

# Processing change

The ALTA Metallurgical Service conference will keep its reputation as a leading international mining and metallurgical industry event in 2012, with key industry speakers from 16 countries and attendees from at least 23 countries.

Convenor Alan Taylor said this year's conference would feature cutting-edge highly topical presentations on nickel, cobalt, copper, uranium and gold.

ALTA 2012 is on at the Burswood Convention Centre, Perth, Western Australia from May 28 to June 1.

Taylor said the conference was also highly valued for the opportunities it provided for networking, technical interchange and open panel discussions.

"Many regular delegates use the conference as an opportunity to catch up with key people from around the globe in one visit," he said.

"It is a unique event because it combines three major conferences in one week (Nickel-Cobalt-Copper, Uranium and Gold) and has a proven record of putting suppliers together with clients."

The conference will be officially opened by Richard Matheson representing the Nickel Institute in Australasia and South-East Asia. Matheson's presentation will cover "Promoting Growth in Nickel Use and Re-Use".

The nickel-cobalt-copper sessions will feature a forum and panel discussion on "Hydroprocessing of Sulphides", which will include papers on developing technology such as BioHeap leaching, the Galvanox process, chloride leaching, and the Kell process.

The sessions will be chaired by Professor David Dreisinger, of the University of British Columbia, Canada, who will also present the keynote address on "Hydroprocessing of Sulphides – Where Are We and Where Are We Heading" at the conference dinner.

The nickel-cobalt-copper sessions will also include papers on key topics, such as the treatment of nickel laterites, solvent extraction and ion exchange, electrowinning, heap leaching, cobalt recovery, new process technology and equipment and materials.

Featured operations and projects will include:

- Vale's massive new Goro pressure acid leaching facility to treat nickel laterites in New Caledonia;
- Eramet's Weda Bay project in Indonesia which has an innovative atmospheric acid leaching process;
- African Eagle Resource's Dutwa project in Tanzania where they plan to treat nickel laterites by heap leaching; and
- Metallica Minerals' Greenvale project in Queensland,

where they plan to breathe new life into the old mine by recovering scandium.

The forum and panel discussion in the uranium sessions will focus on the highly topical uranium heap leaching currently being developed for a number of low-grade deposits.

The keynote opening address will be presented by Professor Suresh Bhargava, of RMIT University, Melbourne. Professor Bhargava's topic will be: "The Whys and Wherefores of Uranium Processing Technology Development".

Other key topics in the uranium sessions will include solvent extraction and ion exchange, and a range of new process technology.

Featured operations and projects will include:

- The Tavivaara Operation in Finland;
- Uranium SA's Samphire uranium project in South Australia;
- Greenland Minerals and Energy's Kvanefjeld project in Greenland;
- Aura Energy's Håggån project in Sweden; and
- A-CAP Resources' Letlhakane project in Botswana.

The gold sessions will include a refractory gold symposium, chaired by Robert Dunne, from Newmont Mining, Denver, USA, who will also present the opening keynote address on "Challenges and Opportunities in the Treatment of

Refractory Gold Ores", a topic which is very relevant to many of the projects currently being developed.

The symposium will include papers on diagnostic leaching, geometallurgical mapping, thiosulphate leaching, treatment of copper-gold, ion exchange, use of lead nitrate addition, gold roasting, and BIOX® technology. Featured operations and projects include the Macraes pressure oxidation operation, New Zealand, and projects using the Albion process in the Dominican Republic, Armenia and Romania.

The conference will be a true international representation with speakers from at least 17 countries, and delegates from more than 20 countries expected to attend. Sponsors and exhibitors are drawn from at least 12 countries.

A pre-conference short course on "Solvent Extraction and Its Application to Copper, Uranium and Nickel-Cobalt" and a post-conference short course on "Uranium Ore Processing" will be presented by Alan Taylor, principal of ALTA.

Conference information is available at the ALTA Metallurgical Services web site [www.altamet.com.au](http://www.altamet.com.au).



ALTA convenor Alan Taylor.

# ALTA 2012

## THE PROCESSING OF GOLD COPPER AND COPPER GOLD ORES WITH FLOWSHEET DEVELOPMENT AND STRATEGIES

Mineral Engineering Technical Services Pty Ltd METS Director/Principal Consulting Engineer Damian Connelly will present two papers to ALTA 2012.

The processing of gold copper and copper gold ores can be highly problematic, site specific and the process selection is dependent on ore grade, mineralogy, acid leach behaviour, cyanide chemistry, product saleability and environmental considerations.

The general effects of copper on cyanide leaching chemistry are particularly increased cyanide and lime consumption and decreased dissolution rates for gold and silver. The severe fouling of carbon, high solution losses and even re precipitation of gold can occur.

Copper and gold have similar chemistries, which creates processing challenges. The past decade has seen the practical implementation of copper gold technology, like the SART Process. Telfer in Australia employs the SART Process and the large operation of Yanacocha has included this process to treat gold ores with the presence of oxide copper minerals. New copper gold projects are also considering the technology.

Amongst other options that can be considered for the processing of these ores are direct leaching, oxidation, pre concentration, tailings leaching and smelting of concentrates.

Reference is made to a number of projects such as Telfer, Boddington, Mt Gibson, North Parkes, TC8, Mt Leyshon, Red Dome, Gabanintha and Selwyn.



*Damian Connelly*

## GEOMETALLURGICAL MAPPING OF A COMPLEX GOLD ORE BODY TO MANAGE PROCESS RISK AND VALIDATE THE PROPOSED PROCESS FLOWSHEET

The Paulsens gold deposit in the Pilbara region of Western Australia was discovered by CRA in 1998. In 2001, St Barbara Mines Limited (SBML) made a successful takeover offer for Taipan Resources and then began an update of the previous Bankable Feasibility Study (BFS) undertaken by Minproc Limited.

This paper describes the history of the metallurgical testwork, plant design and initial development to optimise a project with complex metallurgical process characteristics and manage the risks.

The Paulsens ore is preg robbing, has cyanide soluble copper and nickel and is highly sulphidic. The ore is relatively hard and requires a very fine grind size of P80 53 microns. The metallurgical challenges have been met for this complex ore and the process flowsheet included aspects not commonly associated with a typical gold plant.

Geometallurgical mapping of the global ore body to understand the variability of cyanide soluble copper and nickel as well as potential problems from preg robbing waste

was undertaken to assess the risks and suitability of the proposed flowsheet. Concurrently, the mine schedule could be optimised to manage the levels of copper and nickel in the feed by understanding the copper behaviour with respect to block modelling.

Problems encountered, which will be discussed and project examples noted, with cyanide soluble gold in Carbon in Pulp (CIP) plants include:

- High cyanide consumption.
- High WAD (weak acid dissociable) stabilised in tailings dams and high tailings return water levels.
- Determining the free cyanide level in the leach solution.
- Preg robbing of gold onto copper minerals.
- Very high copper loadings on the carbon resulting in high gold solution losses to tails, poor carbon activity, Dore gold bars with low fineness and increased refining charges.
- Very oxygen demand limiting gold leaching kinetics.
- Increased ferrocyanide and ferricyanide levels in solution impacting on the leach and adsorption.



## Parker Centre researchers to present

The Western Australian Based Parker Co-operative Research Centre (CRC) for Integrated Hydrometallurgy Solutions will present a total of three papers to this year's ALTA conferences.

The Centre will present two papers to the gold sessions, one titled The Increased Activity in the Development of Thiosulfate Based Systems for Gold Recovery and one titled Maximising the Value of Gold Diagnostic Leaching.

The third paper will be presented to the uranium session and is titled Recovery of Uranium and Separation from Vanadium In Alkaline Solutions Using Solvent Extraction.

The Parker Centre is one of seven CRCs in the mining and energy sector. Together, the research of the mining and energy CRCs spans all aspects of this industry sector's operations – from exploration, mining and processing to increasing sustainability in the minerals and power generation industries.

Centre managing director Dr Steve Rogers said the Parker CRC generated research outputs that maximised

returns from hydrometallurgical processing of mineral resources and reduce environmental impacts of hydrometallurgical processes.

"The Centre brings together a world-class team of researchers with diverse yet complementary skills, talents and backgrounds who carry out fundamental and applied research on behalf of the minerals industry, at laboratory and pilot scales and also at operating sites," Dr Rogers said.

"The current Core Participants in the Centre are CSIRO Minerals, Curtin University of Technology, Murdoch University, the University of Queensland and ten companies operating in the minerals industry. There are also 12 Supporting Participants, including mineral processing companies, Central TAFE, the Minerals Council of Australia, the WA Department of Industry and Resources and industry suppliers."

Dr Rogers said the centre had made important research advances in many aspects of hydrometallurgy and the outputs of the Centre's work had been

applied widely throughout Australia and overseas.

"Our research aims to help our industry end-users improve their processing efficiency, financial bottom line and licence to operate through the delivery of the following outputs," he said.

The Centre has 111 full-time equivalent staff members and 31 students (PhD, MSc and Honours), and total resources (cash and in-kind) of \$A75.7 million over the current seven-year funding period.

Dr Rogers said that as well as generating research outputs the centre was also training the next generation of hydrometallurgists for the global mining industry, public sector research institutions and academia.

The Cooperative Research Centres (CRC) programme was established by the Federal Government in the early 1990s to bring together researchers and research users. The aim was to strengthen collaborative linkages between Australian industry and the Australian research community.

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## Steinert meets need with creativity

Steinert Australia is a specialist in delivering separation technologies not only for minerals, but also coal and iron ore.

As a leader in several global markets, Steinert offers an extensive product range to enhance the operations of Australia's leading local and international mining projects.

Steinert provides comprehensive services in customised design, application and commissioning of ore sorting, beneficiation and tramp removal systems to increase product yield, improve concentrate quality, reduced operating costs and boost process efficiencies.

Steinert's Induction Sensor Sorter (ISS) systems separate mineral ores from gangue to recover valuable metals. Steinert's sensor sorting systems will help deliver operational returns through: reduced operating costs, reduced concentrator loads and pre-concentration of grade 3 fractions, while having the added advantage of being a waterless system.

The technology of the ISS induction sorting system combines sophisticated sensor technology and computer-controlled air jets to quickly detect and eject desired target.



Steinert's X-ray Sorting System.

The result – the ISS provides increased economic efficiency, improved quality

The bulk material is transported by a fast-moving conveyor belt to a sorting zone. Below the conveyor belt is an arrangement of sensors, which analyse the material over the whole width of the conveyor belt by means of magnetic induction.

As soon as metallic particles are detected, electronic signals are sent to the central computerised control unit. The compressed air jets, individually controlled by the programming, push the detected materials over the diverter gate. Separated materials can then be collected and conveyed in conventional methods.

The Steinert X-ray Sorting System (XSS) uses a "dual energy" system to determine material density while overcoming the effects of thickness and shape.

It "sees" through the pieces, recognising different material densities, different metals, components containing halogens, and organics.

Pre-concentration of ores saves large amounts of energy in the area of fine milling and fine-grain sorting – thus substantially improving the economics of current mineral processing operations.

The XSS is based on the Induction Sorting System (ISS) platform, which has been used in materials processing with great success for several years, combined with the x-ray component which is also proved in many scanning systems around the world today. These two systems brought together in the XSS as a robust piece of equipment.

The common feature of all Steinert sensor sorters is that each of the individual particles in the material flow is recognised and classified within a fraction of a second according to the pre-set criteria programmed into the flexible system software. If the classification matches – the particle is ejected by a powerful blast of compressed air from reliable, fast-action compressed air nozzles.

Steinert Australia also invests heavily in product development and testing both locally and in Germany, where the company enjoys the confidence of having a fully appointed test facility for equipment performance analysis at our corporate head office.

Steinert Australia believes its more than 120 years of experience and the fact that they offer both traditional and innovative leading edge solutions are what make the company the first choice for countless customers around the globe.

### MINERALS ENGINEERING CONFERENCES

#### BIOHYDROMETALLURGY '12

FALMOUTH, UK, JUNE 18-20, 2012

Sponsored by: ProMine, FLSmidth & International Mining

#### PROCESS MINERALOGY '12

CAPE TOWN, SOUTH AFRICA, NOVEMBER 7-9, 2012

Sponsored by: FEI, Anglo American Technical Services – Research, FLSmidth & Bruker AXS

#### PRECIOUS METALS '12

CAPE TOWN, SOUTH AFRICA, NOVEMBER 12-13, 2012

Sponsored by: Implats, Newmont Mining Corporation, Barrick Gold Corporation & the Gold & Minerals Gazette

#### NICKEL PROCESSING '12

CAPE TOWN, SOUTH AFRICA, NOVEMBER 14-15, 2012

Sponsored by: Nalco Africa

#### SUSTAINABILITY THROUGH RESOURCE

#### CONSERVATION & RECYCLING '13

FALMOUTH, CORNWALL, UK, MAY 6-8, 2013

Sponsored by: EcoSeed

#### COMPUTATIONAL MODELLING '13

FALMOUTH, CORNWALL, UK, JUNE 18-19, 2013

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