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Tailings transformed

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With the right technology, what is one company's trash is another's treasure. The Intec Process, originally developed for the production of high-purity copper from sulphide concentrates, now has application for the full range of base, precious and minor metals.

Intec's focus is now on developing a commercially attractive tailings project at the closed Hellyer zinc-lead-copper mine site in Tasmania.

The project is an opportunity for Intec to showcase its patented chloride hydrometallurgical technologies.

Intec chief executive and managing director Philip Wood said the Intec Polymetals Process is unique in its ability to economically recover the full range of payable metals currently sitting above ground in the Hellyer tailings dam.

"Our recent pilot plant test work on the tailings suggests the Intec Process can achieve significantly higher gold and silver recoveries than conventional cyanide leaching," Wood said.



Intec managing director and chief executive Philip Wood

According to Intec, the 10.9 million tonnes of tailings at Hellyer contain a generous serving of metals – including 910,000 ounces of gold grading 2.6 grams per tonne, 31 million ounces of silver at 88gpt, 305,000t of zinc at 2.8%, 327,000t of lead at 3.0%, and 17,400t of copper at 0.16%. All up, the metals have an in ground value of around \$1.6 million.

"The high metal content of the tailings is due to the refractory nature of the original Hellyer ore. It was a fine-grained complex massive sulphide," Wood said.

"Therefore despite state-of-the-art crushing, grinding and flotation processes at the mill, less than 75% and 60% of the contained zinc and lead respectively, was recovered over the 12-year life of Hellyer mine. Precious metal recoveries were lower – less than 45% and 20% respectively for silver and gold," he said.

Together with Ammtec Limited, Intec purchased the project for \$1.6 million from failed base metals miner Western Metals. The Hellyer assets also include the Burnie metallurgical research and development facility (now owned by Ammtec), the Hellyer and Que River mining and exploration tenements, and the Hellyer mill.

Sample material from the Hellyer tailings dam is being processed at the Intec Gold Process (IGP) pilot plant in northern Sydney to optimise extraction for all of the payable metals. The latest extraction efficiencies achieved on the material average 99% for zinc, 99% for lead, 95% for silver, and 94% for copper. Gold, being locked in pyrite, is the most refractory of Hellyer's payable metals. Intec is now achieving gold extraction efficiencies around 40%.

"Only mid-range gold extractions have ever been expected to be reached economically," Wood said.

"The gold in the Hellyer tailings is low grade as well as refractory, so there would be no economic advantage to continue leaching the tailings beyond say 24 hours. By that stage almost all of the other payable metals are already extracted, and the absolute amount of gold remaining is small."

At these extraction efficiencies, the Hellyer project has a gross extracted metals value of around \$1.2 billion, Wood said.

The test work results from the IGP pilot plant will go into the pre-feasibility study for the Hellyer metals project, which is due for completion by Canadian-based HG Engineering in a matter of weeks.

The Zeehan slag dump, 90km south-west of Hellyer by road, will also be factored into the Hellyer pre-feasibility study. This is the sole asset of unlisted public company Encore Metals NL, which Intec

agreed in May to acquire.

The Zeehan dump contains 450,000t of residual material from lead smelting activities carried out more than a century ago, grading 13.4% zinc, 1.7% lead, 54gpt silver and 50gpt indium.

The in-situ metal value of the slag dump is approximately \$118 million at current metal prices and exchange rates.

"Initial test work indicates that the Hellyer project would be further enhanced through use of the Zeehan material, from both technical and economic viewpoints." Wood said.

"Subject to due diligence work in progress, Intec is considering blending the slag material with Hellyer tailings," he said. "There are a number of other attractive regional feedstocks that could be similarly treated and we are presently negotiating for these as well."

During the remainder of this year, Intec will construct a demonstration plant at Ammtec's Burnie research facility.

The plant will be used in the first half of 2005 to establish all unit operations of the Intec Polymetals Process in treating Hellyer tailings – enabling a bankable feasibility study which Intec expects will successfully lead to Hellyer's commercial financing.

While a commercial-scale polymetals plant is scheduled to be built and commissioned at Hellyer in 2006, with the project's first commercial metals production expected in 2007, tailings may not be the only source of income for Intec at the Hellyer project.

Intec has been in discussions with owners of other metals projects in the region about making the 1.5Mt per annum SAG mill and related flotation plant available as a toll-treatment facility.

Wood said a number of proposed commercial arrangements are already underway, and are expected to provide Intec with supplementary cashflow from 2005.

Intec also believes the potential exists for copper-rich massive sulphides, gold-rich barite deposits and polymetallic sulphide deposits in the vicinity of the Hellyer mill. The company has already begun commercial discussions with other parties to progress these exploration opportunities.

"The one other key focus for Intec lately has been the development of our process to recover gold from refractory concentrates under mild conditions, around 90C and at atmospheric pressure, without resorting to cyanide leaching," Wood said.

He said increasing focus on the treatment of refractory gold had come about through its largest shareholder, the Ivanhoe Mines group, some of whose projects feature refractory gold.

According to Intec, an estimated one-third of the world's gold production comes from deposits classified as refractory.

"This figure is bound to increase as near-surface gold deposits – where weathering has produced ores amenable to conventional CIL/CIP processing – are depleted," Wood said.

He said refractory gold ores and concentrates require pre-treatment such as roasting, bacterial oxidation or pressure oxidation in order to liberate the gold for cyanidation.

"Conventional cyanide processing is coming under increasing scrutiny for environmental reasons," he said.

Therefore in many cases the residual cyanide must be destroyed – a costly step. Wood said this is aside from the cost of setting up a separate, dedicated CIP or CIL circuit after the earlier pre-treatment step.

In contrast, leach residue from the Intec Gold Process contains only minor amounts of chlorides and is essentially the same as residue from the Intec Copper demonstration plant – which was passed by the New South Wales Environment Protection Authority as 'inert waste' suitable for disposal in a managed landfill.

"The IGP is a natural extension of the Intec Process. By developing it we increase our opportunities for commercialisation, because of the structural differences between the gold and base metals industries," Wood said.

"Intec intends to convincingly demonstrate the value of our technologies and commercial prospects to the minerals processing industry and to the financial markets.

"But because money doesn't grow on trees, we need to identify clear, early paths to positive cashflow at the same time."

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