



Mining

Automated Measurement and Control Systems



Our products are used worldwide in mining operations to keep people safe and mines operating. Campbell Scientific systems are versatile, rugged, and reliable; have low power consumption; and are designed for harsh, remote locations or unsafe conditions not suitable for personnel.

Examples include slope stability analysis, weather monitoring, lightning warning, environmental compliance (air and water quality), dam and tailings monitoring, mine ventilation, equipment performance, and roof and shaft stability. All of these can be integrated into a network with data output to GIS or analysis.

Data Acquisition, Retrieval, and Communication

Reliable data can be used to make prompt decisions that reduce risk and liability; promote health and safety; efficiently manage equipment, sites, or multiple assets; and ensure environmental compliance.

Our automated measurement and control systems are capable of measuring virtually every commercially available sensor, then processing, storing, and transmitting the data to your cell phone, field office, or corporate headquarters. Data can be communicated through

radios, cellular modems, satellite modems, local networks, and the Internet. This accessibility allows for easy viewing and informed decision making in response to changing conditions.

Alarms and controls are easily integrated so you can suspend operations, move equipment, evacuate an area, or resume work. Systems can be programmed to send alarms or report site conditions by calling out to computers, phones, radios, or pagers.

Applications

Slope stability analysis

Slope stability data can be acquired from known problem areas or a network of measurement and control systems strategically positioned around a mine. Common parameters used by our systems to monitor slope movement include lateral displacement, water level and flow, tilt, soil moisture, crack monitoring, and precipitation.

www.campbellsci.com/slope-stability



Weather monitoring

Weather stations provide data that can be used to keep mining operations running when conditions warrant and to shut down when people and equipment need to be protected. Weather stations are often used to monitor wind speed and direction, air temperature, precipitation, barometric pressure, and relative humidity.

www.campbellsci.com/weather-climate

Lightning warning

Lightning warning systems provide real-time data used to trigger shutdowns or evacuations during pre-strike conditions, as well as to identify resume-work conditions when the danger of a lightning strike has passed. Visual, email, text, and audio alarms are available to promote precautionary actions that can save lives and prevent equipment damage. Lightning warning systems are capable of measuring electric fields, lightning strikes, temperature, relative humidity, wind speed and direction, solar radiation, GPS time sync, barometric pressure, and precipitation.

www.campbellsci.com/lightning



More info: 435.227.9120

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Environmental compliance (air and water quality)

In surface and underground mining operations, there are often multiple air and water quality conditions that must be monitored to ensure compliance with environmental regulatory requirements.

Air quality and pollution monitoring systems automate data collection and reporting processes by measuring solar radiation, gases, particulates, atmospheric stability class, and other required parameters.

www.campbellsci.com/air-quality

Regardless of salinity level, pollution level, or other harsh environmental conditions, our water quality monitoring and control systems are reliable. These systems measure all relevant parameters, including pH, conductivity, temperature, turbidity, dissolved oxygen, level, flow, and discharge. Specified time, event, or measured conditions can automatically trigger a water quality system to control various devices, such as pumps, mixers, valves, and gates.

www.campbellsci.com/water-quality

Other applications

Our versatile measurement and control systems are used in a variety of mining applications, including the following:

- › Dam and tailings monitoring systems measure water level, flow, and turbidity; slope stability; and air and water quality
- › Mine ventilation systems measure barometric pressure, air temperature, relative humidity, and air velocity.
- › Equipment performance systems keep mining equipment operating at peak performance levels by monitoring temperature, pressure, RPM, velocity, power, acceleration, position, torque, and strain.
- › Roof and shaft stability systems are used to warn of possible cave-in conditions by monitoring changing conditions, cracks, and load distribution.



Mining Case Studies

Campbell Scientific systems have helped a variety of organizations reach their goals. The following are some mining case studies:



For the Montana acid rock application, our equipment characterizes soil water content and temperature changes in the reclaimed materials.

Schafer & Associates of Bozeman, Montana are using Campbell Scientific instrumentation to monitor the performance of Acid Rock Drainage (ARD) caps. ARD occurs when water and oxygen react with waste rock from hard rock metal mining.

www.campbellsci.com/acid-rock-drainage

Fourteen sites in the West Coast of New Zealand contain Campbell Scientific equipment that continuously monitor water quality in coal-mine runoff. Live data is transmitted to a base office for both management and compliance purposes, and to automatically control a lime-dosing plant to raise the pH of the Mangatini stream to ecologically viable conditions.

www.campbellsci.com/new-zealand-mine

Campbell Scientific's CS110 Electric Field Monitor protects workers at a high-elevation gold mine in Peru. During the lightning storm season, evacuations are frequent, but the system allows work to recommence as soon as conditions are safe again.

www.campbellsci.com/peru-lightning



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