INMARSAT

Centralising tailings dam management

A pathway to a safer tomorrow

WHERE ARE WE AND WHERE SHOULD WE GO?

Awareness of tailings dams has risen dramatically in the public consciousness in recent months, with a series of high-profile disasters making the headlines across the world. This has concentrated the mining industry's collective mind on the issue, to the extent that tailings dams are now often the first item on the agenda for CEOs on investor calls. But as anyone involved in the mining industry knows, managing tailings dams safely and efficiently is a long-standing challenge, and despite efforts to drive improvements, tailings management isn't drastically different today than it was 20 years ago.

Mining companies have typically relied on manual processes to collect data from their tailings dams, using either handheld instruments or simple sensors connected to data loggers on site. These processes are expensive, time-consuming and susceptible to human error. The net result is a fragmented and siloed approach to tailings management which leaves mining companies struggling to access, understand and make use of their data. The problem is compounded by the fact that mining companies often have a global footprint, so bringing this data together from dams all over the world, without a centralised system exacerbates the challenge.

With regulators, government agencies and investors paying ever closer attention to tailings management, and mining companies seeking to improve their environmental footprint and move towards Zero Harm, it's increasingly clear that a new approach is required. Fortunately, new technologies are emerging that promise to revolutionise the industry's approach to tailings management and provide mining companies with a centralised, real-time and reliable view of the status of their tailings facilities. This is a fundamentally new approach to managing tailings dams, moving away from labour-intensive, manual processes that are prone to human error and create data silos, to an automated, data-rich and safety-first methodology that delivers a global, unified view of tailings dam integrity to all key stakeholders.

Photo: Eldorado

Tailings dam safety is a long-running concern

CURRENT STATE OF PLAY

It would be fair to say that most mining companies do not have the most effective processes in place to manage their tailings dams. There is a wide range of methods used across the industry for collecting data at tailings dams by mining companies, regulators and auditors, but the vast majority of these processes do not actually give these stakeholders the data they need to ensure the dams are safe – or at least not in a timely manner.

Tailings monitoring processes can be particularly inefficient at closed facilities, though many open facilities also suffer from sporadic and uneconomical approaches. Many mining companies rely on members of staff travelling out to dams, either driving for several hours or taking an expensive helicopter flight to sites (which more often than not are in the middle of nowhere), to take readings with handheld instruments. There are multiple problems with this approach, which we will go into, and that's aside from the obvious inefficiency of sending a staff member out on the road for hours to gather a couple of datapoints. If sites have a tailings manager, and many don't, that person usually has another job, such as geotechnical engineer and tailings is not their primary role.

In another scenario a mining company might send a staff member out to site to collect data once every two weeks, and often as infrequently as once every six months. This 'once in a blue moon' approach does not give them the regular flow of data that they need to identify an issue that may develop into a more serious problem. Tailings can move and change quickly, rain can cause flooding and destabilise slopes, and if mining companies do not have access to data from their dams in real-time, they will not be able to take action to resolve these issues before they develop into a more serious problem. This means the industry currently is generally reactive in terms of tailings management, rather than proactive.

- **Fragmented approach:** This manual approach to data collection may lead to errors in the reporting of metrics at tailings dams, and the lack of consistency in reporting can make it very challenging for mining companies to get a holistic view of the conditions at their tailings dams. Datapoints may be scribbled in paper documents, which then have to be entered into an Excel spreadsheet, a process which leaves room for further errors. Those that have progressed to more advanced methods, such as

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Investors are taking a closer look at tailings facility management ahead of decisions

using sensors to collect data, still can't get the quality or regularity of data that they need because until it is manually downloaded by a staff member from data loggers on the site – it's effectively useless.

Even those organisations that do have more sophisticated multi-sensor systems in place at a dam, may have an entirely different system at another dam, making data standardisation an awkward and inconsistent process.

Fragmented approaches, with a reliance on inefficient, manual processes, are leading to a lack of consistency in managing tailings dams, with no industry standard for best practice and companies not always gathering the same datapoints across their own infrastructure. There is currently very little centralisation of tailings dam management and few companies can access real-time data gathered from all of their dams, and this is preventing the industry from improving the safety of this critical infrastructure.

We've seen a huge amount of effort put into improving health and safety for staff in the mining sector, as part of the move to Zero Harm. As an industry we're making great progress in improving sustainability and adopting more environmentally-friendly ways of working, but the next step has to be improving tailings dam management. Centralising tailings dam management is a crucial step in this journey, enabling mining companies and other stakeholders to ensure that they have constant visibility over their infrastructure so they can take remedial action if necessary.

CENTRALISATION: THE FUTURE OF TAILINGS DAM MANAGEMENT

Gathering data with consistency and regularity from tailings dams across the world, with the help of a monitoring solution, can offer mining companies and other stakeholders a ream of benefits. The first, and most obvious, is that it can enable teams located in head offices or regional control centres to see almost instantly what is happening on a site, such as movement in the slope of the dam, an increase in the phreatic surface or a rise in peizometric pressure, and take action to resolve it. They can stop these issues from developing into more serious problems and dramatically improve the safety of their dams by managing them proactively.

If mining companies can standardise and automate their data collection processes, it means engineers on site don't have to jump in a pick-up truck to drive around with a USB stick to collect data, and instead can concentrate on the business of managing their tailings dams.

If they can then take that key data and present it centrally, enabling global businesses to see all of their dams from around the world in a single platform, they can remove the risk of human error and keeping critical data in site silos. The mining industry will not only begin to see trends and keep audit trails, helping to further improve tailings dam management, but also ensure that critical risks and trends are seen by those most qualified to make crucial decisions.

Simplicity is another important benefit for companies looking to centralise their tailings estates. Using one system means working with one supplier. This results in a reduction in the time spent managing multiple vendors, and frees up time to spend on the most important thing: managing tailings dams. Equally, if a mining company has a global audit partner, the move to a centralised solution also makes the job much easier, more consistent and their recommendations more informed. It means auditors could, if they wanted to, review conditions every day or weekly, a massive improvement from the current six monthly or year audits.

- **Sharing data outside of the business:** Companies gaining a new level of data visibility through the centralisation of their tailings dam estates have important decisions to make in how they share that data outside of their organisation. Through centralisation, sharing with auditors, contractors, regulators, and government bodies becomes much easier, resulting in a more transparent industry.

For regulators and government agencies, having a centralised view of the tailings dams under their authority not only enables them to have a much better understanding of potential safety risks that they may face. This in turn can arm them with the data they need to force mining companies to take action if they identify safety issues with a dam and help them to protect local communities.

Insurance companies can also benefit from a centralised view of the liabilities they have underwritten, and auditors can completely change their business model, moving from reporting every three to six months, to updating their clients on a real-time basis on the integrity of their dams.

Tailings monitoring adopts a fragmented approach

Photo: Charles PH/Unsplash

Tailings dam data is not gathered in a consistent fashion

Meanwhile, the regulation of tailings dams is a particularly thorny issue. Currently, there is no global, standardised regulation for monitoring and managing tailings dams, although there have been moves to create a set of best practice standards by the International Council on Mining and Metals (ICMM). Regulations currently differ from country to country, with limited consistency across different regimes. However, by gathering data on crucial metrics from their dams and centralising that data in an easy to access, cloud-based dashboard, mining companies can share this information with regulators and government agencies and demonstrate to them that they have a constant, real-time view of the integrity of their dams and can resolve any potential safety issues, dramatically improving compliance.

But centralising tailings dam management and improving compliance goes beyond satisfying the demands of regulators. We all know that the mining sector can't carry on doing what it has been doing with tailings dams, and, ultimately, unless it ups its game, regulators and governments will force its hand. Mining businesses have to demonstrate to local communities and society more broadly that they are responsible businesses and that they are using all the tools available to them to be best practice innovators, working proactively – rather than reactively – to ensure the safety of their infrastructure.

THE ROAD TO CENTRALISATION

While the benefits of centralising tailings dam management are clear, actually achieving them with just internal resource can be complicated. Mining companies are, by their nature, focused on mining and not technology. Developing and implementing tailings monitoring systems is complex. This complexity is not just borne from the actual design of the system, but also the installation, the ongoing management, bug fixes, security updates and new features. This is the reason why the industry currently monitors its dams the way it does – every site or company has developed its own system.

By working with a trusted partner who can provide a one-stop monitoring solution, delivering connectivity, visualisation, updates and security capabilities as part of a managed service, centralisation can be easily accomplished.

If you are an expert in tailings dam management you should be spending your time managing tailings dams, rather than managing multiple suppliers. Currently, too many tailings teams are spending time managing multiple suppliers of their disparate tailings dam monitoring solutions or trying to manage all of the supporting technologies themselves.

It is much easier to procure one solution that can support your centralisation objectives on a global level. Working with a trusted global partner who can support your centralisation anywhere means you only have one relationship to manage. They will work with you as part of a change programme to understand your needs, before supporting the solution on an ongoing basis, and evolving your solution as your needs change.

- **The right connectivity and metrics:** Reliable connectivity is critical for this new approach to monitoring tailings dams, and is the backbone for centralising their management. Even smaller mining companies may have tailings dams spread across North America, Africa and Australia that they need to constantly monitor and manage, and it can be very challenging to bring data from these far-flung locations together in one place.

Global satellite communication networks offer the reliable, resilient standard of connectivity that mining companies need to gather data from their tailings dams, regardless of where they are located. With tailings dams often outside of the reach of terrestrial communication networks, mining companies can be discouraged from investing in providing connectivity to their dams by the high cost of installing terrestrial infrastructure.

However, satellite networks require just a terminal to be set up at the tailings dam and can withstand bad weather or natural disasters like earthquakes, and so mining companies can rely on them to transmit data from their dams to a central platform. As long as you can see the sky, you can transmit data via satellite.

One of the Inmarsat satellites

Typically mining companies gather data on a limited number of metrics at their tailings dams, such as pond elevation, on an irregular basis.

However, with the right connectivity in place, there is huge potential for mining companies to use a wide range of sensors to monitor a much broader set of parameters that can measure the integrity of any tailings dam.

With the right connectivity platform in place, mining companies can monitor just about anything – from local weather conditions to slope incline and piezometric pressure and flow rates in and out of dam – from a central location. Working with a trusted technology provider ensures instruments can be converted to work as part of a solution, while adding new sensors allows outputs to be visualised and compared globally.

Tailings dam data management goes beyond satisfying regulators

INMARSAT AS A TECHNOLOGY PARTNER

The Inmarsat Tailings Dam Monitoring Solution builds on 40 years of safety heritage in delivering critical safety communications. It is a managed connectivity service designed to centralise tailings dam management and allows total visibility of conditions across a global tailings estate in one place so operators can manage it more effectively.

The solution ensures that all data is collected consistently 24 hours a day, 365 days a year. It is enabled by Inmarsat's L-Band connectivity, the same service that Inmarsat provides for the Global Maritime Distress and Safety System (GMDSS).

It offers the same user experience no matter where it is deployed, meaning that companies can, for the first time, have a global, repeatable standard on all of their sites. With real-time access to their tailings data, mining companies can improve their auditing processes and make faster, better-informed decisions.

Inmarsat engaged with a leading global mining company and auditor, Knight Piésold, to develop the Tailings Dam Monitoring Solution which, following 18 months in development and a successful trial that concluded in February 2019, is now commercially available.

The initial deployment consisted of piezometers, an ultrasonic height sensor and weather station, connected by Inmarsat's satellite to a cloud dashboard that visualises all the information in one place.

The solution gathers over 100,000 datapoints each month, providing the mining company with a precise and real-time picture of conditions at its dam, enabling it to get smarter about how it manages its tailings. ■

To learn how we can work with you to centralise your global tailings estate please get in touch: inmarsat.com/tailingsdammonitoring