An Introduction to Tailings Management

Issue
The production of metals and minerals enables modern life and its technologies. Computer chip production, for example, uses as many as 60 different minerals [1]. Tailings are the material remaining after the extraction of the desired metals or minerals; production is part of mining and minerals processing. Tailings require engineered solutions for their safe management and storage [2].

Background
Tailings management and storage facilities are engineering projects which comply with specific design, safety, and environmental control regulatory requirements. Responsible tailings management considers specific characteristics of tailings, water management, and the processing method. Engineers design each tailings storage and management facility based on site-specific environmental, climatic, seismic, and geologic conditions, ore type, processing method, production rate, geochemistry, and topography.

Mining companies employ engineering expertise, technological monitoring, and oversight to ensure that these structures are designed, constructed, operated, and monitored and are performing in a manner to minimize risks to employees, communities, and the environment.

Tailings management during mine operation and afterward are the responsibility of mining companies. Government agencies regulate tailings and set minimum design standards. Tailings storage facilities are often a key element in the regulatory process governments employ to ensure the environmental effects are identified and considered before regulatory approval. The design, construction, and operational performance of a tailings storage facility (TSF) are subject to continuous examination and periodic reviews [3].

When tailings management and storage require the construction of a dam or embankment, one of three construction methods shown in Figure 1 is used. The construction method is named based on the direction the dam’s crest moves as additional levels (dikes) are added.

(1) Upstream Construction: The dam crest progresses upstream as the height of the tailings facility increases. Tailings adjacent to the dam are drained and are used to support subsequent levels as the dam is raised.

(2) Downstream Construction: The dam crest progresses downstream as the height of the tailings facility increases. The dam is constructed and supported on top of the previously placed material.

(3) Centerline Construction: The dam crest is raised vertically. The dam’s crest is maintained as the height increases. The upstream portion is constructed on top of previously placed tailings while the downstream portion of the dam is constructed on previously placed materials.
SME STATEMENT OF TECHNICAL POSITION

1. SME recognizes tailings management and storage as an essential part of the mining process.

2. TSFs must be designed, constructed, operated, and closed using substantial engineering expertise, subject to appropriate corporate and regulatory oversight to minimize the risk to the mining workforce, neighboring communities, and the environment.

3. The safeguards applied to TSFs must be grounded in continuous improvement and to learn from past experiences, including past tailings structure failures, to prevent their recurrence.

References


