

one solutions



UNIVERSITY OF TASMANIA

Newsletter of the Centre for Ore Deposit Research at the University of Tasmania

This issue's research profiles: September - December 2000

- **VHMS Conference**
- **Sulfide inclusions in magmas**

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Tasmanian Mineral Studies Get Go Ahead

Tasmanian Deputy Premier, the Hon. Paul Lennon, recently announced the geological projects to be carried out under the Western Tasmanian Regional Minerals Program study.

"The projects will add greatly to the knowledge of the geology of western Tasmania and should attract significant investment in mineral exploration in the region," the Deputy Premier said.

"A vigorous mineral exploration industry is vital to the sustainability of the Tasmanian mining and mineral processing industries which employ over 3,500 people and provide over 40% of our State's export income. The closure of the Hellyer mine earlier this year demonstrates this fact," Mr Lennon added.

"The Commonwealth Government has allocated \$5 million to the Western Tasmanian Regional Minerals Program studies, including over \$4.1 million on the geological projects, which have been agreed on by a committee with representatives from the mining industry and Commonwealth and State Governments. Highly respected geological consultant, Dr Ross Fardon has reviewed the proposed projects and has stated that no better programs could be implemented with the available funds, with current technology and the rugged terrain of the area," the Deputy Premier said.

The work will be carried out over the next 18 months for release in February 2001 and will contain several innovative projects (see box at right).

"These projects represent a significant investment in the future prosperity of Tasmania and the whole Tasmanian community should welcome this development," the Deputy Premier concluded.

The announcement follows the recent release of two reports under the WTRMP: the *Regional Development Plan* and the *Guide for Industry Development*.

The WTRMP covers the areas of western and northern Tasmania as far east as the River Tamar including the offshore Bass and Sorell Basins, which are prospective for oil and gas. It is co-ordinated in Tasmania by Mineral Resources Tasmania (MRT) in conjunction with a Management Committee consisting of representatives from the mineral industry in Tasmania, Tasmanian Minerals Council, Mineral Resources Tasmania and the Commonwealth Department of Industry Science and Resources.

Planned Projects

- First public release of integrated detailed magnetics and radiometrics over the world-class Mt Read and Dundas belts.
- Semi-detailed 200m electro-magnetic survey of Mt Bischoff, Renison Bell, Rosebery and Moina areas.
- Semi-detailed 200 EM survey over Mt Read Volcanics from Mt Lyell to Hellyer.
- First detailed magnetics and radiometrics over north-western Tasmania.
- All company and departmental reports will become available on-line over the world wide web.
- Mineral Resources Tasmania's drill hole data base will be available on line.
- Detailed evidence of the mineralised Arthur Lineament structures in north-western Tasmania from magnetic and seismic data.
- A study into the structure of the Earth's crust in north-western Tasmania from magnetic and seismic data.
- Studies to enhance the petroleum potential of Tasmanian offshore sedimentary basins in Bass Strait

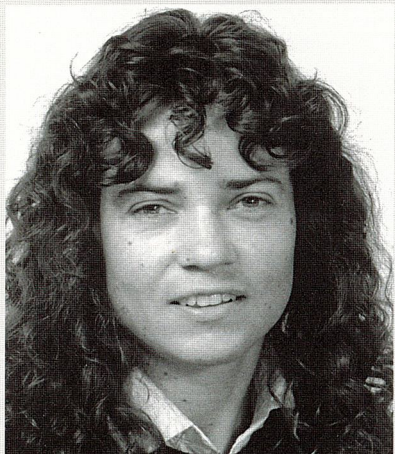
From the Editor

This edition of OreSolutions contains the new short course dates for 2001 plus an important advisory on the new masters teaching program (see back page). We also advise of some new staff and changes to the administrative staff line-up at the CODES office (see this page and back page for contact details), as well as a list of students who are nearing completion and plan to re-enter the minerals industry (see page 8). We also bring you the full presentations list for our important and much-anticipated VHMS conference in November (page 6 and insert).

OS

Awards

CODES researcher **Sharon Allen** (pictured below) recently received a grant from the Australian Academy of Science for 'Scientific Visits to Europe Awards for Young Researchers 2000'. The grant allows Sharon to undertake preliminary experimental work to simulate subaqueous pumiceous mass flows at GEOMAR (Germany), with Dr Armin Freundt, in September-October this year.



Sharon Allen

Staffing

Jessica Tyler, Public Relations Officer, will leave CODES for 12 months this October on maternity leave, and will be replaced part-time by Michaela Patel on Mondays and Tuesdays until October 2001.

PM's Chief Scientist Visits CODES

Dr Robin Batterham, Chief Scientist to the Prime Minister, recently visited Tasmania as part of his national tour to gather information about Australia's position in Science, Engineering and Technology. He visited CODES during August as part of his fact-finding mission to gather impressions about his proposed recommendations to government, presented in his discussion paper 'The Chance to Change'.

Dr Batterham and Ross Large discuss research at CODES and the national science and technology scene in Australia.



The key proposals concerning the education sector include such recommendations as providing more HECS scholarships in science and engineering, increasing the number of post-doctoral fellows and redesigning the R&D Start Graduate scheme. Regarding research infrastructure, key recommendations include increasing the competitive grants scheme, expanding university research infrastructure grants, and creating new and major research facilities. Regarding commercialisation, his recommendations include expanding the CRC program, establishing Innovation Centres, providing pre-seed capital for research bodies and reviewing the opportunities for researchers to better share the benefits of commercialisation.

A copy of Dr Batterham's discussion paper is available at www.isr.gov.au/science/review

News

From the Director

The recent discussion paper by the Chief Scientist, Dr Robin Battenham, 'The Chance to Change', highlights the perilously low levels of research funding in Australia compared with other competing developed nations. Whereas others such as the UK, USA and Canada are now actively and strategically increasing research funding, Australia is continuing to slide into relatively lower funding levels and consequent mediocrity.

Through the research centres programs (ARC and CRC) Australia has developed a top international reputation in the area of economic geology and mineral exploration. However recent cuts to research funding have placed this hard won reputation in jeopardy.

The far-sighted and very positive proposals in the Chief Scientist's discussion paper provide the foundation for the Australian scientific researchers and providers to regain lost ground and to make a significant impact on Australia's economic future.

The second important announcement this last month is the allocation by the Commonwealth Government of over \$4 million towards new geological surveys and improved geological data to support increased mineral exploration activity in Tasmania. CODES is strongly supportive of the Federal and Stated Government initiatives in this area and hopes to become involved in new collaborative research projects that will utilise the new geoscience data and maximise benefits to industry.

OS

LAVA at the AGC

The recently-created specialist group for volcanology, LAVA (Learned Australasian Volcanologists Association), held its first technical session on 'Volcanic facies and processes' at the 15th AGC in Sydney. There were 7 oral presentations, including two from CODES volcanologists, Sharon Allen (Submarine pumice breccia at Yali, Greece) and Jocelyn McPhie (Extensive felsic lavas in the intraplate volcanic provinces), and two posters in the session. The session was very well attended,

with the audience overflowing into the aisles and corridor, and participating in the discussions that followed the talks. Leadership of LAVA passed into new hands at the meeting. Sharon Allen (CODES) and Liz Jagodzinski (AGSO, seconded to PIRSA) have taken on the task. The choice is most appropriate, given the plan to hold the next AGC in Adelaide. Both Sharon and Liz are working in the Gawler Range Volcanics in South Australia and will be well placed to convene technical sessions on volcanology and offer a volcanological fieldtrip.

OS

University Open Day Brings 'Em Out

The University of Tasmania recently held an Open Day series across all three campuses to promote its courses and career opportunities to young people and their families. Numbers at the Hobart campus were up around the 6,000 mark, which was an outstanding result for this first of what will be an annual series.

The School of Earth Sciences put on a series of lectures, displays and activities which were well attended throughout the day, and also presented information on local radio station TTT FM, who were on-campus on the day. Activities included a trilobite hunt for young children, a presentation on earthquakes and volcanoes around the world, tours of the seismic facility, rock store, black smokers display and students and staff were on-hand to provide career advice. A looped series of slides showing Earth Science in the Wild also gave visitors an insight into field conditions aspiring geologists could expect to come across in their life and times.

Mike Roach's seismic/volcanoes display pulled in the crowds.



AMIRA P544: first meeting

AMIRA P544: 'Proterozoic sediment-hosted copper deposits' had its first sponsor's meeting in July at CODES. Present were (l to r):

John Landmark (Anglo American), Marcus Tomkinson (Anglovaal), Doug Haynes, (BHP Minerals), Kirby Johnson (BHP Minerals), David First (Billiton), Hugh Bresser (Billiton), David Burrows (Inco Limited), Mark McGeough (MIM Exploration), Rick Valenta (MIM Exploration), Andrew Allan (North), Ian Neuss (Outokumpu Mining), Russell Fountain (Phelps Dodge Australasia), Stuart Robertson (Primary Industries & Resources South Australia), Ross Andrew (Rio Tinto), Bruce Hooper (Straits Resources), Howard Golden (WMC Resources), Stuart Bull (CODES), Peter McGoldrick (CODES), Ross Large (CODES), Gary Davidson (CODES), David Cooke (CODES), Darryl Clark (CODES), David Selley (CODES), Jianwen Yang (CODES), Robert Scott (CODES), Murray Hitzman (Colorado School of Mines), David Broughton (Colorado School of Mines), Alan Goode (AMIRA International).

AMIRA Project P544

"Proterozoic sediment-hosted copper deposits" is CODES newest major industry-funded research project. The first sponsors meeting was held in Hobart on Friday 14th July and was attended by representatives of eleven of the fourteen sponsor companies. The research project involves collaboration between researchers from CODES and the Colorado School of Mines (Prof. Murray Hitzman and Mr David Broughton). The main focus of the research will be in Zambia and South Australia, and field work in Zambia has now commenced.



GEODE: 'Global comparisons of VHMS deposits'

The project is a collaboration between European, Australian and Canadian researchers coordinated by GEODE, a European Geoscience Group, to study and compare a number of global volcanic districts hosting world-class base metal massive sulfide deposits. The districts selected for study are: Iberian Pyrite Belt (Spain and Portugal), Urals (Russia), Bergslagen and Skelefte (Sweden), Bathurst (Canada), Mt Read Volcanics (Australia) and the Manus and Laus Basins (SW Pacific). Initially, a team of researchers and industry geoscientists from each

district will answer a set of questions and compile data on the tectonic and structural setting, volcanic architecture, styles of ore deposits, alteration facies, hydrogeological modelling, hydrothermal geochemistry, source of fluids/metals and favourable horizons in each province. A special one-day session will be held on November 20 in Hobart, during the Volcanic Environments & Massive Sulfide international conference and field meeting (see page 6) to discuss the major geologic controls on world class VHMS districts.

OS

Project Team Leaders

D Blundell (GEODE, Royal Holloway, UK)
 R Large (CODES)
 F Tornos (ITG, Spain)
 P Weihed (SGU, Sweden)
 P Hertzog
 (FreibergU, Germany)
 S McCutcheon
 (DNRE Bathurst, Canada)
 B Gemmell (CODES)
 H Gibson (LaurentianU, Canada)

Sulfide inclusions in olivine phenocrysts from primitive magmas

Leonid Danyushevsky

Sulfide inclusions have been identified in olivine phenocrysts (and in one case spinel phenocryst) in primitive volcanic rocks from mid-ocean ridges, subduction-related island arcs and backarc basins. These inclusions represent droplets of an immiscible sulfide melt and are trapped by olivine crystals growing from silicate melts. Sulfide melt is usually trapped as separate inclusions, however combined inclusions of sulfide and silicate melts have also been observed.

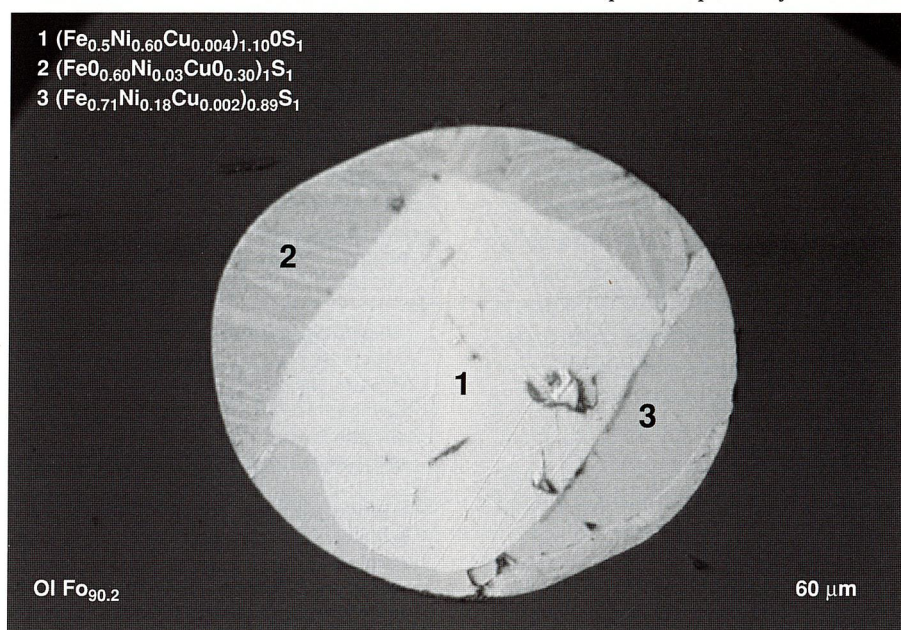
Sulfide inclusions have rounded shapes (see figure) and vary in size from several microns up to 100 µm in diameter. At room temperature sulfide inclusions consist of several phases (see figure). These phases are formed as a result of crystallisation of the sulfide melt after it was trapped.

Crystallisation occurs due to decreasing temperature in the magma chamber after trapping and/or when magma ascends from the magma chamber during eruptions.

In all studied sulfides three different phases can be identified: a high-Fe, low-Ni, low-Cu phase; a high-Fe, high-Ni, low-Cu phase; and high-Fe, low-Ni, high-Cu phase (see figure). Low-Cu phases appear to be monomineralic, whereas the high-Cu phase is usually composed of a fine intergrowth of high- and low-Cu phases, resembling the quench 'spinifex' structure.

Fe, Ni and Cu are the major elements in all sulfides studied. The amount of Ni decreases with

Sulfide inclusion in an olivine phenocryst from a mid-ocean ridge basalt. Note multiple phase composition of the inclusion.



decreasing forsterite content of the host olivine phenocryst, which is an index of the degree of silicate magma fractionation.

Since Ni content of the silicate magma is decreasing during fractionation, this indicates either that the immiscible sulfide melt remains in equilibrium with the silicate melt continuously changing its composition during fractionation, or that the sulfide melt is continuously separated from the silicate melt during fractionation, with later formed droplets having lower Ni content due to the lower Ni content of the evolved, stronger fractionated silicate melt.

Trace element contents of the sulfide inclusions have been analysed on the proton microprobe at CSIRO in Sydney. The main trace elements in the sulfide inclusions are Zn, Pb, Ag,

and Se. Other trace elements are below detection limits, which are normally at a level of several ppm. Zn concentrations (120 +/- 40 ppm) in sulfides are similar to those in silicate melts. This indicates that separation of the sulfide melt does not affect Zn contents of silicate melts. On the contrary, Ag (30 +/- 10 ppm) and Pb (40 +/- 10 ppm) contents in sulfides are at least in order of magnitude higher than in the silicate melt, and thus separation of the immiscible sulfide melt can significantly decrease Pb and Ag contents of the silicate magma.

The widespread occurrence of sulfide inclusions, which were also described in olivine phenocrysts from ocean island basalts, indicates common saturation at low pressure of mantle-derived magmas with reduced sulfur. **OS**

VHMS Conference to Deliver Plenty

The 'Volcanic Environments and Massive Sulfide Deposits' conference in Hobart this November (16-19) promises to be a high-calibre event. Deposits from more than 18 countries will feature in presentations and posters by some of the world's leading minds in VHMS deposits.

Co-convenors Bruce Gemmell and Jocelyn McPhie are pleased with the high quality of the responses to the call for papers, with the program set to feature a range of deposits and mineralised regions from around the world.

Themes will concentrate broadly on a range of topics (see right) and will include oral and poster presentations.

The social program features a dinner at Tasmania's famous Moorilla Estate dining complex with an address by the Deputy Premier and Minister for Infrastructure, Energy & Resources, the Hon Paul Lennon tipped for the pre-dinner presentation.

Displays of rock suites and massive sulfide deposits from Tasmania's Mount Read Volcanics will also be available for inspection, and Mineral Resources Tasmania will also make available its latest maps and data sets for inspection.

The conference will include a full-day meeting of the GEODE project on 20 November (see page 4 for more information).

Places are filling fast, so contact the Conference Secretariat, Conference Design, for registration details.

To register: Conference Secretariat

Conference Design
PO Box 342
Sandy Bay, Tasmania, 7006
Tel: (03) 6224 3773
Fax: (03) 6224 3774
Email: volcanic@cdesign.com.au

• Global VHMS belts

The aim of this theme is to review and describe the regional geology and metallogeny of the important global VHMS belts. We invite presentations on the Iberian Pyrite Belt, Ural Mountains, Bergslagen/Skellefte district, Bathurst camp, Noranda district, Mt Read Volcanics, Hokuroko Basin just to name a few.

• Tectonic setting of VHMS deposits

The association of massive sulfides with extensional settings is well established but in reality, such settings encompass diverse tectonic environments. This session will feature research that uses volcanology, petrology and structural studies to constrain the tectonic settings of ancient and modern VHMS deposits.

• Deposit description and new discoveries

This session will focus on descriptions of individual deposits, emphasising the volcanological/sedimentological setting, structural history, alteration characteristics and mineralisation features. We are also keen to have presentations outlining new VHMS discoveries and successful exploration programs.

• VHMS-epithermal transition

Modern and ancient VHMS systems forming in relatively shallow water often have geological or geochemical features that are akin to subaerial epithermal deposits. VHMS deposits also have been described as having low and high sulfidation characteristics that reflect similar features in epithermal deposits. This session will explore the link between the VHMS and epithermal environments in both modern and ancient settings.

• Subaqueous pyroclastic flows

Volcaniclastic units thought to be generated by explosive eruptions are common in submarine volcanic successions that host massive sulfides. This session will focus on the lithofacies characteristics of such units and their interpretation with regard to transport and depositional processes, vent setting and distance from source.

• Syn-volcanic intrusions and their effects on hydrothermal systems

Syn-volcanic intrusions have been identified as essential elements in the facies architecture of submarine successions that host massive sulfide deposits. Such intrusions are potentially important as heat sources and have dramatic effects on the hydrology and chemistry of mineralising hydrothermal systems. We invite papers that describe such intrusions and consider the interactions with hydrothermal systems by means of experimental and/or modeling approaches.

• Modern seafloor mineralisation

Presentations on modern seafloor hydrothermal activity and discoveries are sought on mid-ocean ridge, intraplate, backarc, arc and forearc settings. We are interested in descriptions of discoveries and new ideas being generated from international oceanographic cruises. Results from the Ocean Drilling Program Legs 139 and 169 (Middle Valley) and Leg 158 (TAG) illustrating the third dimension in VHMS systems are also sought.

• Shallow water settings and VHMS deposition

Facies analysis of several important submarine volcanic successions has shown that some massive sulfides occur in relatively shallow water settings (< 1000 m). Hydrothermal sulfide formation has also recently been discovered in shallow water on the modern seafloor. Papers on the characteristics of shallow water successions as well as the physical and chemical processes that lead to sulfide formation under these circumstances will be presented in this session.

• Textural modification of glassy submarine volcanics

Submarine volcanic successions include large volumes of volcanic glass that is porous and reactive. Subseafloor weathering, compaction, diagenesis, hydrothermal alteration and regional metamorphism produce new textures that can be very difficult to interpret. This session will consider the processes and products of textural modification in submarine volcanics and consider implications for mapping and interpretation of VHMS alteration.

• Volcanology of komatiite successions that host massive sulfides

This session will concentrate on new models for the setting and facies characteristics of volcanic successions that host nickel sulfides, especially komatiite lavas, based on detailed textural and facies analysis of well preserved Archaean successions in Western Australia and Canada.

SGTSG Field Meeting



2001 - A Structural Odyssey

11-16 February 2001, Ulverstone, Tasmania

The Specialist Group in Tectonics and Structural Geology under the auspices of the Geological Society of Australia, will hold their next conference at Ulverstone, northwest Tasmania, from Sunday 11 February to Friday 16 February, 2001. Ulverstone's position on the northwest coast, amongst magnificently exposed high-strain allochthonous Cambrian metamorphic rocks which have been complexly faulted into the underlying autochthonous Neoproterozoic, provides the perfect location for the field conference.

The conference will focus in part on the correlation between Tasmania and mainland Australia, as well as reviewing past and present developments in tectonics and structural geology. It will include three-and-a-half days of presentations and reviews, including keynote speeches from internationally recognised structural geologists.

Two mid-week field excursions are on offer, and the conference is complemented by pre- and post-conference excursions from Bridport in the northeast of the state to Zeehan in the west, reviewing the tectonic history of this often overlooked corner of the Lachlan fold belt.

Meeting Secretariat

If you have any queries regarding the meeting, abstract requirements or submission procedure please contact Conference Design Pty Ltd.

PO Box 342, Sandy Bay Tasmania, Australia 7006

Telephone + 61 (3) 6224 3773

Facsimile + 61 (3) 6224 3774

www www.sgtsg.gsa.org.au

Important Dates

Abstracts Due	31 October 2000
Early Registration Due	31 October 2000
Pre-meeting Excursion	8-11 February 2001
Field Meeting	11-16 February 2001
Post-meeting Excursion	16-20 February 2001



CODS SRC
Centre for Ore Deposit Research



TASMANIA

MINERAL RESOURCES
TASMANIA

PhD Scholarship

Centre for Ore Deposit Research

Structural controls and numerical modelling of hydrothermal fluid flow in low sulfidation epithermal deposits

The Centre for Ore Deposit Research (CODES SRC) works in close collaboration with the Australian mining industry to investigate the geological and geochemical factors that control the formation and location of economic mineral deposits. We have a staff of 24 research scientists and 33 PhD students working on a range of projects in Australia and overseas.

This project will concentrate on interpreting the mineralised structures within low sulfidation epithermal districts to ascertain controls on hydrothermal fluid flow and the development of hydrothermal alteration. The application of numerical modelling techniques will be used to simulate the conditions of fluid flow through complex vein sets.

This project can commence immediately, and is part of an ARC SPIRT/AMIRA project investigating hydrothermal alteration associated with epithermal deposits in Australia, New Zealand, Indonesia, Papua New Guinea and Argentina.

Applicants with structural expertise and a mathematical aptitude are encouraged to apply. Industry experience would be an advantage. Stipend: AUD\$20,822 pa with up to AUD\$2,000 to cover relocation expenses to Hobart, Tasmania.

For further details contact Bruce Gemmell. Tel: (03) 6226 2893.
Email: Bruce.Gemmell@utas.edu.au.

Education News

Masters Celebrates Ten Years

The CODES Masters Program recently celebrated its 10th anniversary, with the June 'Ore Deposit Studies and Exploration Models' short course.

In speaking about the program at the course dinner, coordinator Bruce Gemmell said he was proud of the effort CODES had made in attracting high-calibre students from around the world. He also acknowledged the hard work put in over the years by the administrators of the course, particularly Christine Higgins, who established the robust administrative structure that has lasted us so well over the decade.

As the masters program changes structure in 2001 under the MCA/DETYA initiative, we are confident that CODES will retain its position as the leading institution for masters teaching for industry.

It's A Wrap

Several PhD students plan to submit their thesis and re-enter industry by the end of 2000. These include:

Briony Sinclair, Alison Raos, Zonshou Yu, Cathryn Gifkins, Kirsti Simpson, Andrew Rae, Steve Hunns, Steve Bodon, Rowan Wolfe, Bill Wyman and David Rawlings.

Information about their projects is available in the CODES Annual Report and Research Compendium.

New PhD Students

Christian Schardt

'Hydrothermal fluid migration in volcanic facies architecture:

implications for massive sulfide deposits'. Christian actually started his PhD in 1999 but has missed out on being introduced in OreSolutions. Apologies Christian.

OS

Tasmanian Honours Projects 2000

Cahill, Kevin	Hydrologic modelling of the Tasmania Basin, Tasmania.
Carpenter, Noel	Geophysical evaluation of potential waste disposal sites, Georgetown, N Tasmania. Support from Georgetown Council and Newcrest.
Howlett, Ashley*	Hydrogeology of the Cape Portland area, NE Tasmania.
Jackman, Carl*	Stratigraphy, structure and volcanic facies in the Mount Read Volcanics, Huxley Road area, South Queenstown, W Tasmania.
Legg, Justin	Copper-related alteration in the Smithton Trough, Tasmania.
Meskanen, Unnikki	Acid mine drainage at the Comstock Pb-Zn mine, W Tasmania. Support from Bass Resources.
Perri, Gavin	Land utilisation of the Camelot Park area, Droughty Point, Hobart, Tasmania (completed).
Polglase, Kate	King River environmental geophysics and hydrology, W Tasmania.
Russell, Jacob*	Geophysics of the Comstock prospect, W. Tasmania. Support from Bass Resources.
Scott, Helen*	The character and origin of the Howard's Basalt in the Mount Read Volcanics, W Tasmania. Support from Goldfields Exploration.
Thompson, David*	Geology of the Sidling Range, NE Tasmania. Support from Esso.
Vallerine, Ben*	Precious metal distribution in K lens, Rosebery Mine, W Tasmania. Support from Pasminco.
von Lichtan, Isabella	Xenoliths in the Tertiary Midland volcanoes, Tasmania.
Williams, Nicholas*	Basin Lake hydrothermal system, W Tasmania (completed).
Woolford, Adrian*	Geology and isotope geochemistry of Browns Tunnel, W Tasmania.

*Tasmanian Government Mining Scholarship holders

OS

StudentProject Profile

LOS ANDES DE CHILE NORTE: Geologia, llamas y puna.

Glen Masterman, PhD Student

My PhD research commenced at CODES in February 1999 when I was signed up as a participant in the Giant Ore Deposit Systems project (AMIRA P511). I am investigating the structural and geochemical evolution of porphyry and epithermal mineralisation at Collahuasi in Northern Chile (Chile Norte). Collahuasi is in the Andean Altiplano, 180km east of Iquique (nearest coastal city) and 1500km north of Santiago. The district comprises an east-west corridor of mineralised intrusive centres bounded by the West Fissure and Loa Faults. Collahuasi is the highest major mining operation in the world with an average operating altitude of 4600m and resources of 3Gt @ 0.8% Cu. The Atacama Desert juxtaposes the Altiplano west of Collahuasi, and is allegedly the driest on the

planet (some Chileans claim it hasn't rained for 300 years).

I arrived on site jetlagged and dehydrated 24 hours after our Hobart-Santiago flights. Not the perfect preparation for a high-altitude destination. It took 7 days to fully recover, made difficult by the lack of breathable oxygen (altitude sickness or 'puna' can be a cruel infliction!).

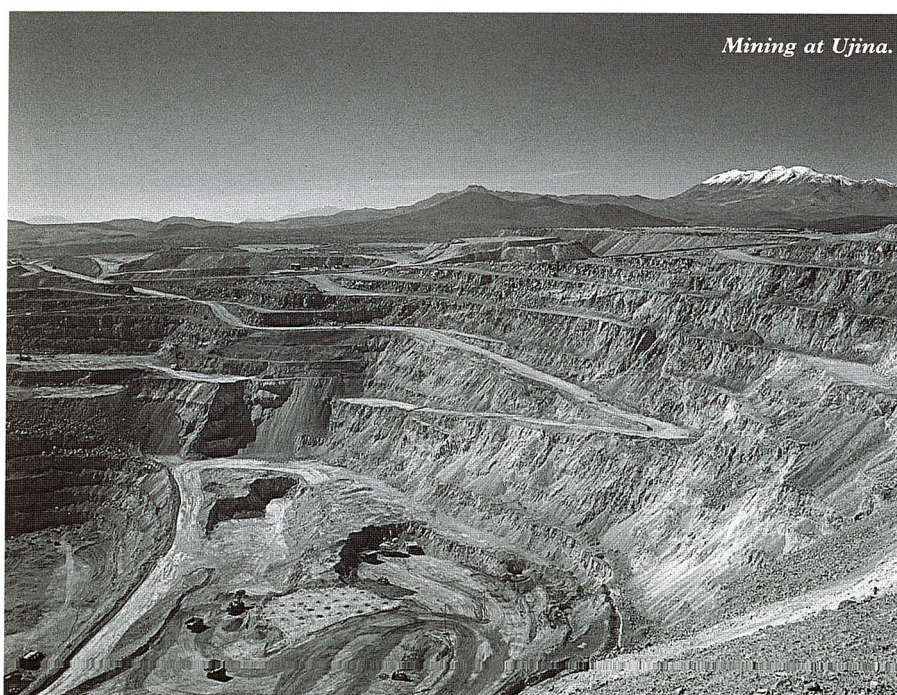
At Collahuasi, conventional work rosters were 7x7 or 4x3, though I opted for a lengthy 12-on/2-off schedule. R&R was thankfully at sea level in Iquique, a bizarre city constructed on a coastal dune platform at the base of the towering Coastal Cordillera.

My fieldwork comprised an eternity in the Rosario core shed (logging drill core at 4700m), punctuated by a brief stint of surface mapping. High-altitude fieldwork is a formidable experience – even the simple task of remembering to breathe while peering through a hand lens required conscious effort.

Altiplano geology and landscape is nothing short of fabulous. The rolling, sparsely vegetated terrain is roamed by a plethora of llamas, alpacas, vicunas, and vizcachas. To the east of Collahuasi lies Bolivia, where north-south trending chains of snow-capped and active stratovolcanos dominate the landscape. Fumaroles and acid-alteration are common in the craters of many volcanoes and frequent earthquakes are an all too subtle reminder of the awesome subsurface potential in this fragile environment.

I was a nervous first time traveller in Chile, as I spoke only a few words of Spanish (sí, gracias, cerveza, nachos, etc), and to my complete amazement, only a handful of Chileans spoke English (I was ignorant enough to believe that English truly was the 'universal language'). Most Collahuasi geologists spoke English, though invariably there were communication difficulties and confusion.

I gratefully acknowledge the understanding and hospitality extended by my Chilean colleagues and amigos and look forward to the occasion when I next visit this unique country. **OS**



Mining at Ujina.

At left: Mining at Ujina. Volcanoes in the background occur on the Bolivian side of the border. Production figures in 1999 were 60,000 ore tonnes/day at a stripping ratio of 4:1. Two thirds of the ore are passed through the sulfide concentrator; the remaining third goes to the oxide leach plant. Concentrate is pumped in slurry form along a 150km pipeline to the coast south of Iquique. Copper cathode is produced on site from oxide ore.

InCirculation

UTas Presentations

15th AGC, Sydney, July 2000

Agnew, M. Late silurian setting of the Lewis Ponds Massive Sulfide Deposit, New South Wales. 15th Australian Geological Convention, Geological Society of Australia, Abstracts No. 59, p.4.

Allen, S.R., and McPhie, J. Water-settling and resedimentation of submarine rhyolitic pumice at Yali, Greece.

Amini, Z. Z. The affect of oceanography on sedimentology and geochemistry of the temperate carbonates of Bass Strait, Australia

Barley, M. E., Pickard, A. L., and **Khin Zaw**. Shrimp zircon dating of granitoids from Myanmar: constraints on the tectonic evolution of southeast Asia.

Burrett, C., and Berry, R. Proterozoic Australia-Laurentia fits: Auswus an alternative to sweat.

Close, D., Edgoose, C., and **Haines, P.W.** Chronological constraints on a rift sequence underlying the southwest Amadeus Basin, Central Australia.

Cooke, D. R., and Davies, A. G. S. Phreatic explosions, breccia deposits and gold mineralisation in low sulfidation epithermal environments

Crawford, A. J., and Munker, C. Cambrian arc evolution along the SE Gondwana active margin: a Tasmania-New Zealand perspective.

Davidson, G. J., Varne, R., and Brown, A. V. The ocean crust dyke/basalt hydrothermal sulfur anomaly – insights into its growth and geometry during crustal

extension on Macquarie Island, Southern Ocean.

Davidson, P., and Kamenetsky, V. S. Melt inclusion studies of immiscible hydrosaline magmatic fluids: the first stage of hydrothermal fluids?

Davies, A. G. S., Cooke, D. R., and Gemmell, J. B. Overlaps between phreatic and phreatomagmatic brecciation – implications for the development of hydrothermal systems. An example from the Kelian gold deposit, East Kalimantan, Indonesia.

Gemmell, J. B., and Sharpe, R. Sulfur isotope characteristics of subaqueous epithermal mineralisation, Conical Seamount, Papua New Guinea.

Haines, P.W. Cainozoic multiple impact event in South Australia and its inferred signature within terminal eocene stratigraphy of the St Vincent Basin.

Holm, O. A structural and metamorphic profile of the Arthur Lineament and surrounds, Northwest Tasmania.

Large, R. R., Bull, S. W., Cooke, D. R., Garven, G., McGoldrick, P. J., and Yang, J. Ground selection for stratiform zinc deposits in north Australian proterozoic basins: sources, aquifers, seals, faults, traps and halos..

Lickfold, V. The intrusive history of the Goonumbla porphyry Cu-Au deposits, NSW.

Limtrakun, P., Khin Zaw, Ryan, C. G., Mernagh, T. P., Falloon, T. J., Steele, D. A., and Wathanakul, P. Formation of the denchai gem sapphires, northern Thailand: mineral chemistry and fluid/melt characteristics.

McPhie, J., Allen, S. R., and Simpson, C. Extensive felsic lavas in intraplate volcanic provinces.

Meffre, S., and Crawford, A. J. Ridge subduction in the New Hebrides intra-oceanic island arc: implications for the recognition of collision events in ancient arc-related sequences.

Quilty, P. G., and the Leg 188 shipboard scientific party. Biostratigraphy of ODP Leg 188 and its contribution to understanding of the 'Amery Basin'.

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GeoAnalysis 2000

Zonshou Yu: 'Chemical decomposition of geological materials for trace element determination using ICP-MS'. **OS**



Society of Economic Geologists
University of Tasmania
Student Chapter
 sponsored by CODES SRC

Lune River Gem Fossicking

Armed with buckets, spades, raincoats and wellies, a few intrepid gem fossickers arrived on a cold Saturday morning on 26 August to go Gem-Hunting at Lune River. This is a well-known gem-collecting destination in southeastern Tassie and the student chapter of the SEG coaxed Simon Stephens from the lapidary laboratory into being our guide for the day.

Even though the weather kept numbers down, the party had a really good day with heaps of mud to play in for children of all ages, literally from 2 years upwards.

We all found bits of Jurassic tree ferns, with Sarah's classifiable stem and spores piece being one of the best pieces of loot. In addition to the tree fern pieces, we found a load of really pretty agates and bits of petrified wood from a gravel layer beneath a partially weathered lava flow at Lune River.

Thanks to Neil for organising it and to Simon for helping us polish up our loot.

Noel White's World

Dr Noel White, Consulting Economic Geologist visited CODES and gave a talk on 'Working in an international minerals exploration company'. The talk was one of many he prepared for his SEG International Exchange series

(1998-99), designed to cover issues of interest to any student contemplating a career in minerals exploration. It covered issues such as what the work entails, education and training requirements, current company activity, deposits, factors that control exploration policies, short and long term trends and how to get a job.

Through a lively set of anecdotes and photos, Noel conveyed the true life and times of field geologists.

Field Trip

**Central western
New South Wales**

1-5 November 2000

A field trip has been planned for the first week in November to investigate the three major types of Ordovician magmatic/hydrothermal Cu-Au deposits in the region: porphyry, skarn and high sulphidation epithermal deposits.

The trip is planned for 1-5 November 2000 and is open to SEG Student Chapter members and other students and well as geologists from industry and research institutions.

Places are limited. Details on the CODES web site at www.geol.utas.edu.au/codes.

**Renison Tin Mine
Tasmania**

14 September 2000

Darryl Clark, the secretary of the Student Chapter, is organising a trip to the Renison Tin Mine in western Tassie on 14 September

2000. The field trip is being organised to further the professional development of the society's members. One of the main objectives of the Society of Economic Geologists is to advance the science of geology through the scientific investigation of mineral deposits and mineral resources and the application thereof to mineral exploration, mineral resource appraisal, mining, and mineral extraction endeavours. We as economic geologists can learn a great deal from Renison Bell's experience in successfully negotiating obstacles and risks involved with long-term mining and production. In exchange for Renison leading an underground tour for our members, we asked Ross to contribute to the field trip by giving us and the Renison Tin geologists a talk on exploration models for Renison-style tin deposits.

Quiz Night

SEG organised a Quiz Night at the Sandy Bay Yacht Club on 26 June. We had over 40 people taking part with Dave Cooke as our quiz master for the evening. It was a fun night where 'old music' stole the show and divided the winners from the rest - Stuart Bull and his team got 18/20 for the music round and went leaping and bounding ahead. Spot prizes for the quickest team to get a 'pictionary' clue saw great amusement as the team with 2 of the 3 MSc students attending won it for solving 'bald'.

OS

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short course dates

exploration and hydrothermal geochemistry

23 April - 4 May 2001 Leader: Bruce Gemmell & David Cooke

Covers recent developments in exploration geochemistry, with particular emphasis on the importance of the regolith and landscape evolution, as well as an introduction to the chemistry of hydrothermal systems. Includes a review of the importance of metal solubilities and ore fluid chemistry in controlling types and locations of ore deposits.

exploration geophysics, remote sensing and geographic information systems

2 -12 July 2001 Leader: Mike Roach

Focuses on the theory and application of potential field and electrical geophysical techniques in exploration geology. The uses, problems and pitfalls of each methods will be covered. Both prospect evaluation and regional geophysical studies will be discussed, as well as structural interpretations of airborne geophysical data, remote sensing, data integration and the application of GIS systems to exploration geology.

DETYA announced in March 2000 that The University of Tasmania was successful in a joint bid for funds through the Science Lectureship Program, to offer a coordinated network of earth science courses of relevance to the minerals industry, at the undergraduate and postgraduate levels.

The course will provide students with a world-class, national, minerals geoscience qualification that matches the needs of the allied minerals industry, and enables students to study coursework units from all the universities in the network. A list of the new coursework units offered will be included in the next edition of OreSolutions.

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