

Monitoring cuts tailings dam risk for Canadian oil sands operator in extreme weather conditions

Country Canada	Project type: Tailings dam monitoring	Sector: Mining	Main product: Wireless data loggers and gateways
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Challenge

Oil sands make up one of Canada’s most important fossil fuel reserves. But their exploitation has to be carried out with care so as not to degrade natural environments, often on indigenous community lands. At one major oil sands mining site, a large Canadian energy company had installed around 2,000 boreholes with vibrating wire piezometers to measure pore pressure and moisture levels around the operation’s tailings dams.

However, these were not equipped with loggers and were being read manually, with at most a weekly frequency. In winter, freezing conditions on the site, which spans more than 40 square kilometres in northern Alberta, made it hard for people to take readings in a timely manner. Because the mining operator was keen to minimize the gaps in the sensor information, it tasked Canadian firm GKM Consultants to come up with a cost-effective and failsafe way of automating the readings throughout the year.



Solar powered Gateway installation designed for two weeks of autonomy.

Solution

Tests were carried out on a range of remote monitoring options, evaluating cold weather performance, long-range wireless transmission and equipment battery life. Worldsensing’s LoRa-based long-range, low-power communications system emerged as a clear winner. As well connecting Worldsensing five-channel and single-channel vibrating wire data loggers to the piezometers, in several locations around the site GKM Consultants is hooking Worldsensing’s digital nodes up with Measurand ShapeArrays to monitor slope stability.

At the time of writing, the site is equipped with more than 10 Worldsensing gateways and 200-plus nodes, which were installed in just two fortnights. The installation is in the process of being expanded and provides readings every four hours, all year round. Because the data is transferred automatically from each sensor to the oil company’s systems, there is no scope for human error. Even under freezing conditions, the battery life of the data loggers could be up to 10 years, minimizing the need for field visits.



Five-channel vibrating-wire node installed on wooden post.

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“It’s 100% satisfaction. They keep coming back and asking for more. The return on investment is easily less than a year for this.”



Adam Dulmage

Business Development Executive, Mining Sector
GKM Consultants

Benefits

Previously the oil sands company had an entire team of people taking manual readings on the piezometers, usually on a weekly basis. With the WorldSensing equipment all of the readings are taken automatically, improving the reading frequency nearly 40-fold. This allows the team to focus on analyzing this higher quality dataset, instead of spending most of their time collecting it.

The WorldSensing system has not only improved the frequency of readings, but also the immediacy—since each reading is transferred several kilometres to the gateway then onto the oil sands company’s visualization software systems once it is logged. This gives the operator a much more detailed and immediate view of conditions on the site, allowing them to make more timely and better-informed decisions, enhancing safety and productivity.

Advantages

- Vast reduction of operational costs by replacing manual readings with automatic remote monitoring
- Large increase in data collection frequency, even in winter months
- Improvement in immediacy of data quality and the ability to detect early movements for risk management
- 40x increase in data frequency of readings



Five-channel vibrating-wire node installed on wooden post.

About GKM Consultants

GKM Consultants was founded by distinguished engineers who felt there was a need to bring together instrumentation technologies and complex monitoring assignments into a single turnkey servicing company for the benefit of their clients.

GKM Consultants is known internationally for its expertise in designing, installing, and implementing geotechnical monitoring solutions. GKM bridges instrumentation technologies and complex monitoring requirements into turn-key solutions.