

# Tailings and Mine Waste Management



The effective, safe disposal of mine waste presents technical and environmental challenges. Each project site is unique, and our approach is to tailor the design of every tailings and waste rock storage facility to provide economical solutions appropriate to site conditions, while providing long-term security and environmental protection.

We have a long history of assisting our clients in the siting, design, permitting, construction support, operational monitoring, and closure of tailings and waste rock storage facilities for a wide variety of climatic and seismic conditions throughout the world.

Our specialists have pioneered and advanced the development of alternative tailings management technologies, such as sub-aqueous systems, drained sub-aerial systems, thickened/ultra thickened/paste tailings disposal, and dewatered 'dry stack' tailings systems.

We provide complete and comprehensive design and operational expertise for tailings management tailored to the specific features of each site and needs of each client.

Our team also helps mitigate risk by providing project audits of tailings facilities in jurisdictions around the world in accordance with the Global Industry Standard on Tailings Management (GISTM), assisting our clients in better understanding and managing the risks of their facilities.



Tailings Dam  
Design



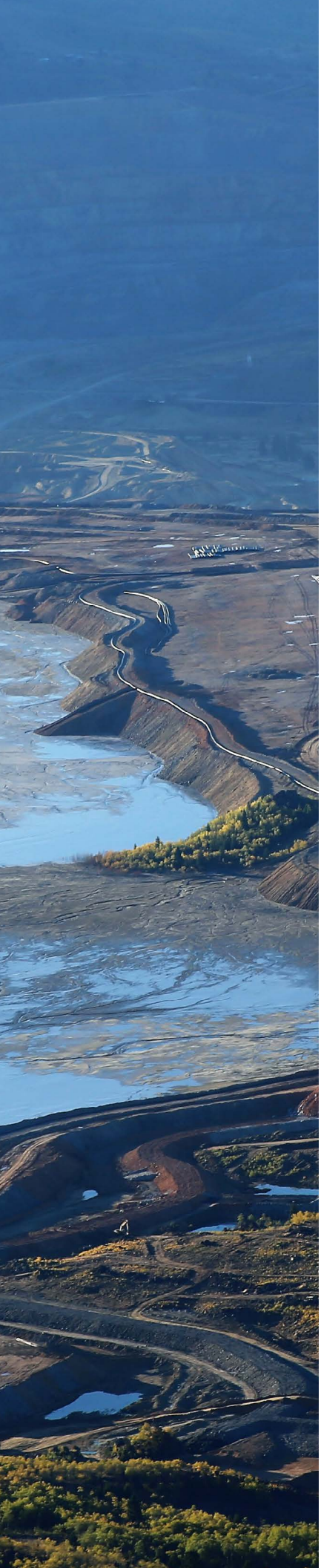
Waste  
Characterization



Tailings Dam Breach  
Assessments and  
Inundation Studies



Tailings Dam  
Monitoring and  
Instrumentation



## Tailings Dam Design

Our technical specialists have designed tailings dams for hundreds of mines in every major mining district in the world. In addition, we have designed dams for water storage, power development, irrigation, and flood control. Dam expertise includes earthfill and rockfill dams, concrete-face rockfill dams, concrete gravity and arch dams, roller-compacted concrete dams, appurtenant structures such as spillways and diversion channels or tunnels, and water-retaining and drained tailings dams constructed from mine waste materials.

Our full suite of tailings dam services includes dam design, inspections, safety, and rehabilitation; geotechnical site investigations; instrumentation monitoring; hydrology and hydraulic design; dam site alternative studies; seismic risk assessment and stability; construction QA/QC and support; construction permitting assistance; and as-built documentation.

## Waste Characterization

A complete understanding of ore deposit geology, mineralogy, geochemistry, and hydrochemistry is important for developing mining operations in an environmentally safe way. Our expertise in waste characterization, tailings and waste rock, field and laboratory testing, numerical modelling, and the practical application of preventative strategies has been applied to numerous successful mining projects at various stages from initial development to permitting and from operation to closure.

## Tailings Dam Breach Assessments and Inundation Studies

Dam breach studies are generally expected and often required for the design and operation of tailings storage facilities. Understanding the consequences of a dam breach ultimately leads to designing safer dams and properly preparing for emergencies.

Our world-leading specialists conduct dam breach modelling and inundation mapping for a wide range of projects within the mining and hydropower industries. Our team has completed numerous modelling projects for a global client base. The results of such studies are used to determine the hazard classification of a dam through the assessment of dam failure consequences, support emergency preparedness and response planning, and inform environmental project assessments.

## Tailings Dam Monitoring and Instrumentation

Our experienced tailings dam monitoring and management professionals provide leading-edge monitoring and risk reduction solutions for safe, responsible tailings management. An innovative suite of new instrumentation, remote monitoring techniques, and data management systems provide unprecedented real-time, remote access to data and evaluation tools. These state-of-the-art systems compliment experienced engineering guidance and operational management strategies to enhance safety and environmentally responsible tailings management, control corporate risk, and increase public confidence in the mining industry.

Our specialists provide world-renowned expertise in tailings management and have been involved in the design, construction, operational monitoring, and closure of tailings facilities around the globe. Our industry-leading tailings monitoring and management professionals design and implement state-of-the-art tailings monitoring programs tailored to project specific site conditions and our clients' operational requirements. We offer a comprehensive range of instrumentation, monitoring, and dam safety services that take advantage of leading-edge technologies and draw upon our extensive industry experience. Our relevant technical services include:

- Site investigation and characterization of tailings facilities using best available drilling, testing, and sampling methods
- Specification, installation, and expert analysis of geotechnical and hydrogeological instrumentation
- Application of remote sensing and monitoring, including InSAR, satellite imaging, photogrammetric monitoring
- Implementation of state-of-the-art automated remote monitoring and data management systems
- Development of tailings management and risk reduction programs, including specification of performance objectives and development of Trigger Action Response Plans
- Provision of regulated dam safety services, including dam safety inspections and review, Engineer-of-Record oversight, and regulatory engagement