

July 23, 2013

Biological Processes Are Becoming Increasingly Important In Tackling Complex Metallurgy Cost Effectively

By Ryan Jackson in Vancouver

Bioleaching currently accounts for an estimated 20 per cent of the world's mined copper.



The Rio Tinto mine

Historians have speculated that bioleaching of copper was undertaken as early as Roman times, but the first concrete evidence comes from the Rio Tinto mine in 17th century.

The Rio Tinto mine in Spain, from which the major miner Rio Tinto derives its name, was a cornerstone of European copper production.

It's estimated that up to 200,000 tonnes of rough ore were treated in the late 1800s with between 20 per cent and 25 per cent of the copper being recovered annually by the bioleaching process.

These days, London and Canadian-listed EMED Mining owns the historic Rio Tinto minefield, and the planned restart of production there doesn't involve bioleaching.

But the biological processing technique is alive and well in other parts of the world.

What's more the process has now been expanded to treat ore for gold, zinc, cobalt, and uranium, in addition to the traditional copper, in some 40 industrial plants worldwide.

Perhaps the most notable application has been at the Escondida copper mine in Chile where BHP Billiton, Rio Tinto, and their Japanese partners are using the bioleaching procedure for low-grade sulphide material which had previously been classified as waste.

The use of bioleaching at Escondida, combined with sulphide ore flotation, has allowed the mine to become the world's largest source of copper and one of the lowest cost producers globally. Escondida produced in excess of one million tonnes of copper in 2012.

But while Escondida represents a large scale example of the technology, interest in bioleaching is not limited to the majors.

The environmental sustainability, potentially low capital requirements, and ability to process metallurgically problematic material presents considerable opportunities for the juniors as well.

Long-time friend of Minesite Conroy Gold And Natural Resources is investigating the application of Gold Fields' BIOX process for the pre-treatment of refractory sulphide ores at its flagship Clontibret gold project in Ireland.

The BIOX process was first developed in the 1970s and 11 commercial plants have been commissioned to date.

The BIOX process is used ahead of conventional cyanide leaching process and is designed to break down sulfides which encapsulate gold particles preventing the gold from being leached out.

Gold Fields cites improved recovery, low capital and operating costs, easy operation, environmental friendliness, and a proven track history as the main benefits of the approach.

So far, Conroy has reported that metallurgical testing has been meeting expectations.

“What we’re steadily getting on with are the crucial tests on the metallurgy to confirm that we go ahead with BIOX. The tests are very well underway, and all the tests so far have come out at least as well as we’d hoped”, Professor Richard Conroy of Conroy Gold And Natural Resources told Minesite in a recent interview.

If the metallurgical studies go according to plan, Conroy intends to proceed to the feasibility stage at Clontibret. An updated scoping study released at the end of 2011 has already indicated a mine could produce 50,000 ounces per year over 11 years and generate an internal rate of return of 49.4 per cent.

Meanwhile, another friend of Minesite, Besra has recently indicated that biological processes are among a number of methods of recovery being considered for its 3.3 million ounce Bau gold project in Malaysia.

Metallurgical testing to date has delivered impressive results for traditional recovery methods - 98% gold recovery by pressure oxidization, 92% by albion, and 95% by flotation - alternate technologies are also being considered.

Chief among them are bio-oxidization for the high grade material and bio-leaching for the low grade material.

“I think we have to look at all the alternatives because the CAPEX required for an 8,000 to 10,000 tonne a day plant with a pressure oxidization system gets quite pricey”, explained James Hamilton, Vice President, Investor Relations.

“We want to cover all our bases and we have the technical team in place to look at all the different systems and understand them.”