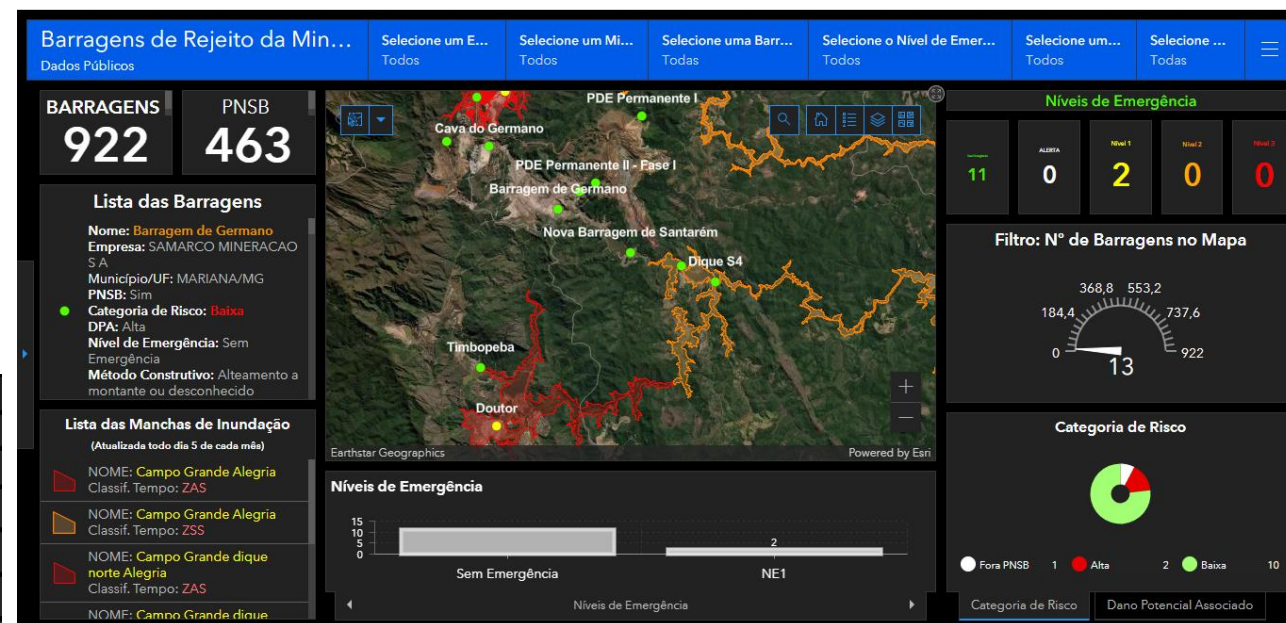
CONSERVATION STATUS

- ✓ AVALIATION OF TENDENCY IN THE CONSERVATION STATUS OF STRUCTURES
- ✓ TEMPORAL VISUALIZATION OF THE EVOLUTION OF ANOMALY;
- ✓ FAST ACTION OF ANM



What is ANM doing regarding the topic PAEBM ?

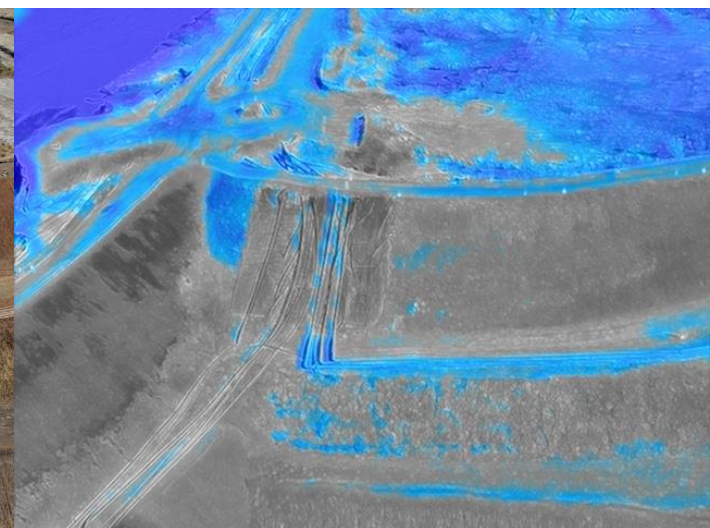
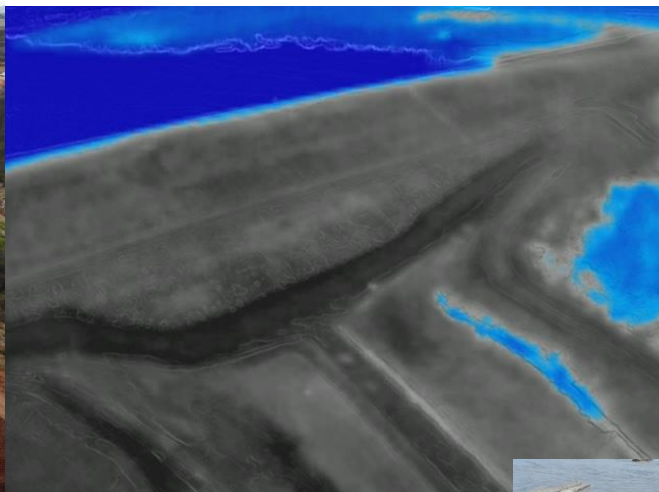
Dashboards



FIELD INSPECTION - TOOLS



Drone with thermal imaging camera, hypsometer, penetrometer





FIELD INSPECTIONS IN NUMBERS

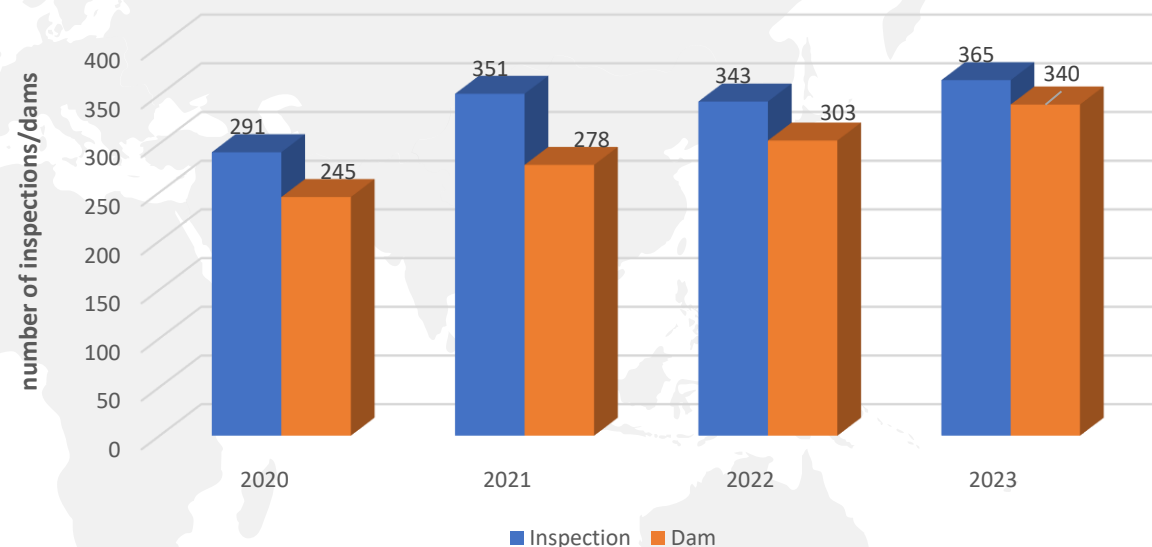


Number of inspections and
number of dams inspected

2020
2021
2022
2023

By the Dam owner : 24 inspections (1 inspection each
15 days) x year in 463 dams in the PNSB:

11112 inspections/year



Source:
Annual reports, available in:
<https://www.gov.br/anm/pt-br/assuntos/barragens/relatorios-anuais-de-seguranca-da-barragens-de-mineracao-2/>






Essential service: inspections during the pandemic

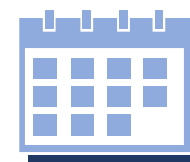


TRANSPARENCY

Annual Report on Dam Safety

GISTM
Principle
15

-  Regulatory review
-  Special Projects: Agreements, trainings, acquisitions
-  Registration of dams
-  Emergency Actions
-  Inspections and Notices



INFORMATION FOR THE POPULATION



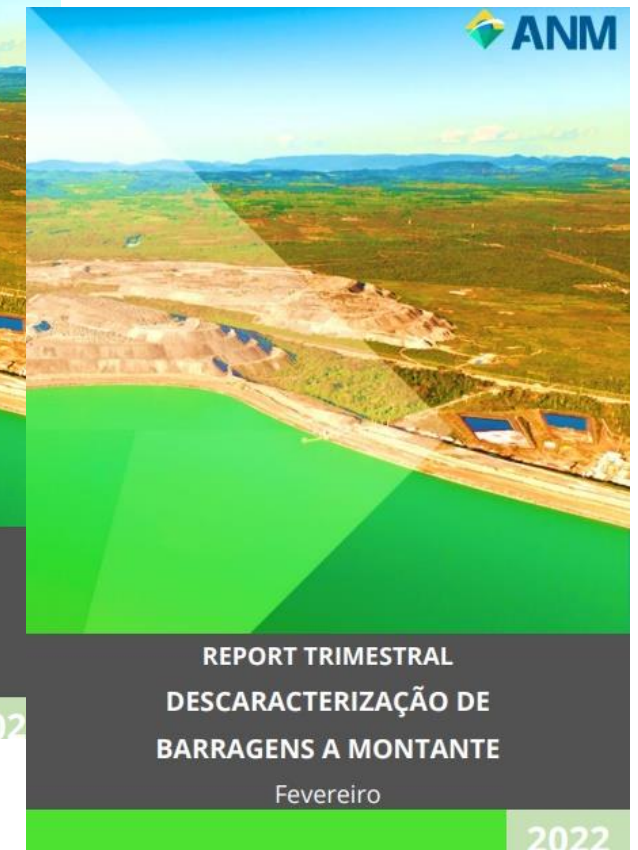
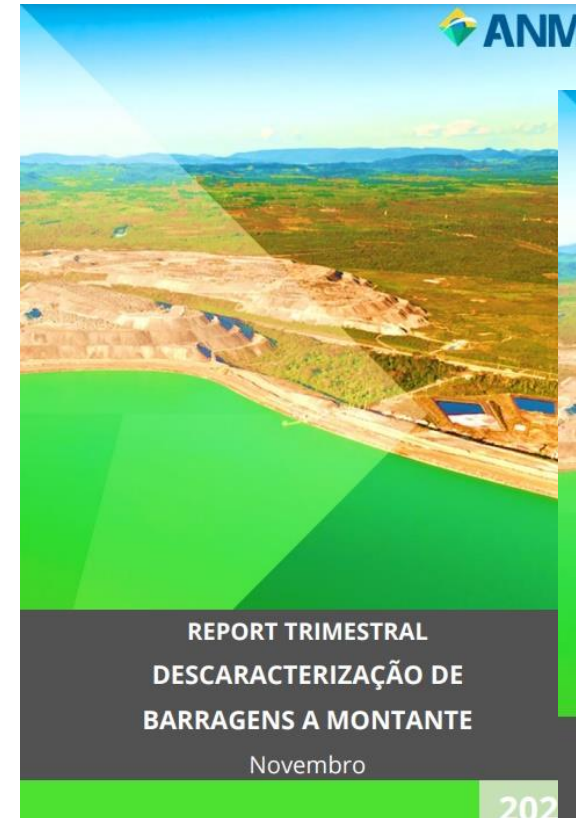
TRANSPARENCY

CLOSURE OF UPSTREAM MINING DAMS

GISTM
Principle
15

Published every trimester
on the ANM page

<https://www.gov.br/anm/pt-br/assuntos/barragens/boletim-de-barragens-de-mineracao>



INFORMATION FOR THE POPULATION



NEW CHALLENGES... WHAT LAYS AHEAD?

Dams
ks/tips



Stac





NEW CHALLENGES... WHAT LAYS AHEAD?



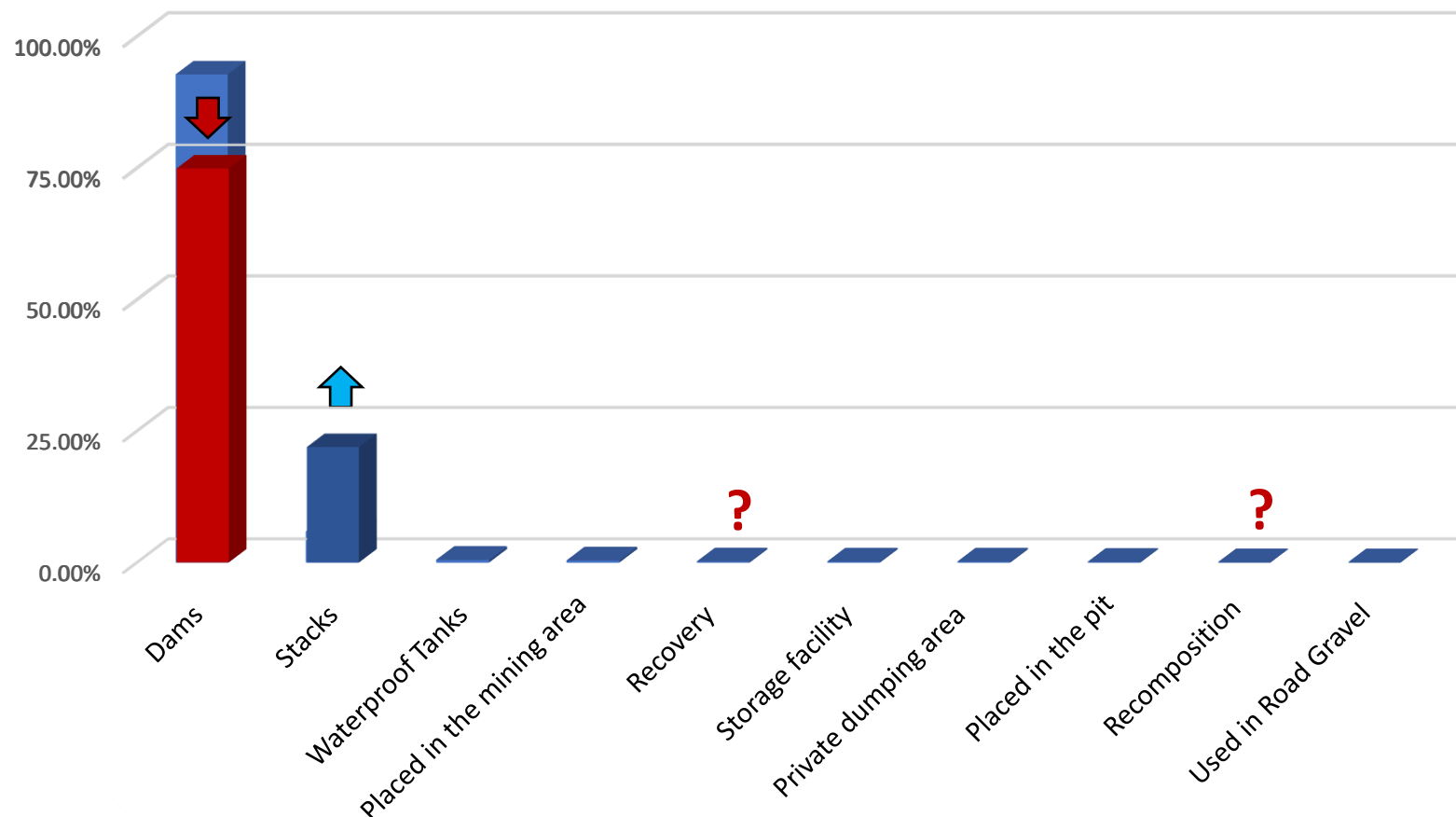
ANM Agência
Nacional de
Mineração

Dams and Stacks

MAIN METHODS OF TAILINGS DISPOSAL IN MG

Dams	92.68%
Stacks	5.84%
Waterproof Tanks	0.48%
Placed in the mining area	0.37%
Recovery	0.17%
Storage facility	0.15%
Private dumping area	0.15%
Placed in the pit	0.10%
Recomposition	0.02%
Used in Road Gravel	0.01%

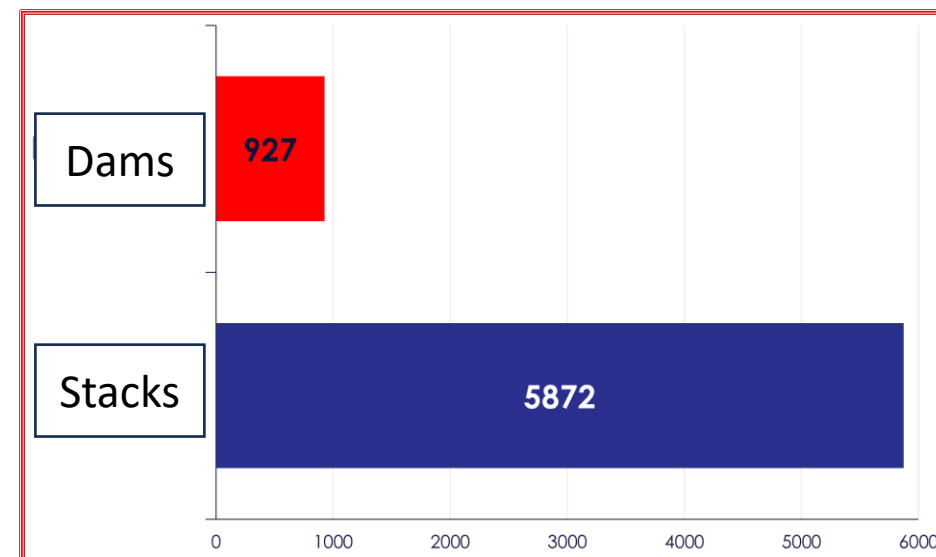
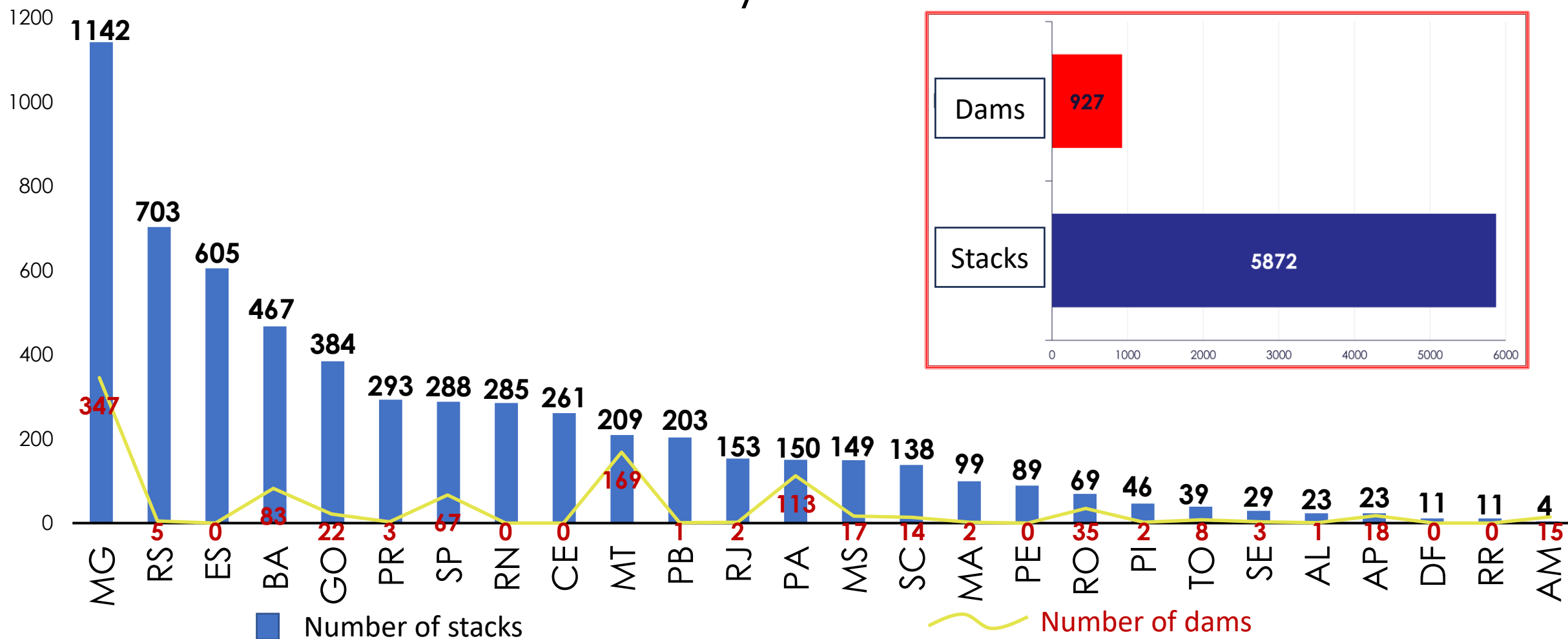
FEAM (2016)





NEW CHALLENGES... WHAT LAYS AHEAD?

Preliminary data on stacks





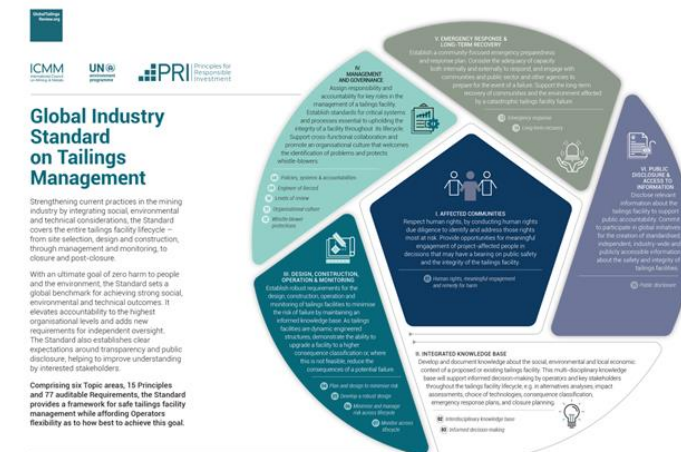
THANK YOU!

Luiz Paniago Neves
sbm@anm.gov.br



Establishing a Global Tailings Institute:

**Investor Mining & Tailings
Safety Initiative**



Mission

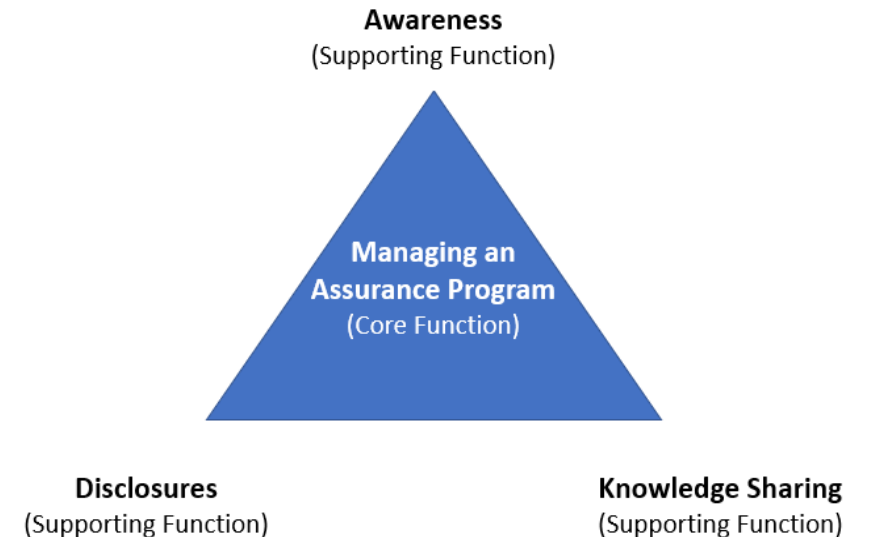
Mission:

The core function of the Institute is to oversee the implementation of, and conformance with, the Global Industry Standard on Tailings Management (GISMT). To achieve this, the Institute's core priority will be:

- **Assurance:** Managing an assurance framework where tailings facility will be audited and certified against the GISTM by qualified, independent third-party assessors.

This will be supported by:

- **Awareness:** Promoting awareness, understanding and adoption of the GISTM by (all) mining companies (public, private and government owned), building on the efforts of the Global Tailings Review.
- **Knowledge Sharing:** Facilitating the sharing of knowledge of implementing the Standard to improve overall knowledge in tailings management.
- **Disclosures:** Supporting confidence in the Standard and its implementation through transparency of tailings facility details and auditing outcomes.

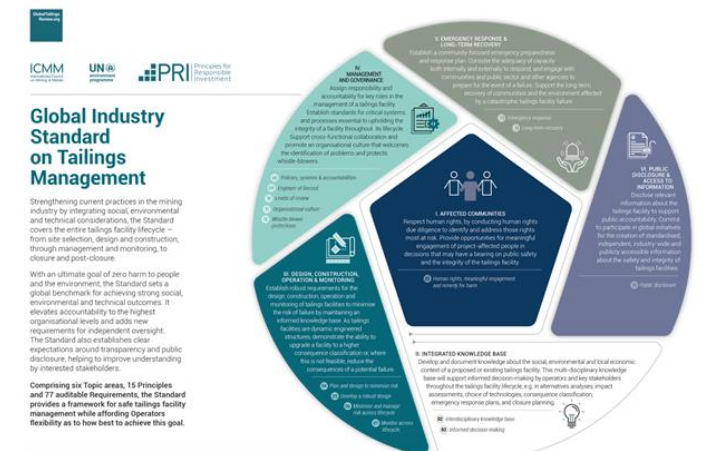


GTMI Progress

- Multi-Stakeholder governance model has been agreed.
- UNEP & PRI (via the Church of England Pensions Board and the Swedish Council on Ethics) have to date funded \$350k to support technical process to establish the Institute. This has included appointing a Tailings Expert Advisor and a Project Manager to support development of a sustainable business plan.
- A fee-based model has been developed and extensively tested with ICMM and Non-ICMM companies.
- Ahead of a sustainable fee-based model coming into operation the Institute will require a year of incubation/set-up. A \$2m budget has been developed for this phase.
- ICMM has agreed to become a Founding Partner to the Institute and committed \$1 million for the set-up phase subject to match funding being secured.
- Match funding for the \$1m has been sought from governments and we expect to announce this by end of Q1 2024.
- Scoping for a headquarters to be hosted in a nation with tailings facilities and for a country host partner have been undertaken and discussions are underway.

Addressing the Legacy of Waste:

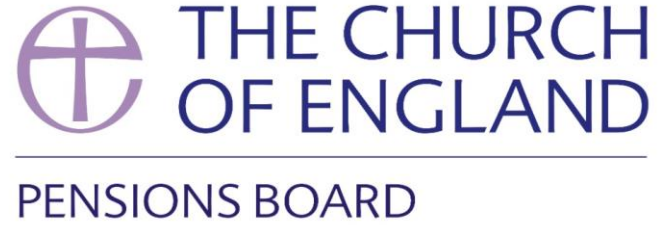
Investor Mining & Tailings Safety Initiative





COMMISSION INTERNATIONALE
DES GRANDS BARRAGES

INTERNATIONAL COMMISSION
ON LARGE DAMS



Global Tailings Registry



Why? Disclosures and public information

- International Commission on Large Dams (ICOLD)
 - Global register of large dams. **62000 structures** (>15m height, or >5m and impounding more than 3 million m³) in **166 countries**. 2/3 Geolocated. Behind a paywall. Of the 62000, 1861 are TSFs.
- Global Tailings Portal
 - Predominantly publicly listed company disclosures (107 companies). **1863 facilities** all geolocated with answers to 20 basic engineering and governance q's. Open access.
- Macklin, M. et al.
 - 11,587 TSF's. Impact Modelling. Includes 'gray literature' and notes challenge of incomplete reporting of TSFs, resulting in an underestimation of risk.

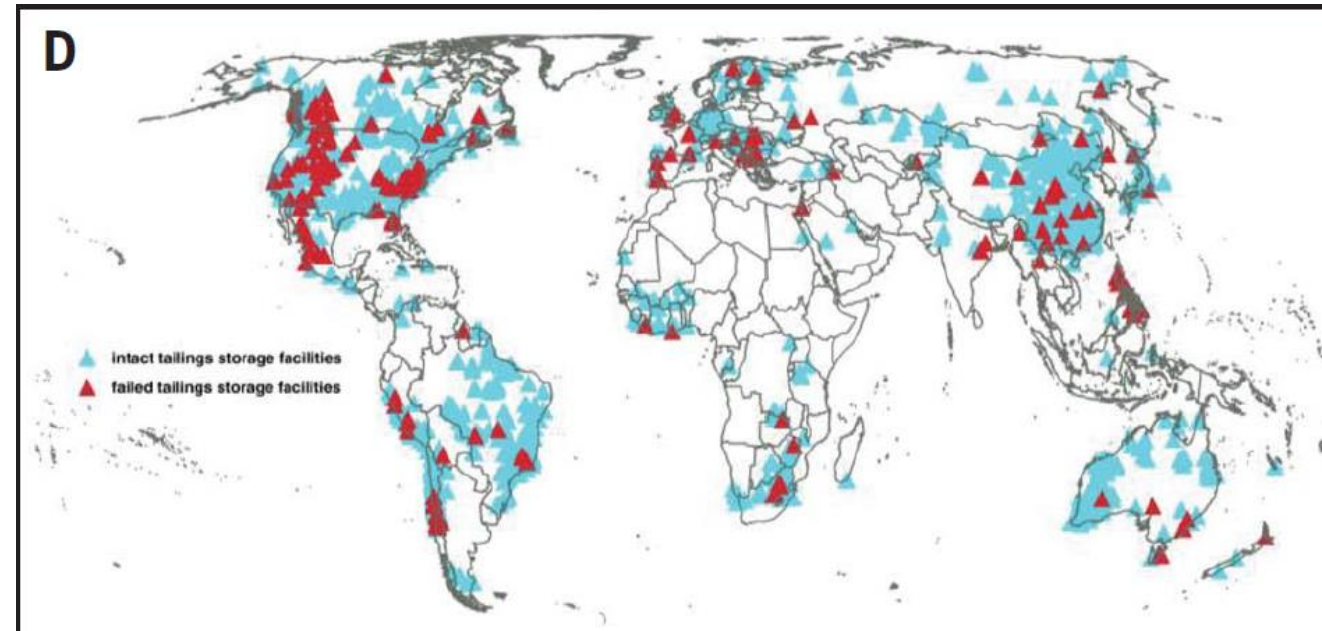
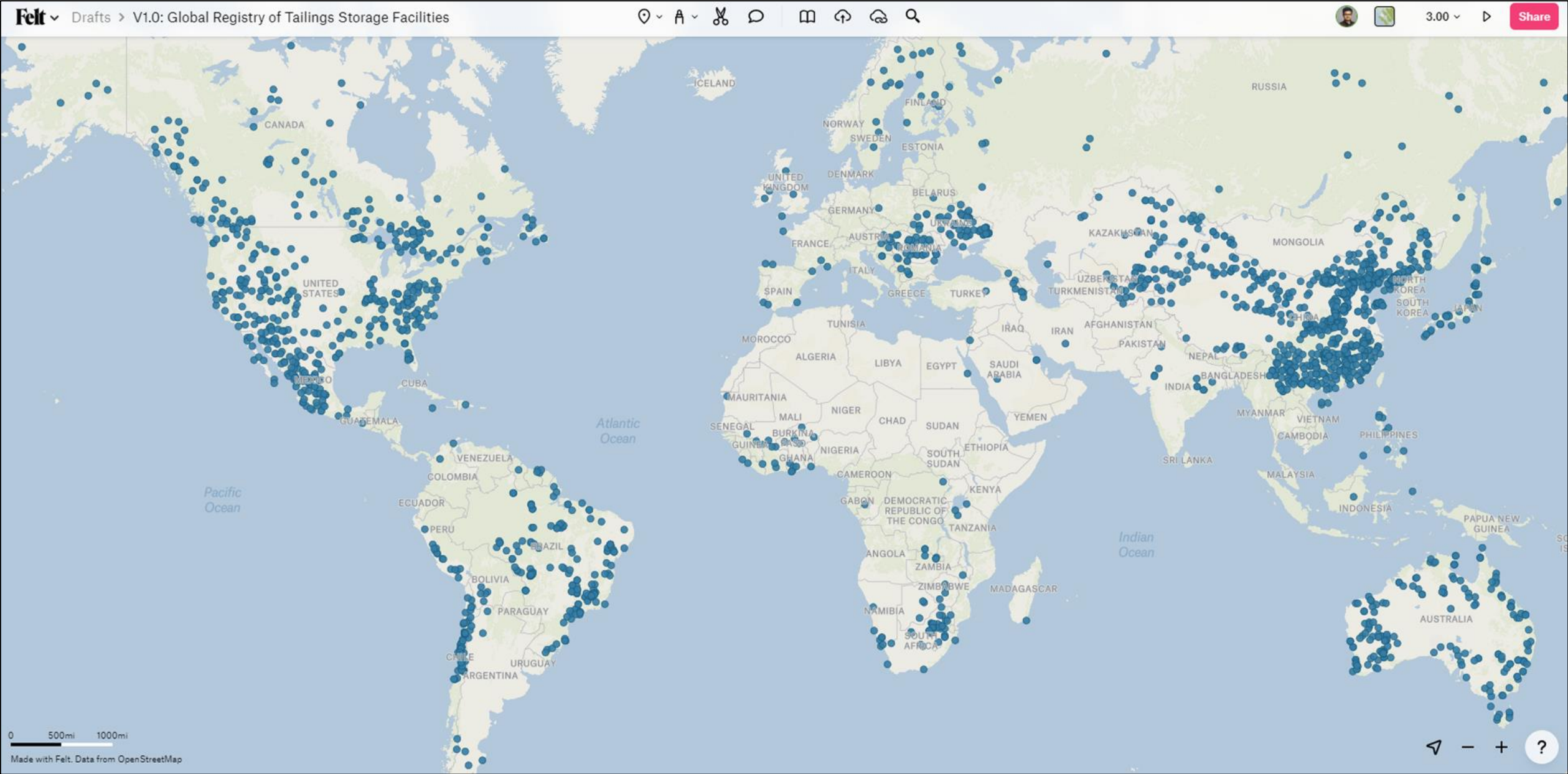


Figure 1 D. Intact and Failed Tailings Storage Facilities. Macklin et al., Science 381, 1345–1350 (2023)

Registry Working Group (2023-present)

Member	Affiliations	Country	Role in Working Group
Andy Small	Klohn Crippen Berger ICOLD Tailings Committee (Past Chair)	Canada	Co-chair
Dr. Stephen Barrie	Church of England Pensions Board	England	Co-chair
David John Cooling	United Nations Environment Programme	Australia	Co-chair
Dr. Nahyan M. Rana	Klohn Crippen Berger ICOLD Tailings Committee	Canada	Technical Lead
Annika Bjelkevik	TCS Consultants ICOLD Tailings Committee (Chair)	Sweden	Senior Advisor Regional Contributor (Scandinavia)
David Brett	GHD ICOLD Tailings Committee	Australia	Senior Advisor Regional Contributor (Oceania)
Hervé K. Wa Kitambo	WSP ICOLD Tailings Committee (Vice Chair)	Congo (DRC)	Regional Contributor (Africa)
Dr. Ram Manohar Bishwal	National Institute of Technology Rourkela ICOLD Tailings Committee	India	Regional Contributor (India)
Elias Baptista	BCCexperts ICOLD Tailings Committee	Mozambique	Regional Contributor (Africa)
Mauro Pio dos Santos Junior	Pimenta de Avila Consultoria ICOLD Tailings Committee	Brazil	Regional Contributor (South America)

Global TSF Registry (v1.0, Jan 2024)



Global TSF Registry (v1.0, Jan 2024)

- Largest list of TSFs collated & standardized to date:
 - Open-access dataset contains **14,144 TSFs of which 12,767 are geo-located**. (20,822 TSFs identified in total, but some disclosures are confidential)
 - Updated with 2023 company disclosures for “Very High” and “Extreme” classification TSFs
 - Currently encompasses **73 countries**
 - Continues to expand via ongoing work on India, Africa, western Europe, Indonesia and Philippines
- Design of database expected to facilitate seamless integration with future company disclosures
- Requires an institutional home
- Aimed to be an online, publicly accessible registry that is “live” (continually maintained and updated)

Update following Jagersfontein Tailings collapse:

**Investor Mining & Tailings
Safety Initiative**



Initiative Position on Legacy Facilities:

Investor Mining & Tailings Safety Initiative



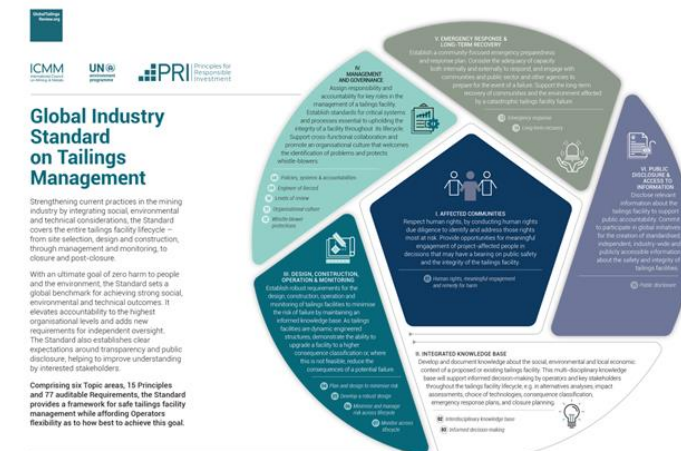
Initiative Position on Legacy Facilities:

It is proposed that the Initiative supports:

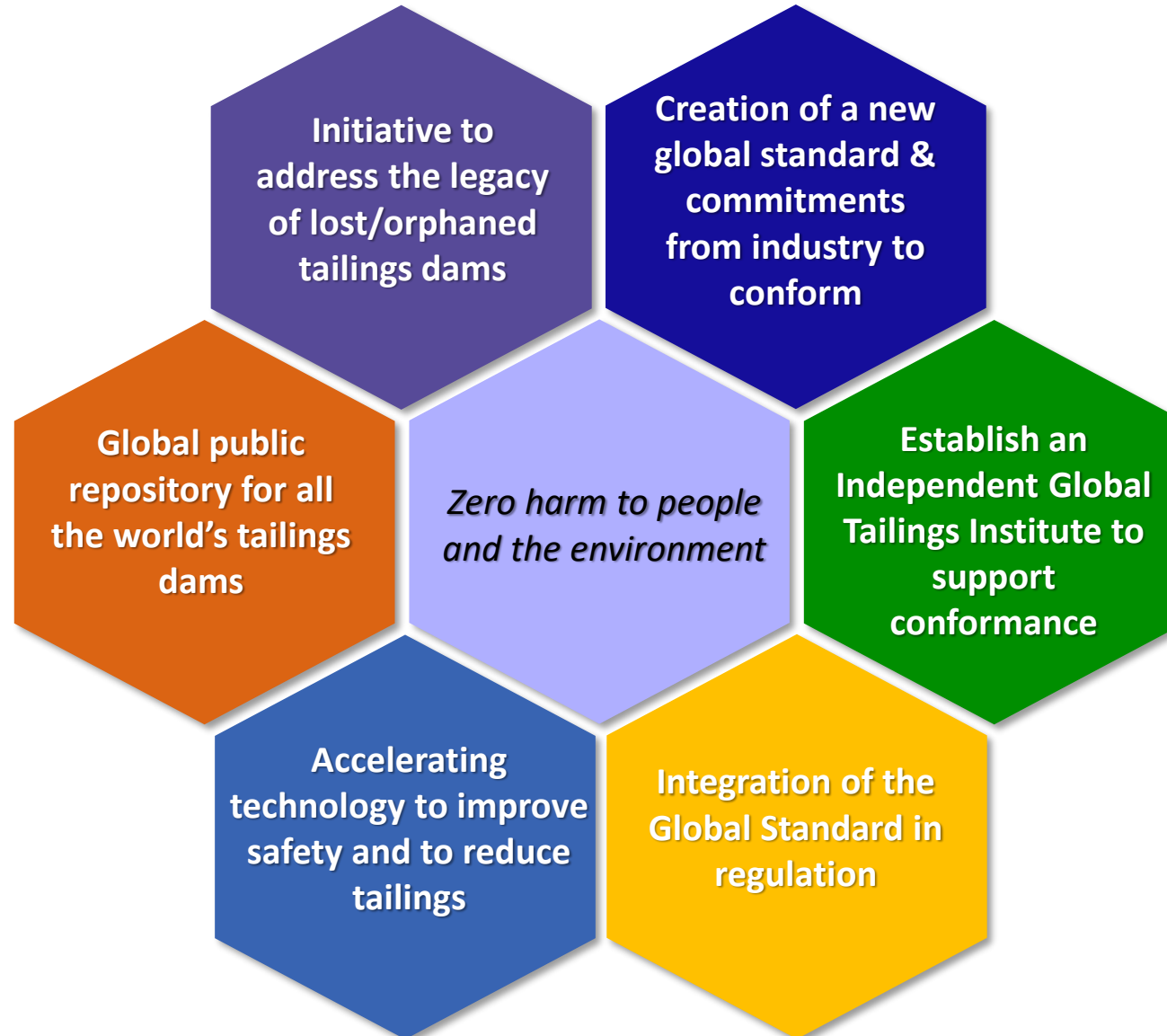
- The creation of a single global repository of tailings facilities:
 - Open question remains to be addressed as to where this global repository can be housed e.g. under future role of the independent Global Tailings Management Institute or elsewhere?
- The need for national processes to undertake independent risk assessments of facilities to identify risks posed by any legacy facilities.
- Once facilities have been risk profiled to establish a system or approach to the monitoring of highest risk facilities.
- Recognising that some facilities will not have owners and require urgent issues to be addressed and that in some situations there may not be resources to do this, a mechanism should be created between governments, companies and other stakeholders for the establishment of a Tailings Legacy Fund that can be accessed to undertake urgent work.

Concluding Session:

Investor Mining & Tailings Safety Initiative



Investor Mining & Tailings Safety Initiative



24th January 2024, 12.30pm-2.15pm

Global Roundtable Investor Mining & Tailings Safety Initiative

Convening on the eve of the 5th Anniversary of the
Brumadinho disaster

Investor Mining & Tailings
Safety Initiative

