TAILINGS FACILITIES **AND WASTE MANAGEMENT**

OUR MANAGEMENT APPROACH

We manage mineral waste by designing, building, operating, maintaining, and closing tailings storage facilities and waste stockpiles in a safe manner that reduces risks to the environment and communities. Our Tailings Management Framework sets clear accountabilities and responsibilities, and supports safe and efficient planning, implementation, monitoring, and review of critical facilities. Corporate and site-specific tailings management systems and associated processes incorporate the actions necessary to verify that all critical facilities have quality designs, sound dam safety practices, comprehensive risk management, and effective emergency response and preparedness systems, and that we continue to work towards meeting or exceeding current best practices and industry standards. We also follow local regulations and best practices to manage, measure and monitor the generation and disposal of industrial and domestic non-mineral waste, and we adopt site-level operational procedures to reduce waste and lessen impacts on the environment and communities.

Policies

- Environmental Policy

Standards and Guidelines

- The Tailings, Water Dam, and Heap Leach Facilities Corporate Standard incorporates best practices recommended by the Mining Association of Canada (MAC)'s Tailings Management Guidelines, the MAC Towards Sustainable Mining (TSM) Tailings Management Protocol, and the Canadian Dam Association (CDA) Dam Safety Guidelines. It includes clear accountabilities and a well-defined Tailings Management Framework for the planning, implementation, monitoring, and review of critical facilities.
- Corporate Environmental Incident Management Standard contributes to highlighting actions to improve waste management.

Plans, Programs, and Initiatives

- Site-specific tailings management systems, aligned with the MAC Tailings Management Framework, guide the approach for each site to incorporate and manage the Operational, Maintenance and Surveillance (OMS) activities, comply with regulatory requirements, and meet the CDA Dam Safety Guidelines.
- OMS manuals serve as a critical component in meeting performance objectives and managing potential risks. OMS manuals are updated and reviewed annually to reflect any changes to the facility conditions. OMS manuals follow the guidance provided by the MAC.
- Best practices are followed during construction of our tailings and heap leach facilities and accepted quality assurance and quality control (QA/QC) procedures are also followed to verify construction activities are meeting design and construction specifications set by the design engineer for the facility. QA/QC activities typically require completion of field verification and inspections of the works, taking samples of construction materials and performing laboratory testing.
- Predictive modelling is conducted prior to operations and through closure to identify the potential for long-term acid drainage and metal leaching from mine workings, tailings, waste rock, and heap leach facilities.
- Site-specific emergency response plans (ERP) help minimize consequences of a tailings storage facility spill or failure. Plans are aligned with facility risk assessments and linked to the Corporate Crisis and Communications Plan. ERPs involve all levels of the organization, as well as local community stakeholders. ERPs are developed to prepare our employees and communities to deal with unlikely worst-case scenarios.
- ERPs involve four main steps: (i) documentation preparation, which includes completion of a dam breach and inundation studies, and development of communication plans and a downstream survey; (ii) stakeholder mapping and internal training, where employees are trained on risk prevention and what to do in the event that an incident takes place; (iii) external training on the procedures required if an emergency were to occur; and (iv) simulation process involving community participation and local government bodies.
- Drills and emergency simulations are conducted regularly to train our employees on emergency procedures; help local authorities and emergency response services understand their roles in the event of emergency; and so that communities feel confident in the level of planning that has been done to keep their people and communities safe.
- The Engineer of Record (EoR) forum convenes EoRs on as needed bases to discuss specific technical matters and share best practices.

Monitoring and Evaluating

- Site inspections are conducted regularly by technical staff to assess facility conditions. Surveillance activities include collection and processing of monitoring data and completion of regular visual inspections of all facilities.
- Dam safety inspections (or Safety Inspections for heap leach facilities) are conducted at least annually by the external EoR to assess the stability and safety of facilities.
- Dam safety reviews (or equivalent Independent Safety Reviews for filtered tailings or heap leach facilities) are conducted by an independent reviewer following CDA recommended criteria and frequencies, and commensurate with the consequence classification of the facility, to assess facility risk and identify improvements.
- Experts review boards to further improve our current assurance process in some of our higher consequence facilities, including EoR forums and an Independent Review Board for Jacobina Mine in Brazil.
- Management system reviews are conducted annually by internal teams presented to the Vice President of Mineral Processing, Tailings & Dams, country managers and/or general managers, and led by the Senior Director of Critical Facilities, to ensure corporate governance over tailings management and to ensure that the Company is satisfied that the tailings management structure and system are effective.
- The TSM Tailings Management Protocol self-assessments and internal audits to ensure the compliance of its tailings management system with the TSM protocol are conducted annually by each site.
- The TSM Tailings Management Protocol external verifications are completed by independent auditors every 3 years on frequencies recommended by the TSM protocol.
- Risk assessment and dam breach analyses are conducted for each tailings facility; key risks are identified and risk management plans developed accordingly.
- Regular reports are prepared to update executive management on tailings stability and operations status for all facilities. The reports include key identified risks, critical controls and mitigation actions.
- The monitoring of downstream water, sediments, and soil quality helps ensure our compliance with predictive models and water quality regulations.
- Corporate Environmental Audits sample and review the site management system to identify areas for improvement.

Accountability

- The Process Manager or an equivalent senior staff at each site oversees and is responsible for implementing all aspects of the tailings management framework.
- The Senior Director of Critical Facilities is responsible for the development of strategies for efficient implementation of tailings, heap leach and dam safety management systems. The Senior Director of Critical Facilities provides technical support to sites, reports to the Accountable Executive Officer (AEO) and is supported by the Senior Engineer for Tailings and Dams. Together they assess, support and guide sites with their tailings and critical facilities management.
- The Vice President of Mineral Processing, Tailings & Dams is accountable for the adequate performance of tailings, heap leach and water dam facilities and is designated as the AEO.
- The Vice President of Environment oversees management of industrial and domestic non-mineral waste.
- The Board Health, Safety and Environment Committee has oversight of matters related to tailings management, critical facilities and waste management, and receives reports on a quarterly basis.
- The EoR provides technical direction on behalf of Pan American Silver and verifies whether the tailings facility (or its components) has been designed, constructed, and performs in accordance with performance objectives and indicators, applicable guidelines, standards and regulatory requirements.
- The independent reviewer, a third-party provider other than the EoR who is not and has not been directly involved in the design or operation of a given tailings or water storage facility, provides objective, expert advice and recommendations to help the Company identify and manage risks associated with tailings facilities as well to implement the tailings management system.