Case Study

GEOSENSE

SECTOR: MINES

PROJECT: EL SOLDADO TAILINGS STORAGE FACILITY, CHILE

OVERVIEW

The El Soldado tailings storage facility, at the El Soldado copper mine in Chile (around 1,000 m above sea level), has a capacity of approximately 150,000 m^3. The site has implemented an innovative tailings management approach called Hydraulic Dewatered Stacking (HDS).

HDS was developed alongside the mine's Coarse Particle Recovery (CPR) technology, which produces a free-draining sand byproduct. This material enables a more stable, rapidly consolidating tailings structure.

Incorporating vertical sand drains allows the facility to consolidate faster than traditional wet impoundments, improving stability and accelerating closure timelines.

MONITORING

Given the novel nature of the HDS approach, continuous geotechnical monitoring was critical to validate its performance and ensure long-term stability.

Unlike conventional amphitheatre-shaped pits, the El Soldado pit features a slope geometry, which required a tailored monitoring strategy and a robust data management system.

Geosense In-place Inclinometers (IPIs) were installed to provide continuous deformation profiles, supporting targeted slope stability assessments.

To monitor pore water pressures and groundwater responses, a comprehensive range of Geosense Piezometers was employed, including standpipe, heavy-duty, and drive-in vibrating wire models, the latter driven in using a CPT rig.

Geosense Total Earth Pressure cells and Vibrating Wire Piezometers were deployed during the construction of a roadway to the tailings site, measuring effective stress (total stress minus pore water pressure).

150,000 M³ CAPACITY SITE

WATER RECOVERY RATES EXCEEDING 80%

RANGE OF PIEZOMETERS SPECIFIED

A full-range soil water potential sensors and ultrasonic flow meters were also used to monitor discharge flows.

A cloud-based monitoring platform from Insight Terra integrated and managed data from this diverse sensor network, deployed across more than 60 wells within the 12 × 4.8 km site. Sensors were connected to World Sensing wireless data loggers, collecting information from from the deepest pit levels, with four gateways installed to overcome the mine's complex topography.

RESULTS

Continuous monitoring confirmed the tailings remained unsaturated, accelerating consolidation and improving facility stability.

Water recovery rates above 80% demonstrate the HDS system's success.

The solution enables near-real-time visibility of structural and hydraulic conditions, enhancing decision-making and advancing sustainable, progressive tailings closure.

PRODUCTS USED

- VWP-3000 Piezometers
- VWP-3400 Drive-in Piezometers
- Standpipe Piezometers
- In-place Inclinometer (IPI)
- Quick Joint Inclinometer Casing
- Total Earth Pressure cells
- Wireless Network Solutions
- Full-range soil water potential sensors
- Ultrasonic flow meters

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