

Autonomous Sensors

Monitoring tailings dams and spoil dumps

Challenge

Mine tailing facilities contain the waste material removed during the mining process, whereas spoil managements house the remains after the processing and removal of precious materials.

Where spoil contains only overburden or waste rock, due to the techniques used throughout the extraction process, tailings are usually a slurry of fine particles and may include but are not limited to rock, sand, chemical reagents and processed water. Spoil is commonly stored as a conical piles, whilst tailings are typically sorted in dams. The unravelling and ultimate collapse of either can result catastrophic consequences including injury and loss of life, significant impact to communities, and extensive damage to the environment.

It's understood that the geotechnical integrity can be irretrievably weakened by processes hard to identify, including abnormal pore pressures induced by ground water permeating and eroding the embankment or foundations of these structures.

The current process to monitor and assess these storage facilities for signs of failure rely heavily on visual inspections conducted by workers walking along the unstable perimeter and Piezometer-like devices with imperfect measurement capabilities. There is currently limited research surrounding the precursors or indicators to provide early detection of a failing wall. Therefore, no real monitoring process can provide an accurate assessment of real-time dam or spoil dump stability.

With the recent significant failures, a better way to monitor and maintain tailing storage facilities is required to improve safety and asset monitoring, and avoid environmental catastrophe.



SURFACE

Research

The main objective of this project is to develop a wireless sensor solution that will determine the groundwater pressure and flow throughout a spoil dump or tailings dam. This solution will monitor the condition of the structure in order to reduce personnel, environmental and financial risks.

Phase 1 of the project focusses on the research, design and development of a prototype wireless groundwater pressure sensor that will provide information for determining stability. Many of these wireless sensors will be used together to profile groundwater conditions throughout the spoil dump or tailings dam. An optimal method of communication will be identified to form an interconnected mesh network that transmits data from each of the sensors through the spoil dump, to the surface and back to the engineer.

The collected data will then be analysed to develop a profile of the groundwater in spoil, providing much-needed insight into the causes and precursors to tailings dam and spoil dump failures.

Partners



Benefits

- Removal of personnel from hazardous areas including unstable grounds
- Active and remote monitoring of spoil dumps or tailings dams, allowing frequent safety audits
- Improved tailings dams and spoil dump designs
- Creation of mitigation strategies for groundwater pressure and seepage during and post mining activities
- Reduced cost of sensor installation and equipment

Status

Mining3 has developed a fully functional prototype system and is currently deploying the prototype at partner mine sites.

For more information contact:

Byron Wicks

Technology Leader | Embedded Systems
info@mining3.com

About Mining3

Mining3 is the world's leading research organisation, directed by its global mining industry members to develop and deliver transformational technology to improve productivity, sustainability and safety.

SURFACE



Phone +61 7 3365
5640
info@mining3.com

Building 101, 2436 Moggill
Road Pinjarra Hills Qld 4069
Australia

mining3.com