



CASE STUDY: Mine Slime

SLIME MANAGEMENT IN AN UNDERGROUND MINE

The Challenge

Most underground mines use water for drilling, cutting, washing and dust control. This water, in addition to the normal seepage of groundwater, flows to underground holding sumps. Over time, fine rock cuttings, dust and sand build up in the sumps, eventually decreasing their holding capacity for mine wastewater. If the sumps are not cleaned of these solids, the material can become a dry, hard mud referred to as “mine slimes.”

The traditional approach to managing underground slimes is a costly and time consuming process. It involves allowing the solids to settle to the bottom of the sump while the cleaner water from the top flows over to a clean water sump. The harder, thicker slimes are typically cleaned out using scoop tram equipment and transported to a vacant area in the mine to dewater.

Not only can this cleaning and drying process take as long as six months; it requires numerous man hours and excessive pump repair due to abrasion and corrosion caused by pumping large volumes of slimes.

GFL was asked to explore methods for breaking up the slimes that had hardened and made the sumps inoperable. As a provider of engineered environmental solutions, GFL came up with a preventative approach that would stop the build-up of mine slimes from occurring in the first place.

The Solution

At 1,149 metres below the surface of the mine, GFL installed a Lynx 418 centrifuge with a newly engineered stand, mix tank and polymer feed system to instantly separate the solids from the water. This was the first time this approach was applied in an underground mine.

GFL’s three-person crew, consisting of two operators and one supervisor, obtained required certifications and site-specific training in order to operate underground.

This method delivered immediate results and provided Vale with several advantages over the traditional approach:

- Accelerated slime management process to avoid water quality issues caused by solids accumulation and potential overflow of slimes in the clean water sump
- Yielded potential metal recovery from slimes
- Reduced pump repair and maintenance costs

- Improved safety by delivering an ongoing dewatering solution to minimize slime build-up and related hazards such as slips and trips.

The Results

The crew worked 10-hour shifts for six days to successfully process the slimes and produce dry, stackable cakes of an average of 60% solids, exceeding slump test requirements that validate its solid composition. Producing a dry, solid material eliminates seepage in the mine, while also making it easier to transfer. The solution also delivered clean water that consistently removed 99% of solids, making the water suitable for reuse in Vale's processes.

By operating at the source, GFL limited the amount of waste that was required to be transported above ground. The pilot project met operational expectations and safety performance standards, ensuring its operators systematically managed and controlled risks associated with operating in underground conditions.