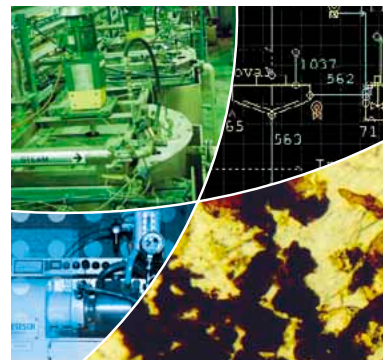




**hrltesting**

# News at hrltesting

October 2011



## A Disappearing Spoon

Recently we came across a story that when gallium was discovered in 1875 a popular prank was to make gallium teaspoons. When these were used to stir hot tea they promptly disappeared as the metal melted and sank to the bottom of the cup. The 'joke' could be replayed over and over as the metal was remoulded back into a spoon at room temperature. (Check it out on You Tube). Of course none of this has anything to do with **hrltesting**, but now that we have your attention we'll keep it brief.

**Welcome to our 5th issue of the hrltesting newsletter. We have had another busy year with enquiries growing strongly.**

Our mineral processing facilities and capabilities have grown beyond what we thought possible 12 months ago. We continue to grow our very solid foundations and broaden our range of services. Along with our testing services, we continue to actively undertake truly novel process developments which we are sure will be of value to the minerals industry for many years to come. Our services and expertise are unique and this is borne out by the many repeat clients we have.

Our assay laboratory has now grown to the point where its services can now be made available to external clients.

Read on for more information about our projects, new services in the assay laboratory and more new faces at **hrltesting**.

We would like to take this opportunity to thank you for your support and look forward to being of assistance to you in the future.

**Chris Casingena**, General Manager – Metallurgical Testing

**Geoff Whebell**, General Manager – Assay and Business Support

## Alkaline Sulphide Leaching

Testwork has continued over the past year improving the flowsheet to remove arsenic from base and precious metal concentrates. This collaborative research project is being funded by a major mining company along with **hrltesting's** parent company, Core Resources.

A comprehensive range of open and closed circuit batch leach tests have been conducted on a number of base metal concentrates with arsenic contents between 0.5% and 5%. Arsenic extractions in excess of 90% have been consistently achieved, along with significant extraction of antimony, another penalty element. Improvements in analytical methods have allowed for greater confidence in the assay data and understanding of the process chemistry.

Advances have also been made in the arsenic fixation stages of the flowsheet. Extensive batch testing of the unit processes involved have identified likely operating conditions which, in turn, have allowed for optimisation of the flowsheet as a whole (including leaching conditions) to reduce reagent consumption and operating costs. METSIM modelling by Core Process Engineering has been used to support flowsheet development.

The next phase of testing will examine continuous operation of the flowsheet, with two pilot plant campaigns scheduled over the next 12 months.

## Analytical Services

### Sulphur Sulphur Sulphur

We are proud to offer true expertise in sulphur speciation. **hrltesting's** assay laboratory has unsurpassed expertise in the analysis and speciation of sulphur and arsenic. A thorough understanding of the chemistry of these elements has enabled the development of novel and robust methods for their chemical analysis. Plus, with the recent addition of a new Leco sulphur/carbon analyser the **hrltesting** assay laboratory now has even greater capability and capacity for these challenging elements.

## hrltesting introductions



**Peter Kunst**  
Project Manager

Peter completed his Chemical Engineering degree at The University of Queensland and has spent the past 12 years testing hydrometallurgy processes, the last eight of which have been with **hrltesting**. His experience has incorporated the development of new technologies through both bench and pilot-scale projects as well as plant commissioning. He has supervised the operation of a number of Albion Process pilot plant campaigns and in more recent times, his focus has been on heap leaching of base metal targets and the development of an Alkaline Sulphide Leaching process for high arsenic-bearing concentrates. Through partnering with clients to provide project support and services, he has proven himself to be a practical and versatile project manager.



**Steven Trout**  
Chemist

Steven joined our team in 2010 and has had extensive experience in the sampling and wet chemical analysis of ores and concentrates. After obtaining his Bachelor of Science majoring in chemistry from James Cook University in 2006, Steven worked for Alfred H Knight in Townsville and at their UK headquarters. In Townsville he acted as a client representative for the loading, weighing, sampling and moisture determination of bulk concentrate shipments for their export by ship. Steven's experience complements our offering of services for shipment supervision and sampling. In the UK he worked in Knight's central wet chemical preparation and analytical laboratory. Steven is a welcome addition to our assay laboratory.

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### The Assay Laboratory

The past year has seen the assay laboratory move onto a trajectory of growth and improvement. We now have a staff of fourteen, a strong team of professional chemists with many years of experience that can be directed to any analytical chemical problem, and have continued our commitment to service excellence with ongoing investment in equipment and technical excellence. May saw the arrival of a new Agilent AAS and in September we commissioned a new Leco sulphur/carbon analyser and muffle furnace.

### Albion Process and Pilot Campaigns

Albion Process testwork continues to expand with a high level of customer enquiry. Several continuous pilot plant runs were completed in the last 12 months as part of project feasibility studies. The outcomes of which include one client, GPM Gold, committing to detailed design for their project in Armenia. Equipment upgrades continue with a new generation pilot plant being designed for a new client along with recruitment of additional staff.

### Cobalt Recovery Pilot Plant

During the year effective recovery of cobalt with minimal losses as a high grade cobalt hydroxide solid was demonstrated. Acidic cobalt sulphate raffinate liquor containing minor iron, copper and zinc was obtained from an Albion Process pilot after neutralisation and copper solvent extraction (SX) operations. In order to obtain the cobalt units in the SX raffinate the liquor required further purification. This was achieved via three separate continuous purification pilot plants. All three pilots were found to be successful in both purification and product separation. Solid liquid separation was successful using precipitate recycling and seeding techniques. The final stage cobalt solids (cobalt mixed hydroxide) were found to contain between 35-40% cobalt and minor amounts of magnesium, zinc and sulphate. Data from the pilots enabled flowsheet modifications and verification as well as confirmation of the flowsheet for the successful feasibility study.

### Miscellaneous

Some significant bench scale projects were carried out over the last 12 months with an interesting rare earth flotation project currently in progress. The primary objective is to make an apatite concentrate rich in cerium, lanthanum, thorium and yttrium. Initial testwork yielded good results with a very high grade (nearly 100%) apatite concentrate, with around 80% phosphorus recovery and acceptable rare earth recovery. Further testwork and mineralogical studies are being carried out to optimise grade and recovery.

## Did you know

Did you know hrltesting was the first laboratory to have a Netzsch fine grinding mill in service (the precursor to the current IsaMill)?

**Come and join us at booth 93 at Mining 2011 in Brisbane.**

## hrlAnalytical

hrltesting makes its assay laboratory services available for commercial use. The unsurpassed level of service that has been developed for hrltesting's use is now available to you.

Quality, timeliness and safety are the cornerstones of the service. Specialising in:

- Mineral Chemical Analysis
- Environmental Testing
- Analytical Chemical Services
- Laboratory Technical Audits
- Bulk Mineral and Concentrate Shipment Sampling



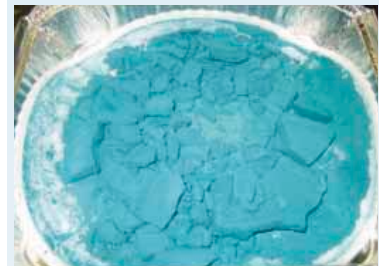
Iron precipitation



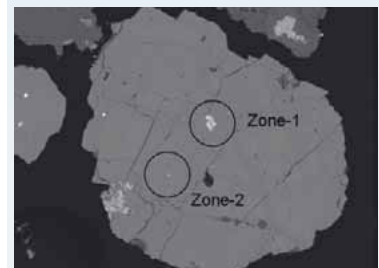
Zinc precipitation



Cobalt precipitation



Cobalt product – mixed hydroxide



SEM image of an apatite grain. No rare earths were found to be present in solid solution in the mineral lattice, however two high grade inclusions of rare earth elements (cerium, lanthanum) are highlighted.

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### hrltesting

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