

Minewater treatment at a profit

● A water treatment plant installed at a mine in Jiangxi province, China, has made profit in its first year of operation from the sale of the copper recovered in the treatment process. **LIS STEDMAN** reviews the project.

Vancouver-based BioteQ Environmental Technologies is involved in an intriguing 50:50 joint venture with the Jiangxi Copper Company (JCC) in Jiangxi province, China. The joint venture commissioned a wastewater treatment plant at JCC's Dexing mine in April 2008, and during 2009 the plant generated an extraordinary profit, of close to \$2 million from the sale of the copper recovered during the treatment.

drainage, and had an initial capital cost of CAN\$3.6 million (\$3.58 million). 'It's a large plant about the size of a football field, treating a very large volume of water,' Ms McQueen notes.

The two companies share equally in the water treatment project revenues and costs. The profit is possible because the treatment process is treating wastewater that is generated by mine drainage from waste dumps and low grade stockpiles, removing and recovering in the process valuable copper. Although the volumes of



The Dexing copper mine where the ChemSulphide process is used to recover dissolved copper from mine water.

Credit: BioteQ Environmental Technologies'.

Tanja McQueen, BioteQ's vice president of corporate development, explains that JCC is the largest copper producer in China, with five mining operations and a smelting facility in Jiangxi province. Not only this but it is also an important producer of sulphur, gold and silver. 'We have signed a joint venture to review the water treatment needs at the sites and identify if our technology is the appropriate treatment for them,' she says.

The Dexing mine plant uses BioteQ's ChemSulphide process to treat 24,000m³/day of acid mine

drainage are large, the concentrations of metals are still high enough to present an environmental challenge.

Ms McQueen explains: 'The rock is not good enough to refine but still has copper in it, and when it rains the water is still toxic. The plant allows us to recover copper in a form that can be recycled and sold to a refinery.'

Selling the very high-grade copper not only offsets the costs of treatment but also enables the substantial profit – a not inconsiderable 1.7 million pounds (634,500kg) of copper is removed annually from the

environment. Some 5.5 billion litres of clean water is also produced, which is reused at the mine site.

She notes that JCC's driver for installing the plant is an environmental one. 'On all the sites where we operate we can recover metal, and that is of interest to mining companies, but it is an insignificant amount. The water is toxic and fully regulated and they have to treat it. We can turn it into something useful.'

The treated wastewater meets very strict water quality regulations, Ms McQueen notes, as well as producing 'a saleable waste that would otherwise be left in the environment'. The technology is a proven one, with working plants in Canada, the US, Mexico and Australia as well as China, and new projects in development in all of these countries and Chile.

'It is neat,' she agrees. 'It is a process that can generate a recurring revenue stream and cash flow. Sometimes we just give the metal to the customer and charge a water treatment fee – it is structured around what the customer wants.'

The company does have another joint venture, with a US-based mining company in Arizona, she adds. Several contracts are structured as build-own-operate (BOO) ventures, where the company pays the capital costs, or as a capital-free framework in which the customer owns the plant and the company provides an operating service.

BioteQ has two new projects at the design and engineering stage with JCC – one at the Dexing mine to recover cobalt and nickel, and a ChemSulphide plant for JCC's Yinshan zinc mine. Ms McQueen says: 'For us, China is such an exciting market just now. The project to recover cobalt and nickel is going through due diligence at the moment. China holds tremendous potential for us.' ●

BioteQ's ChemSulphide treatment

At the Dexing mine, the treatment process uses chemical sulphide reagents to remove and recover metals from contaminated water, producing solid particles of high-grade copper sulphide and very clean water.

In the ChemSulphide process, chemical sulphide is added to the contactor tank where it mixes with the water to be treated under controlled conditions to selectively precipitate metals as a metal sulphide. The precipitated metals and water are pumped to a clarifier tank where the clean water is separated from the metal solids and discharged or recycled.

The metal solids are then filtered to remove excess water, producing a high-grade metal sulphide product suitable for refining. To recover separate

metal sulphide products, separate contactor and clarifier tanks are set up in series.

The metals that can be recovered include copper, zinc, nickel and cobalt. Toxic metals such as arsenic, antimony, lead, cadmium, and manganese are also removed from the water.

BioteQ's ChemSulphide process is used to treat acid mine drainage, leach solutions, industrial wastewater, water in mineral processing operations and contaminated groundwater. The metal recovery rate is greater than 99%, and the recovered metal products are of a sufficiently high grade to be suitable for refining.