



DAM MANAGEMENT AT SOUTH32



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THE IMPACT OF DAM FAILURES

In 2014 and 2015 two significant tailings dam failures occurred in the mining industry, impacting the surrounding landscape and local communities. Preventing tailings dam failures is vital to the mining industry's ability to maintain the trust given to us by communities around the world to manage their land and natural resources safely.

GOVERNANCE AND RISK MANAGEMENT

South32 owns, operates and builds dams, including tailings dams, at most of our operations.

At South32, we monitor and manage our tailings dams. We assess the risks for each tailings dam, taking into account the materials contained, the location and other factors to identify and put in place the most appropriate failure prevention mechanisms, or controls.

Controls typically include monitoring and maintenance. This includes regular checks of any monitoring equipment to ensure it is functioning as designed, monitoring the nature

of the tailings deposition and the liquid levels, as well as monitoring the integrity of the tailings dam structure itself.

Maintenance includes keeping tailings pipelines and water reclamation systems in good repair and monitoring water levels in the embankment's fill and foundation, to make sure it continues to meet safety and environmental requirements.

We regularly audit the governance frameworks of our dam structures to confirm the correct monitoring and maintenance activities are taking place at the required frequency and that regulatory requirements are being met.

In accordance with South32's risk management framework, the South32 Board's Risk and Audit Committee is presented with material risks. Its role includes overseeing development and implementation of risk management systems and reviewing the effectiveness of South32's risk management framework.

WHAT IS A TAILINGS DAM?

Tailings dams are physical structures that contain the groundrock tailings from ore-milling and separation processes. These dams allow water used in ore processing to be recycled. Tailings dams sometimes contain hazardous materials and are likely to grow in size over the life of a mining operation.

Tailings dams should be designed according to their surrounding context, to withstand the force of earthquakes and be built to last for the long-term. Tailings dams must be managed closely throughout the lifecycle of a mining operation.

OUR VOLUNTARY REVIEW

In FY2016 we voluntarily conducted a full review across all of our dam structures. This included re-examining the management controls and processes we already have in place to assess effectiveness.

The results of the review concluded that our dam structures are well managed and that any improvement actions are being implemented. The results of our voluntary dam review were also presented to the Sustainability Committee of our Board.





Worsley Alumina, bauxite residue tailings dams, Australia.

SOUTH32 DAMS

South32 has six dam structures of a scale that we need to manage closely. Three of these dams (the Worsley Alumina refinery catchment lake, Illawarra Metallurgical Coal's Brennan dam and Energy Coal South Africa's Khutala underwater storage dam) are water storage dams and are adequately designed and managed for this purpose. The remaining three dams, at Worsley Alumina, Cannington and GEMCO, are tailings dams that were built to contain waste from processing ore at these operations.

These six dam structures at South32 are subject to annual monitoring and governance at the operation through to Board oversight. Our voluntary review resulted in affirmation that the management of our dam structures is adequate. As learnings emerge from dam failures in other organisations we will continuously assess the relevance to our own operations and apply management actions if and where these learnings are relevant.

Worsley Alumina

At Worsley Alumina, the bauxite residue tailings dams are designed for co-disposal of slimes¹ and sands, as a single stream of thickened slurry. Therefore, separation of sands and slimes, which can contribute to dam failure, is not an

issue. These dams are raised by the upstream construction method, where the required strength of the dam wall is achieved before building the next stage of the dam. This ensures that the walls remain stable. The tailings behaviour and wall strength is controlled by depositing and drying the tailings material in thin layers, before adding the next layer. This process turns the liquid into a solid and removes its ability to 'spill'.

The effectiveness of our tailings drainage systems and the position of the water table is monitored by special instruments called piezometers (for measuring and monitoring the pressure or depth of groundwater). Annual dam stability investigation and analysis ensures the appropriate safety factors are maintained for each bauxite residue tailings dam.

GEMCO

GEMCO's residue tailings storage areas are low set (~13m maximum height) reducing any risks around scale or velocity. GEMCO also has separate dams for sand and slimes, which results in the ability to manage the content of each dam appropriate to the density of the slurry contained. Most of the dams consist only of perimeter

starter embankments so are, in effect, water storage dams. Where dams have been raised, this is through the downstream construction method, maintaining the same water storage capacity of the starter dam. This means that perimeter slope stability at GEMCO is largely independent of the nature and behaviour of the contained tailings.

Cannington

At Cannington, the residue tailings dams are based on a single stream of tailings, with upstream dam wall construction. Perimeter discharging of material promotes the formation of beaches of well-drained, coarse material and ensures water pooling occurs away from the dam walls, lowering any risk that the dam walls become weakened by water. To ensure this is effective we actively monitor perimeter wall water pressures and the position of the water table in the dam to ensure the ongoing strength of the dam walls.

¹Slimes = soft, moist earth or clay left behind after ore processing.

INTERNATIONAL COUNCIL OF MINING AND METALS TAILINGS REVIEW

Following recent tailings dam failures, the International Council on Mining and Metals (ICMM) is undertaking a global review of tailings storage facility standards and critical control. The ICMM Tailings Review is led by a working group of ICMM technical member representatives.

The results of the ICMM Tailings Review will support us, other member companies and the wider industry, to better manage the risks associated with these facilities and minimise the risk of these types of events from happening.

South32 employees are part of the ICMM Tailings Review working group, where knowledge from all ICMM member companies is being shared. ICMM is expected to produce its report on tailings dam management towards the end of 2016.

South32 will continue to engage with industry and other expert organisations to collectively raise the performance of the design, management and closure of dams, specifically around tailings structures. More information can be found at: <http://www.icmm.com/en-gb/environment/tailings>.

EMERGENCY RESPONSE

South32 regularly reviews and maintains an emergency response plan at dam sites. Our plans have been reviewed and updated to incorporate the learnings gained from the recent tailings dams failures in the industry. These response plans designate accountability and response at a field, operational and regional office level and, in general, involve the following three steps in an emergency:

1. Confirm the situation
2. Isolate the incident and prevent its escalation
3. Take immediate steps to safeguard employees, contractors, the community, the environment and South32 assets.

Following immediate response and once stability has been ensured, the focus shifts to managing the wider operational issues and health, safety and environmental ramifications. A critical element is ongoing liaison with stakeholders to effectively communicate and support long-term action. Emergency response plans continue through to recovery and resumption of the operation and the community's way of life.



Our volunteer firefighters at Worsley Alumina, Australia.

WHO WE ARE



OUR PURPOSE

Our purpose is to make a difference by developing natural resources, improving people's lives now and for generations to come. We are trusted by our owners and partners to realise the potential of their resources.



OUR STRATEGY

Our strategy is to invest in high-quality metals and mining operations where our distinctive capabilities and regional model enable us to stretch performance in a sustainable way. By maintaining financial discipline and continually optimising our portfolio we will deliver sector leading total shareholder returns.



OUR VALUES

CARE

We care about people, the communities we are a part of and the world we depend on.

TRUST

We deliver on our commitments and rely on each other to do the right thing.

TOGETHERNESS

We value difference, listen and share, knowing that together we are better.

EXCELLENCE

We are courageous and challenge ourselves to be the best in what matters.

IMPORTANT NOTICES AND DISCLAIMER

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