



Credits to: Agencia Informativa Latinoamericana S.A.

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.



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



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



WR-Lag installation in Varangéville Salines Mine - France

REFERENCE PROJECTS

Europe

Wieliczka Salt mine - Poland
Realmonte mine - Italy
Aitik mine - Sweden
Tailing dam mining industry - Romania
Petralia Mine - Italy
Stratoni 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.



Installation of MEXID extensometer into the cavern's ceiling

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

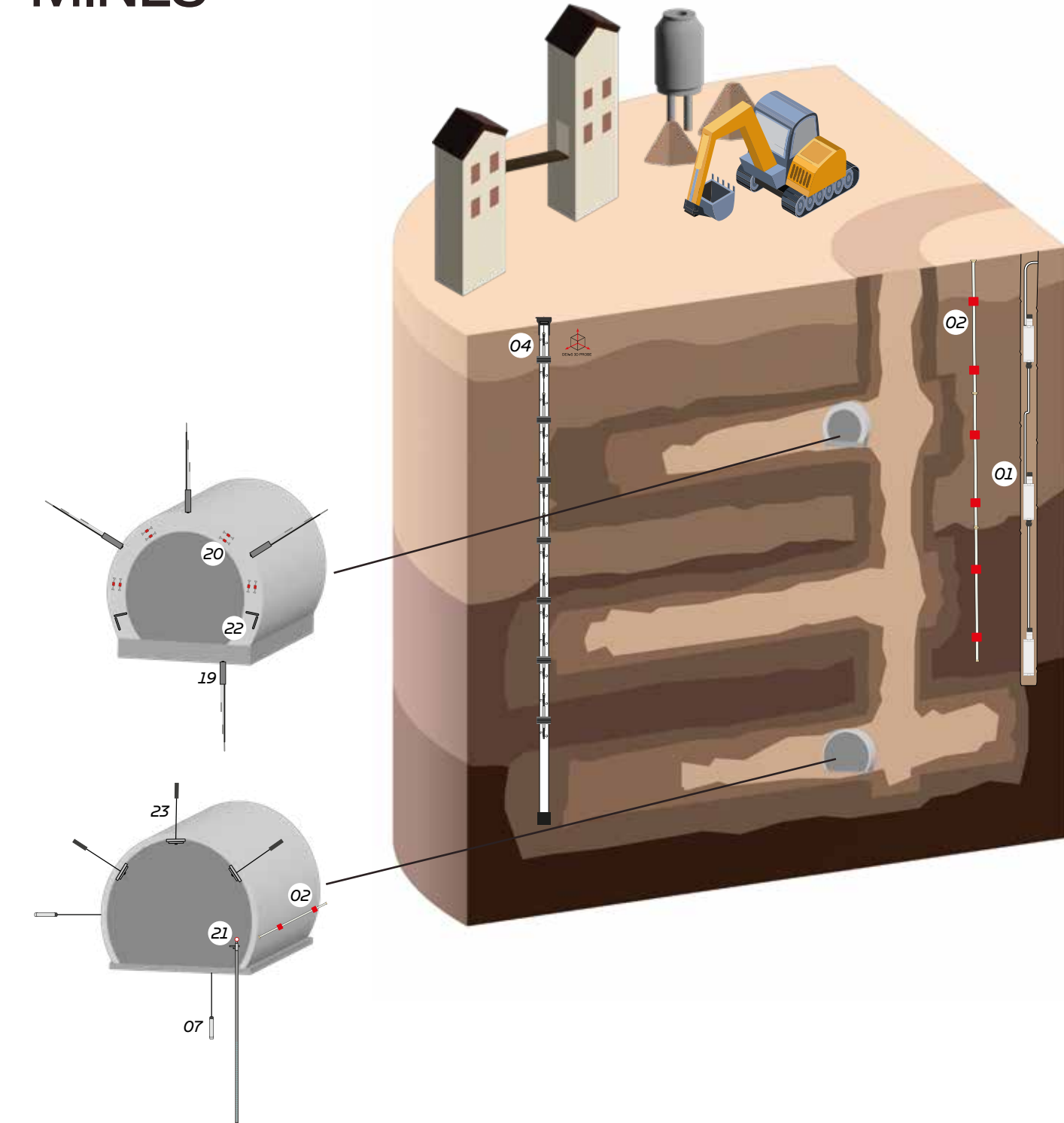
Waste Dumps

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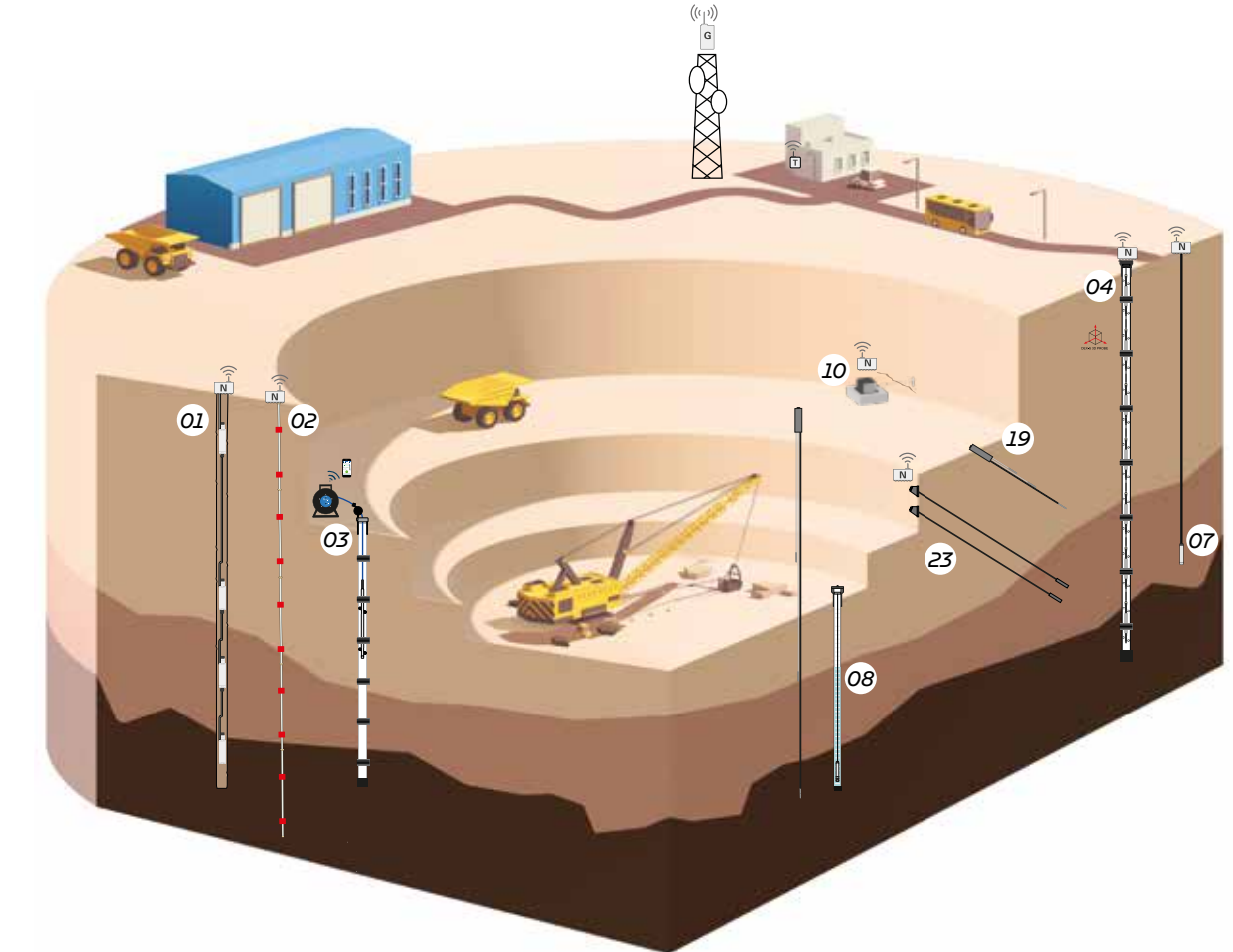
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UNDERGROUND MINES



Drawings not in scale

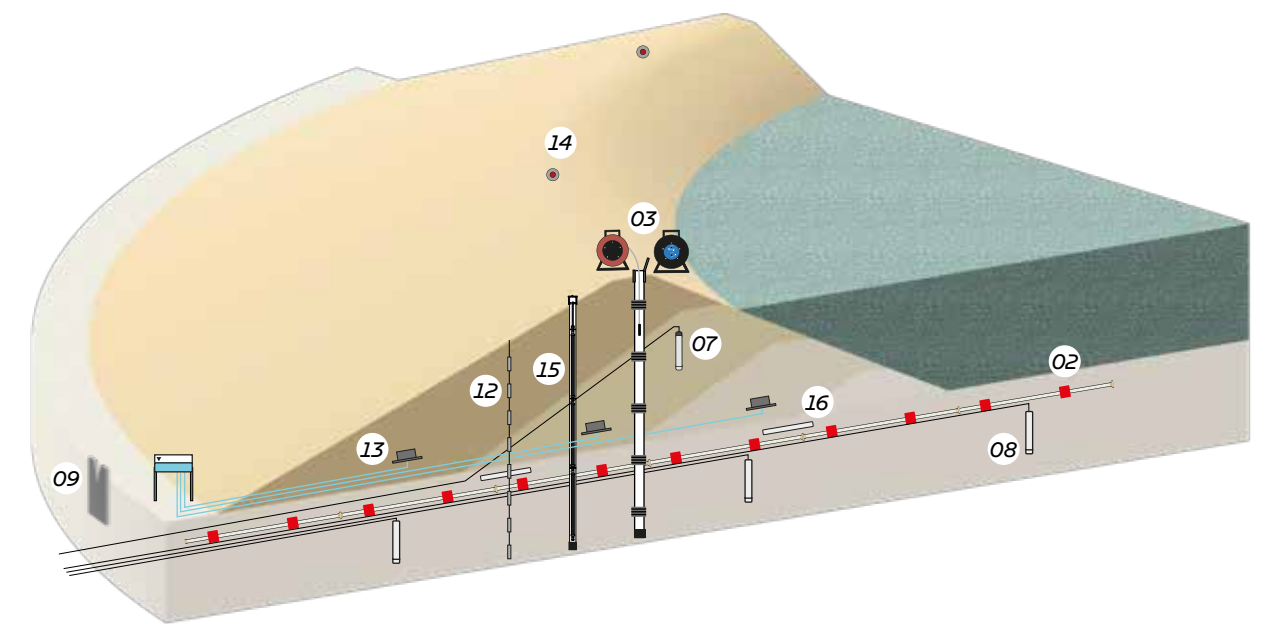
OPEN PIT MINES



Reading solutions and data collection

The readout units and dataloggers are an essential part of the monitoring system. The readouts are needed during the installation procedures, in order to check any instruments before and after their installation, or when an automatic monitoring solution is not required. MIND readout is the new portable multichannel readout unit able to read and store data from both digital and analogue instruments, via its MIND App. Dataloggers and wireless solutions are ideal for the automatic and remote monitoring in any geotechnical conditions. OMNIAlog and WRLog dataloggers offer precise measurement and reliable data acquisition from various sensor types and gauges supporting vibrating wire, MEMS and digital sensors, and all major geotechnical instruments. Sisgeo can also offer a dedicated service for data/measurement management from automatic and manual monitoring systems called AIDA IoT (powered by Field Srl). The electric signals of the instruments are captured by the Data Acquisition Units, sent to a Server and later imported to a dedicated Database, where they are divided by project, instruments and measurements. Data are then converted into engineering units, validated, processed and represented in charts and table format.

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
- WR Log 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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MINES SAFETY AND MONITORING
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