



CASE STUDY: Mine Tailings

ESTABLISHING NEW STANDARDS IN MINE TAILINGS SOLUTIONS

The Customer:

As a large and diversified Canadian resource company, the client operates several steelmaking and coal-mining operations and exports its processed coal by sea.

Project Description:

Every year, the mine and its preparation plant produce 18 million tonnes of clean coal. As a waste by-product, the plant also produces approximately 1 million dry tonnes of coal fines annually, which are directed into a tailings pond. The plant is able to use the water in the pond for processes, but when the pond gets too full with tailings, with a high ratio of total suspended solids (TSS), it has adverse effects on the plant equipment. By removing the tailings, the return water meets plant criteria for efficiency and safety. In March 2017, GFL was awarded a five-year contract to remove the tailings, starting with 800,000 tonnes in the first year.

The Challenge:

To dredge the fluid out of one tailings pond and move it into another, it needed to travel five kilometres, including a 192-metre climb up the side of a mountain. In addition to calculating the correct pressure, flow rate and rheology just to pump and transport the fluid, the practical logistics of getting the equipment onto the site were a significant undertaking. The technical and physical challenges were so complex, the vendor that was originally awarded the project went bankrupt in the process of trying to solve the engineering puzzle. In fact, the contractor's inability to remove the tailings meant the pond nearly reached its total holding capacity. The plant was at risk of shutting down, which would have cost the client \$100,000 per day to deal with the problem. So it was critically important that GFL find a working solution.

The Solution:

GFL began by enlisting the help of its Onsite Technical group, a team that tests waste samples, determines the most effective methods for removing contaminants, identifies the right equipment for jobs, estimates the cost to implement the solutions, and assists with commissioning projects to ensure proposal targets are met.

While conventional wisdom would have suggested placing individual pumps up the side of the mountain, the GFL team determined that it was best to position all of the pumps together in one location. This decision simplified monitoring and maintenance, and improved safety for the operators who are onsite 24 hours per day. The team also determined that the equipment required a special “zig-zag,” high-low configuration for the pump pad to support sufficient intake and discharge to achieve the required 280 pounds of pressure per square inch of pumping force. Sourcing and shipping the dredging equipment—not to mention assembling it on the mountain range—required extensive, meticulous planning and attention to detail to ensure successful installation. In late May 2017, after almost three months of research and problem solving, GFL commissioned its solution. It remains fully operational today. With precise calculations and seamless execution, GFL rose to the complex engineering challenges of this tailings management project.

The team managed to exceed client expectations and establish a new standard in pumping over long distances. The Onsite Technical team originally calculated that an efficient flow rate (or processing rate) under these conditions would be about 3,200 gallons per minute (or 4,200 dry tonnes per day), assuming the fluids contained 30 per cent solids. In commissioning the system, the GFL solution proved it could actually pump an average of 4,600 gallons per minute of fluids containing 45 per cent solids (8,020 dry tonnes per day)—well above the dry tonnage target production rate. On the last day of full processing, operators reached a rate of 10,279 dry tonnes. The client is elated with the results. For the first year of the five-year contract, the company had allocated seven months for GFL to remove 800,000 tonnes of tailings. The team did it in a little over three months – less than half the estimated time. Upon meeting the target well in advance, GFL was asked to remove an additional 50,000 dry tonnes, which the team accomplished in six days. In the contract’s four remaining years, GFL is on track to transfer at least 1 million dry metric tonnes of material each year; in fact, the team has accelerated the timeframe once again.