



**Objective:** To establish guidance and commitments for the Safe Management of Dams and Geotechnical Mining Structures such that critical assets are controlled as well as to deal with the risk controls associated with the implemented Management Systems.

This Policy applies to Vale and its 100% controlled subsidiaries. It must be reproduced for its direct and indirect subsidiaries, within Brazil and overseas, always in compliance to the articles of incorporation and the applicable legislation. Its adoption is encouraged at other entities in which Vale has a shareholding interest, in Brazil and overseas.

## References:

- POL-0001-G – Code of Conduct
- POL-0009-G – Risk Management Policy
- POL-0019-G – Sustainability Policy
- *ABNT NBR ISO 9001:2015 – Sistema de Gestão da Qualidade (SGQ).*
- Technical Bulletin – Application of Dam Safety Guidelines to Mining Dams from the Canadian Dams Association (CDA).
- Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure from the Australian Committee on Large Dams (ANCOLD).
- Tailings Dam Safety Bulletin from the International Committee on Large Dams (ICOLD).
- Guide to the Management of Tailings Facilities & Developing an Operation, Maintenance, and Surveillance.
- Manual for Tailings and Water Management Facilities (the OMS Guide) from the Mining Association of Canada (MAC).
- Global Industry Standard on Tailings Management (GISTM) from the Global Tailings Review (ICMM-UNEP-PRI) & Tailings Management: Good Practice Guides from the International Council on Mining and Metals (ICMM).
- Slope Design Guidelines for Large Open Pit Project (LOP) from the Commonwealth Scientific and Industrial Research Organization (CSIRO da Australia).
- AA1000 Stakeholder Engagement Standard from the Accountability Stakeholder Engagement Technical Committee
- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets from the International Finance Corporation (IFC).

## Context:

Vale owns, via its operations, structures or assets which are considered critical. These are water reservoirs, tailings storage facilities, sediment ponds, mine waste storage facilities, earthen stacks, waste rock dumps, open pits and underground structures. Thus, in order to continuously improve the management of these critical assets, Vale has invested in the expansion of the Safety Management Systems for such assets and has also worked on the development of Critical Control Systems for geotechnical risks.

Consequently, some of the various implemented actions insofar are: (i) the role of Engineer of Record (EoR), responsible for providing permanent technical oversee throughout the life of the structure for each critical asset; (ii) adapting the safety systems to the three lines of defense format, aligned with Vale's Risk Management Policy, as well as in defining the roles and responsibilities of those involved with management; (iii) registering documents and historical technical analyses of all dams' physical conditions; (iv) constructing backup dams downstream of facilities at a critical level and/or providing additional reinforcement, in addition to decommissioning upstream dams; (v) alternative tailings disposal projects to conventional tailings facilities whereby the concentration by weight is increased and the moisture content is reduced; and (vi) establishing an Executive Committee for geotechnical risks.



## Guidelines:

Given the existing Safety Management context for these critical assets and Vale's goals, the following directives were defined:

- Design and operate tailings storage facilities, water reservoirs and sediment dams, mine waste storage facilities, amongst other earth structures such as open pits, stacks and underground works, such that potential failures are prevented, monitored and mitigated, and that risks be always reported to the company's senior leadership. Vale's objective is for these assets to count with critical control actions in place so that risks are prevented and mitigated.
- Keep the facilities and structures physically stable throughout all the critical earth structure's life cycle, starting at its construction and during its operation, decommissioning, closure and post-closure.
- Implement the Safety Management System so that dams, earth structures and other mine waste storage facilities are built and/or raised following a detailed engineering design, under the supervision and with the acknowledgement of the Engineer of Record – EoR – and that these structures are operated following the mining dams' operation, maintenance and surveillance manuals, also called the OMS Manual.
- Handle and/or dispose of tailings solid particles as well as the process or impounded water only within the tailings storage or mine waste storage facility's designated areas, minimizing the formation of supernatant water. Proceeding with these actions outside the designated areas requires prior and clear approval from the Business Executive Board and the Safety and Operational Excellence Executive Board, as well as, where applicable, from public administration authorities.
- Fulfill the objectives of the Safety Management Systems for tailings storage facilities and geotechnical mining structures that aim to protect life, the communities, the integrity of infrastructure and processes, the availability and quality of water, and, generally, the environment protection, in order to ensure the inspection and monitoring of water reservoirs, tailings storage facilities and sediment dams in addition to open pits, stackings and underground mines, not only respecting the Company's internal procedures, but chiefly the applicable standards. Therefore, the assignation and contracting of engineering services, external review and consultancy services must prioritize quality, ethics and not the cost of such services.
- Maintain a Safety Management System that allows for an effective level of governance in routine activities and with a level of strict compliance regarding the critical assets' performance in agreement with the national and international technical standards hereby referenced; thus, this System will keep adequate and active communication, dialogue with society and engaging the surrounding communities in agreement with the AA 1000 Stakeholders Engagement Standard-2015, the IFC Stakeholder Engagement Handbook or following the industry's best practice standards similar to the aforementioned standards.
- Ensure that all components of the Safety Management System for dams and mine waste storage facilities are designed with continuous improvement elements, using and applying the best available technology and best practices according to international institutions (MAC and ICMM) and, at the same time, in the technical realm, the best practices of the Institutions (CDA, ANCOLD, ICOLD and LOP).
- Design and operate all Vale's earth structures with the adequate licenses, following the pertinent local legislation and engaging the communities.
- Maintain and disclose to the interested parties a preparedness and contingency plan for response to emergencies regarding the critical earth structures and geotechnical assets based on the best practices and best available expertise and in compliance with legislation in effect. The plans must be periodically tested through simulations and must be kept updated taking into account the communities and affected people.



## Commitment to the Safe Management of Tailings and Water Dams and Geotechnical Mining Structures:

Vale's operations are mainly guided by the following commitments:

- Implementing diverse controls aimed at managing the water in tailings storage facilities, from the design phase to the operation of the project. This must be achieved using hydraulic works to convey surface water runoff out of the impoundment and avoiding the interference of tailings or sediments at the spillways' inverts.
- Tailings disposal must consider guidelines or operational parameters in the planning sequence that cause or favour displacing water ponding away from the tailings storage facility dam's upstream slope in agreement with the Detailed Engineering Design, Design Criteria, Normative Standard, Technical Specification or OMS Manual.
- Reclaim, in the most efficient way, the water used in the production processes with the use of thickening circuits to reduce the volume of water that would be transported together or separately with the tailings; thus, prioritizing water recirculation at the process plant itself before reaching the storage facility or similar installation, so that water flow and ponding is avoided wherever the Detailed Engineering Design or OMS Manual does not specify it.
- Follow the safety conditions and best practices hereby mentioned (ICOLD, CDA and/or ANCOLD) exclusive for water reservoirs' embankments and hydropower dams, whether these are planned either for mineral processing or for environmental control or for power generation.
- Improve, via the governance hereby established for dam safety and geotechnical mining structures as well as the independence and technical rigour of the Management Systems that support the quality of critical assets, a compulsory follow up to be carried out on a permanent and documented basis by the Engineer of Record (EoR) for the critical asset's every single stage of the life cycle, i.e. from design to closure.
- Develop staff members in a professional manner, so that they achieve the appropriate training for each key function in the activities for geotechnical, hydrotechnical, dewatering and mining processes, based on efficient communication and specific training, in order to ensure that employees with relevant experience understand their responsibilities and, so, ensure direct, transparent communication with an appropriate sense of urgency at all levels of the organizational structure. Therefore, personnel training and continuing education will be carried out to keep the level of knowledge up to date regarding the earth structures as well as the improvement of the practice linked to the most rigorous engineering techniques.
- Implement, at all stages of the asset's life cycle, geotechnical risk controls and activities tied with identified geotechnical monitoring based on the studied failure modes and their associated consequences. In the event of changes related to performance caused by internal or exogenous factors, a new engineering and risk assessment should take place as soon as possible. Risks must be periodically assessed in a specific way in order to measure the effectiveness of controls for each critical earth structure. These must count with an opinion in writing from the specialist in charge designated by Vale and the EoR in order to certify that such earth structures are operated in a disciplined manner, maintained and under surveillance, with updated and accessible information, and that the historical registry of the earth structure is properly stored and available in accordance with international quality standards.
- Implement the Safety Management System for tailings dams and mine waste storage facilities, amongst similar systems, for the critical control of geotechnical risks. The scope of this System is applicable to every single stage of the asset's life cycle, comprising the various design phases: from construction to operations, to closure and post-closure.

### General Provision:

- This Policy must be reviewed periodically, at least 1 (once) every 3 (three) years or as required.