

## FOCUS ON Cerrejón Open-pit Coal Mine

Cerrejón is a large open-pit coal mine in Northern Colombia owned by Glencore. At Cerrejón, low-ash, low-sulphur bituminous coal from the Cerrejón Formation is excavated. At over 690 square kilometres the mine is one of the largest of its type, the largest in Latin America and the tenth biggest in the world.

Sisgeo Latino America supplied a large quantity of vibrating wire piezometers and other instruments including:

- Vibrating wire HD piezometers with ranges until 10MPa, with stainless steel filter and armoured cable with PVC jacket.
- Vibrating wire standard piezometers with ranges 3.5MPa, stainless steel filter and cable with LSZH fire retardant jacket.
- Mind portable datalogger

In order to determine the variations in pore pressures within the mine body, it was necessary to implement a monitoring system consisting mainly of vibrating wire piezometers. This monitoring system enabled detailed knowledge of the pressure trends and the reconstruction of a detailed hydrogeological model.

In total, more than 400 instruments were supplied, with different types and lengths of cable, which can reach depths of up to 250/300 m. Installation at these depths involves very complicated drilling and installation processes, which must be analysed in advance, so that every useful detail of the process can be defined, as well as being carried out by a team of highly experienced drillers and installation crew.

Credits to: Agencia Informativa Latinoamericana S.A.

DEX-S inclino-extensometer installation, Chuquicamata Mine - Chile



DEX-S inclino-extensometer installation, 150 mt depth, Ptolemaida Mine - Greece



WR-Log installation in Varangéville Salines Mine - France



## REFERENCE PROJECTS

### Europe

Wieliczka Salt mine - Poland  
Realmonite mine - Italy  
Aitik mine - Sweden  
Tailing dam mining industry - Romania  
Petrulia Mine - Italy  
Stratonii mine - Greece  
Coal Drama mine - Greece  
Kevitsa mine - Finland  
Mikhailovskiy mine - Russia  
Valsora mine - Italy  
Ruggetta mine - Italy  
Milos Island mines - Greece  
Phosagro/Apatit mine - Russia  
Ptolemaida Mine - Greece  
Salines Mine, Varangéville - France  
Zelazny Most – Poland

### America

El Teniente mine - Chile  
Chuquicamata mine - Chile  
Escondida mine - Chile  
Antamina mine - Perú  
San José mine - Chile  
Pasta de Conchos mine - Mexico  
El Soldado mine - Chile  
Los Andes mine - Chile  
Cerrejon mine - Colombia  
Collahuasi copper mine project - Chile  
Centinela mine - Chile  
Radomito Tomic mine - Chile  
Gran Colombia gold mine - Colombia  
Quellaveco mine - Perú  
Antioquia gold mine - Colombia  
El Porvenir mine - Nicaragua  
Embalse Caren - Chile  
Pascua Lama mine - Chile  
Cerrejon mine - Colombia  
Cisneros gold mine - Colombia  
Las Cenizas mine - Chile

### Asia & Africa

Arab Potash project - Jordan  
Mae Moh Coal lignite Mine - Thailand  
Wetar Copper Mine - Indonesia  
Catoca Diamond mine - Angola  
Premier mine - South Africa  
Letlhakane mine - Botswana  
Cullinan mine - South Africa



# MINES SAFETY AND MONITORING

## MINES SAFETY AND MONITORING

The mining sector faces many unique challenges that no other industry experiences. The robustness and accuracy of Sisgeo's instruments make them ideal for the geotechnical and hydrological applications, the slope stability analysis, the dam, tailing and cavern monitoring, the roof and shaft stability.

### Monitoring purposes

Mine safety and quality control

Integrating the usual soil investigations and geophysical tests

Preventing some unexpected factors that may generate anomalies

Foreseeing the risks through an "Early Warning System"

Increasing the production, minimizing the risks

Keeping the maintenance of the mine during operation

Providing legal protection to the contractor and/or the owner

### Main mine types

Underground mines

Open Pit Mines

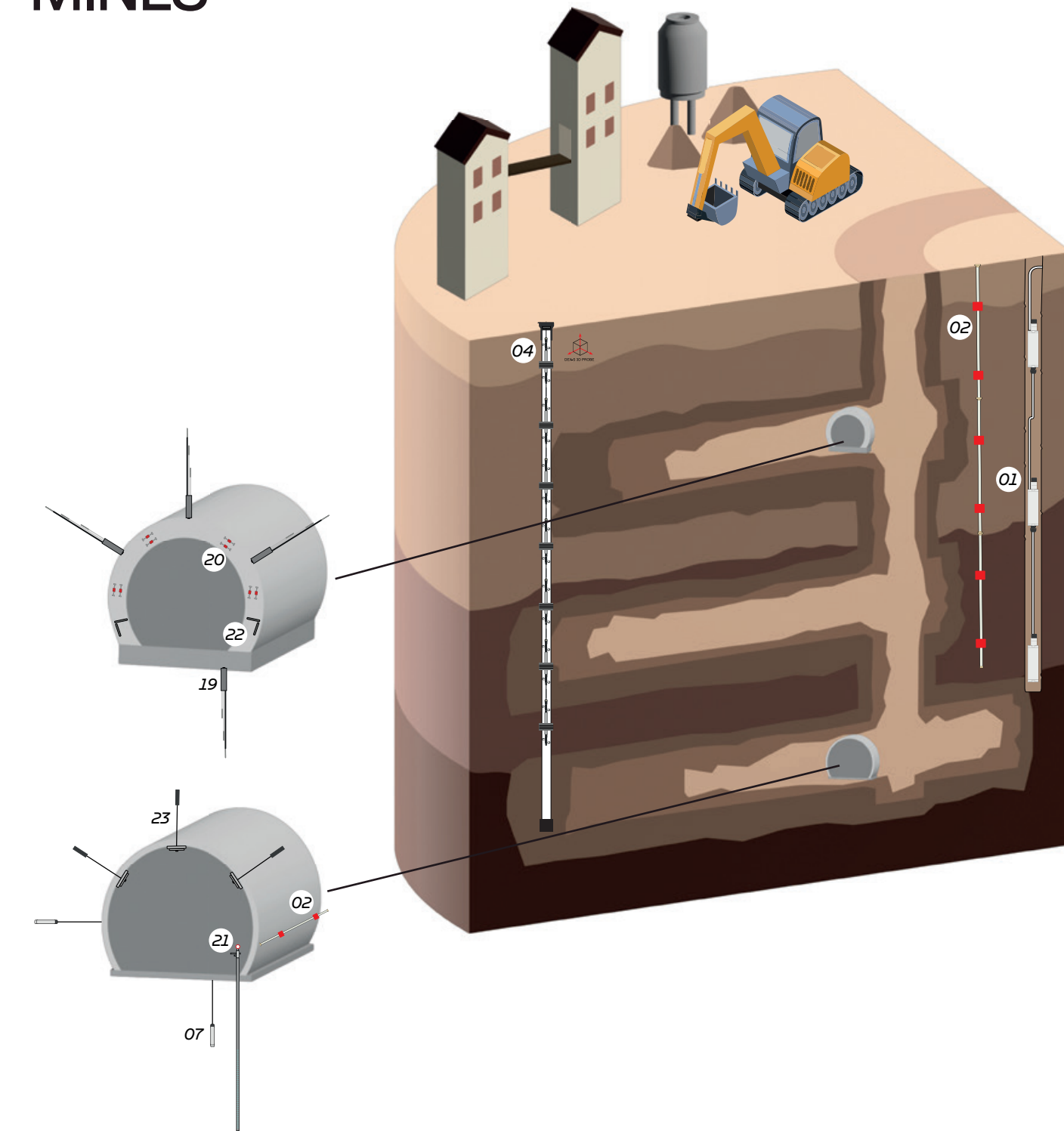
Tailing Dams

Waste Dumps

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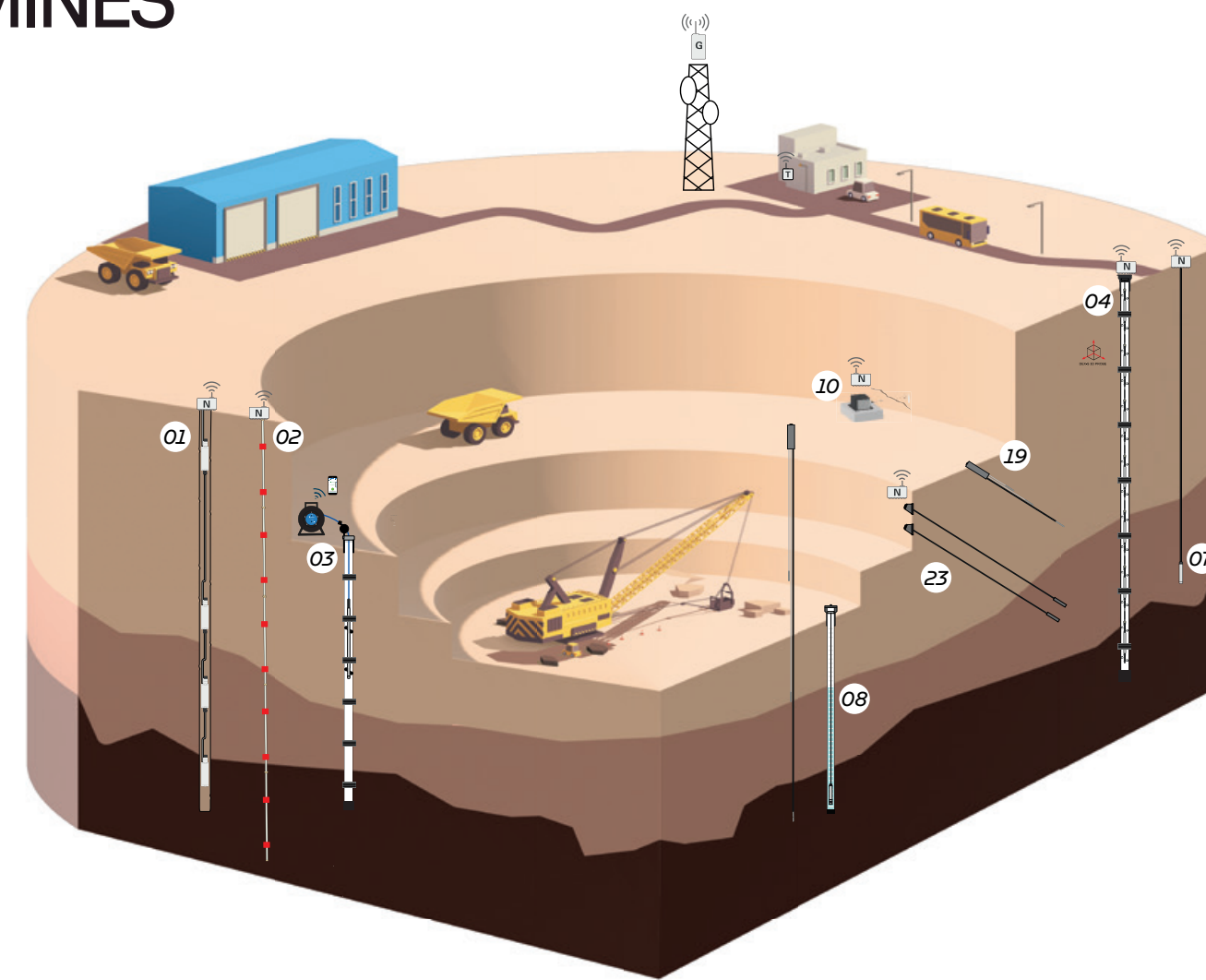


# UNDERGROUND MINES



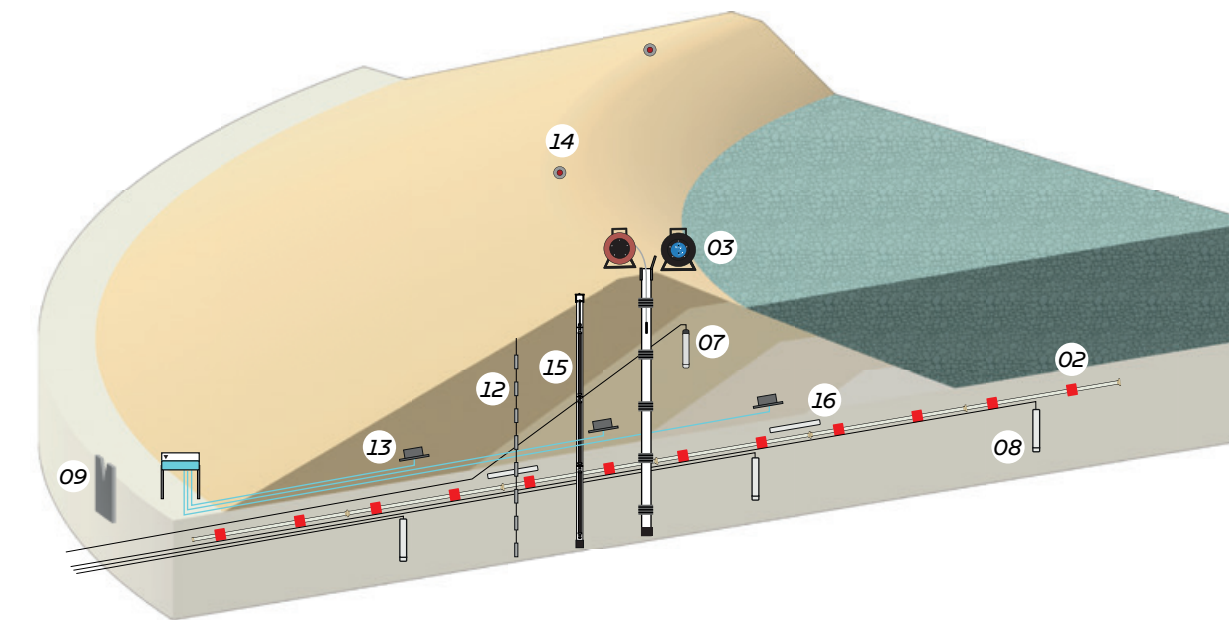
Drawings not in scale

# OPEN PIT MINES



# TAILING DAMS

# WASTE DUMPS



## INSTRUMENTS

- 01 Multipoint piezometer: Monitoring of the pore water pressure at different levels
- 02 Digital LT-inclibus: Check of the structural or ground horizontal/vertical displacement
- 03 B.r.a.in inclinometer system: Monitoring of the ground horizontal displacement and slope stability
- 04 Digital DEX-S inclino-extensometer: 3D borehole automatic profiling
- 05 Vented pressure transducer: Measuring automatically the water table level
- 06 Inclino-settlement column: Monitoring vertical/horizontal ground displacements in the same borehole
- 07 Vibrating wire piezometer: Control the pore-water pressure in rocks or grounds
- 08 Titanium piezometer: Monitoring the pore-water pressure in corrosive field
- 09 Seepage V-Notch flowmeter: Evaluation of water seepage
- 10 Wire crackmeter: Monitoring the movement of wide cracks or joint

## READOUT AND DATALOGGER

- MIND readout
- OMNIalog multichannel datalogger
- Wireless system

## INSTRUMENTS

- 11 Magnetic detector probe: Manual monitoring of the settlement's evolution
- 12 Temperature string: Monitoring the temperature in the same vertical at different depths
- 13 Multipoint settlement system: Settlement monitoring
- 14 Geodetic survey point: Topographic control of structural displacements
- 15 Digital MD-Profile system: High-accuracy profile monitoring for slope stability
- 16 Total pressure cell: Total pressure between the tailing dam body and foundations or within the embankment
- 17 Digital H-Level settlement system: Differential settlement monitoring of structures
- 18 Digital tiltmeter: Check of the rocks or structure tilting
- 19 Digital Mexid extensometer: Monitoring of displacements and/or settlements at different depths
- 20 Vibrating wire strain gauge: Check of the concrete stress conditions
- 21 3-Port pipe union: Monitoring the pore-water pressure acting around the tunnel
- 22 Radial and tangential pressure cells: Monitoring the radial and tangential stresses
- 23 Anchor load cell: Check of the load acting on rockbolt



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ALL THE PRODUCTS

MINES SAFETY AND MONITORING  
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