

Polymers in the Mining Industry

By Greg Kriebel

Mining operations can meet the demands of increased environmental vigilance with polymer preparation systems.

In the past, the stereotypical images that came to mind when considering mining operations were an old prospector panning for gold in California or a line of soot-covered faces emerging from a coal mine in West Virginia. Today, the mining industry has evolved into an incredibly complex, global, economic behemoth with mining operations at all points on the compass. Miners are constantly on the lookout for the latest rich deposits of diverse commodities—such as gold, copper, coal, iron and phosphates.

According to a PricewaterhouseCoopers International Limited report, “Mining 2011: Review of Global Trends in the Mining Industry,” revenues for the world’s 40 largest mining companies grew by 32 percent in 2010 to a record \$435 billion, while net profits rose to \$110 billion, a 156 percent increase from 2009. According to the Mining 2011 report, this growth was driven by surging commodity prices, as well as the rising demand from the emerging economies in China, India, Indonesia and Brazil. China, for example, was not only the world’s largest producer of gold in 2010 but also its largest consumer of copper.

This surge in mining activity has helped make countries such as Namibia (phosphates), Peru (copper), Zambia (copper), South Africa (coal and gold), Sweden (iron ore) and Morocco (phosphates) must-see locations for mining professionals. What they will find when they set up operations in those countries, however, is that the traditional prospector and coal-miner images are not the only things that



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have changed about mining. An increased interest in how a mining operation affects the surrounding environment means that miners can no longer leave waste areas in their wake as they move to the next site.

This article focuses on the technology that is now available—specifically dry polymer preparation and makedown systems—for use in mining operations that optimize wastewater recovery, reuse, recycling and reclamation efforts.

The Challenge

They are tailings, and they are an inescapable fact of life in the mining industry. Simply put, tailings are the materials that are left over after the completion of the mining process that separates the valuable fraction from the uneconomic fraction of an ore. The produced tailings, which generally range in size from a grain of sand to a few micrometers, which is the equivalent of one-millionth of a meter, are transferred to a



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retention pond that has been constructed at the mining site.

When the pond becomes full of tailings-heavy wastewater, or the mining operation has been completed, the wastewater must be treated and the tailings removed. If the mining operation is continuing, tailings-free, treated wastewater can be used in the drilling process, used for equipment cooling activities or introduced into a nearby stream or body of water. If the mining operation has been completed, stricter environmental regulations around the globe mean that the contaminated pond cannot simply be left behind.

However, removing the tailings is not easy. Because the tailings are so fine, filtering them from the water is nearly impossible. A system is needed that can flocculate the tailings, or cause them to form into small clumps or masses, making their removal from the wastewater much easier.

The flocculation process requires equipment that reliably introduces a mass-forming polymer into the wastewater.

This equipment must dependably prepare the flocculent and operate without the threat of breakdown or malfunction, since miners are most concerned with what comes out of the ground. They should not have to worry about water recycling.

A Polymer Solution

Many mining companies have turned to a dry polymer preparation system technology. This technology is ideal for mining applications because it uses a negative-pressure, blower-induced conveyance system to transport and disperse the dry polymer prior to the wetting process.

Dispersing dry polymer prior to moistening it with the dilution water ensures effective polymer-particle wetting. The result is reduced mix and hydration times, higher polymer performance, lower chemical costs and fewer moving parts. This process results in increased reliability and reduced maintenance concerns.

The benefits of this system include:

- As mentioned, separation of the polymer prior to wetting, which prevents polymer buildup at the volumetric feeder and plugging/clogging of the conveyance system
- Multiple hopper configurations that can be designed to meet every mining operation's unique needs
- Hoppers designed for loading without the need for stairs or platforms, resulting in increased safety for the operator, along with cleaner operation and a reduced



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Meet environmental challenges and optimize wastewater recovery, reuse and recycling in mining operations with the **dynaJET™** Dry Polymer Preparation System.

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- Properly dispose of tailings on site
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chance of polymer spills

- Six standard control panels, providing the flexibility to choose the features that best meet the requirements of the mining operation without additional customization costs

In addition to the flocculation of tailings, some dry polymer systems have also been successfully used to coagulate

process and wastewater at the mining site and to aid in separating ore in hard-rock copper-mining operations.

Conclusion

Because of their general nature, the majority of mining activities take place in pristine environments. A mine is much more likely to be found in a forest in Peru than beneath the streets of New York. As the level of environmental consciousness has increased globally, the charge to the mining company has changed. The main motivation behind a mining operation in the past was to recover the commodity in the most timely, cost-effective manner possible. Today, that recovery must also take place in the most environmentally safe way.

With the amount of waste material that is produced during mining, that is a difficult challenge to overcome. Today, that challenge has become easier to conquer thanks to the advanced technology offered by dry polymer make-down and preparation systems. These systems not only provide the flocculation and coagulation of waste materials that is demanded, but they do it with a performance reliability that allows miners to concentrate on the ultimate goal—recovering critical commodities efficiently.

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or 215-699-8700, ext. 3361. For more information on the dynaJET dry polymer system, please go to www.fluidynamics1.com. Neptune is an operating company within Pump Solutions Group (PSG), Downers Grove, Ill. PSG is comprised of several pump companies, including Almatec, Blackmer, EnviroGear, Fluid Dynamics, Griswold, Maag, Mouvex, Neptune, Quattroflow, RedScrew and Wilden. For more information, visit www.psgdover.com.