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C-276

CASE HISTORY

Hydrated Lime Feeding for Water Treatment at Gold King Mine

The Challenge:

Gold mining in the region around Silverton Colorado had been an important part of the local economy until the last mine closed in 1991. The Gold King Mine was abandoned in 1923. It was known to have contaminated mine drainage, a problem common to subsurface mines around the world. Subsurface mining exposes minerals to water and air, and the resulting drainage must be carefully managed to protect the environment. Gold King had been leaking drainage water for years, resulting in contamination of the upper Animas River basin which wiped out fish and effected other animal species in the watershed. The Environmental Protection Agency [EPA] had taken over the responsibility of remediating The Gold King leaks. Previously in 2009 the mine's adits or passageways had been plugged and drainage pipes installed to relieve pressure from water build up. There was the concern that the system might not be enough to prevent a future more serious leak. EPA's goal was to better stabilize the situation.

Mine water levels were estimated as work began in 2014 so that a drainage pond could be properly sized and built to treat the expected volume. Returning to the actual mine drainage work in 2015, workers found that landslides had compromised the entrance and pipes. Once these were cleared EPA planned to excavate the entrance starting at the top of the estimated water level and draw water at a controlled rate for treatment in the pond. As operations got underway, water began spewing out at ever increasing rates. The levels had been underestimated and were much higher. The plug failed and water rushed into a small creek and then into the Animas River.

The River was closed for recreation and its water banned for drinking, bathing and irrigation. Major towns along the downstream San Juan River were impacted within days. Levels of heavy metals had reached hundreds of times their acceptable limits. Levels eventually were diluted enough that by the time water passed through Lake Powell and further downstream, it was safe for all uses.

The EPA immediately took responsibility and developed a remediation plan. They sought an onsite water treatment plant that could be operated at the remote mine location, be able to run all year long with a minimum of supervision and perform the task of treating the effluent over a wide range of flow rates. The need was obviously immediate.

The Solution:

Alexco Environmental offered an onsite solution including a 75 ton silo and feed system to feed hydrated lime to treat 200-800 gallons per minute of influent. Alexco contacted Vibra Screw Inc. Totowa NJ who makes a variety of equipment to handle bulk powders to see what was needed and what could be shipped within a week. Vibra Screw offered its AccuFeed volumetric screw feeder with variable speed drive and controller with 4-20mA remote speed input, allowing the lime feed to automatically adjust to the changing PH of the influent. The higher the acidity, the more lime was continuously fed. The system also treats the heavy metals.

The AccuFeed was placed below the silo which provided the bulk lime supply. Feeder discharge was to the influent feed line. Treatment includes all flow from the mine as well as water that had been stored in the retention ponds.

The feeder uses a patented controlled vibration design to ensure even filling of its feed screw with uniformly dense material. This provides for extremely high feed accuracies. The feeder is molded from high strength, composite materials that provide a high degree of corrosion resistance.

The system was up and running within weeks. It runs around the clock, even though the tough Colorado winters. A large supply of lime is maintained at the site as access is difficult at best.

Water continues to flow from the mine at approximately 550 gallons/minute. Without the treatment plant, many settling ponds would have been required.

EPA has spent more than $14 million so far in its response to the Gold King mine spill. Water is being successfully treated. EPA is pleased with the plants performance and is considering systems at other mine locations.

As originally appeared in Processing Magazine