

Workshop A Waste Rock Dumps

Design, Maintenance, Operation, and Closure of Waste Rock Dumps

This workshop provides a comprehensive overview of the life cycle of mine waste rock storage and management facilities, starting from the development of baseline studies, whose results are critical for preparing safe, sustainable designs that incorporate closure considerations. Through case studies, recent research, and an interactive session, participants will gain insight into practical methodologies and recent advances aimed at optimizing physical and chemical stability, water management, environmental compliance, and post-closure land use.

Date: Saturday, October 24, 2026

Duration: Full day (approx. 8 hours, including a 1-hour lunch break)

Language: Spanish / English

Topics to be covered:

- **Introduction**

The importance of integrated waste dump management throughout its entire life cycle will be addressed. Key technical, environmental, operational, and closure-related challenges will be presented. In addition, the multidisciplinary approach required for efficient design, operation, maintenance, and closure will be explained.

- **Design Considerations**

This section covers site selection and the minimum data requirements for different engineering stages, including baseline studies such as field and laboratory investigations, geology, hydrology, hydrogeology, geochemistry, seismic hazard, and borrow materials. Key recommendations for an optimal construction process will be provided. Based on site conditions and the identification, characterization, and classification of the material to be disposed of, a preliminary layout will be developed, incorporating operational considerations and closure planning.

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- **Integrated Water Management in Waste Dumps**

This section addresses the importance of understanding the natural behavior of surface and groundwater. Using an Integrated Water Resources Management (IWRM) approach and multidisciplinary investigations (including hydrology, hydrogeology, hydrochemistry, geochemistry, and hydrogeochemistry), the future behavior of water quantity and quality—both natural and anthropogenic—can be predicted within the context of waste dump design.

- **Waste Rock Dump Design**

Definition of geotechnical and geochemical parameters. Stability analyses using limit equilibrium methods, as well as rigorous stress–strain analyses under static and dynamic conditions. Civil and hydraulic design including subdrainage systems and monitoring ponds, geomembrane lining systems and effluent collection (when required), dump volumetrics, disposal planning, access roads and ramps, perimeter channels, chutes, erosion control structures, and culverts.

- **Construction Quality Assurance**

The implementation of quality control and quality assurance procedures during waste dump construction will be analyzed. Topics include construction supervision, material control, compaction verification, and compliance with design specifications. Case studies demonstrating successful quality control, monitoring, and classification of waste material to be placed will also be presented.

- **Instrumentation and Monitoring**

Definition of alert levels. Use of monitoring technologies such as prisms, piezometers, settlement sensors, and inclinometers, and their integration with numerical models for performance evaluation and risk management.

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- **Risk Analysis**

Training in FMEA-based risk analysis focuses on the continuous pursuit of excellence in waste dump safety, emphasizing early identification of potential failure modes in order to define measures to mitigate, eliminate, or substitute risks. This training enables participants to develop risk mitigation plans.

- **Closure Plan**

Introduction to waste dump closure criteria. Integrated mine closure management, including knowledge base development, definition of future land use and closure objectives, analysis of environmental risks associated with components to be closed, closure and success criteria, and closure and post-closure measures in accordance with Peruvian regulations, including the design of cover systems.

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