

50th Anniversary

Geology Department Bulletin

Message from Head of Department

The 50th year of teaching and research in the Geology Department at the University of Tasmania has been a very successful year. We have the largest Honours class (20 students) since the Department was established; we have been officially recognised as the top Department in the University in terms of research performance; and we have graduated ten excellent PhD students during the past 12 months.

Over the 20-year period since 1976, our student numbers have shown steady growth (with minor fluctuations) from 57 EFTSU to 113 EFTSU in 1996. Over the same period, academic teaching staff have dropped from 12 to 10 and technical and administrative staff from 11 to 8. However, there has been major growth in academic research staff funded from outside grants, from 0 in 1976 to 13 in 1996. This big shift in academic staff from 100% funded by the University profile funds in 1976 to 57% funded by outside grants in 1996 is a consequence of the Federal Government's reduction in general funding to Universities, and the need to focus the Department's research effort into areas that can secure outside funds from ARC, Industry and State Government.

Our long term plan to secure outside funds for the CODES Key Centre and Geology Department have been very successful, and in 1996 the University of Tasmania was ranked number 1 in Australia by the Australian Research Council for research performance in the Earth Sciences (ARC Report No 47). Our research success is not only due to our high national and international profile in geology, but also because of the breadth and depth of our research activities across many sub-disciplines, including Ore Deposit geology, Petrology, Geochemistry, Sedimentology, Tectonics and Structure, Volcanology, and Geophysics. The foundations laid, especially by Professor S.V.V. Carey, Dr Max Banks and Dr Mike Solomon in the first 30 years, have paid off, and provided a spring-board for growth in student quality and research standing over the subsequent 20 years.

I would also like to give recognition to the excellent contribution made by the technical and administrative staff toward the success of our Geology Department. Under trying conditions of funding cuts and reduced staff numbers, the general staff have performed to a very high standard, and provided the matrix to keep the Department coherent!

The Department is now positioned well for the 21st Century. The new Special Research Centre (SRC) recently awarded by the ARC, will replace the Key Centre and provide nine years of secure funding. The Centre will become a global leader in Ore Deposit Research by building upon the strengths of the Department and the previous Key Centre. Projected undergraduate student numbers for 1997 are up by about 35% over 1996 figures, and we anticipate another large Honours class and a fresh intake of PhD and Masters of Economic Geology students. Industry support for the Department and the Centre has been extremely positive, and we plan to further develop our links with industry through both postgraduate training and focussed research projects.

However, the bottom line is that the strength and reputation of our Geology Department lies with our graduates - congratulations, and keep up the excellent record!

Ross R Large
Professor of Geology

Including CODES Newsletter 4

115 not out

Peter Cornish (25 years), Phil Robinson (26 years), June Pongratz (36 years) and Vagn Jensen (28 years) have been the backbone of the technical staff of the Geology Department, giving over 115 years of valuable commitment. Well done, and keep going!



A 50th Anniversary mug has been produced, featuring this design.

Only \$8.00 each.

Available from the Geology Secretary.



— 50 years & still expanding —

Geology Department/CODES Staff 1996

Head of Department and Director of CODES
 Professor Ross R Large, Ore deposit geology
 Deputy Head of Department
 Assoc Prof Clive F. Burrett, Tectonics and stratigraphy
 Dr Ron F. Berry, Senior Lecturer in structural geology
 Dr Stuart Bull, Research Fellow in sedimentology and volcanology
 Dr David Cooke, Lecturer in hydrothermal geochemistry
 Mr Peter Cornish, Laboratory Manager
 Assoc Prof Anthony J. Crawford, Petrology
 Dr Leonid Danyushevsky, Research Fellow in igneous petrology
 Dr Garry Davidson, Research Fellow in ore deposits
 Dr Trevor Falloon, Research Fellow in igneous petrology
 Ms Marilyn Feast, Geology Secretary
 Dr Bruce Gemmell, Senior Lecturer in economic geology
 Ms Jeanette Harris, CODES Secretary
 Mr Keith Harris, OIC High-Pressure Laboratory
 Ms Christine Higgins, CODES Administrative Officer
 Ms Nilar Hlaing, Research Assistant in geochemistry
 Mr Vagn Jensen, Electronics Technician
 Dr Vadim Kamenetsky, Research Fellow in petrology
 Dr Paul Kitto, Research Fellow in isotope geochemistry
 Dr David E. Leaman, Senior Lecturer in geophysics
 Dr Roger Lewis, Senior Lecturer in Geophysics
 Dr Jean McClenaghan, First Year Course Coordinator/Lecturer
 Dr Peter McGoldrick, Research Fellow in sediment-hosted ores
 Dr Jocelyn McPhie, Senior Lecturer in volcanology
 Ms June Pongratz, Resource Centre Manager/Seismic Technician
 Dr Aung Pwa, Research Fellow in geochemistry
 Dr Prasada Rao, Associate Professor in Sedimentology
 Dr Michael Roach, Lecturer in Geophysics and GIS
 Mr Phillip Robinson, Analyst
 Ms Kathi Stait, Curator
 Mr Simon Stephens, Petrographics Manager
 Dr A. Joe Stolz, Lecturer in volcanic geochemistry
 Dr Jan Van Moort, Senior Lecturer in geochemistry
 Professor Rick Varne, Petrology
 Dr Khin Zaw, Research fellow in fluid inclusions/SE Asian geology

"Venturers" at Savage River mine



Geology Department Runs Australian Student Mineral Venture

In 1995 the Key Centre, in conjunction with the Tasmanian Mineral Council was successful in gaining a three year tender to operate the southeastern Australian Student Mineral Venture (ASMV) under the guidance of Dr Paul Kitto. This initiative was instigated by the AusIMM Education Endowment Fund. Major financial support was provided by the AusIMM Educational Endowment Fund, CRA, Placer Pacific, and AusIMM branches throughout Tasmania, Victoria and New South Wales. In 1997 additional financial sponsors have included Pasminco and Aberfoyle Hellyer. Guarantees of logistic support and co-operation from numerous companies and individuals from throughout the Tasmanian mineral industry have also been crucial to the success of this program.

The two week ASMV program was designed to demonstrate and foster a positive attitude towards career opportunities in Mineral Science, Geoscience and Mining and Metallurgical Engineering for senior high school students from south eastern Australia, and what better place to undertake such a program than the compact natural laboratory offered by Tasmania. In January 1996 twenty four students descended on the Launceston Campus of the University of Tasmania to begin an exhaustive program of excursions, lectures, laboratory work and social activities that took the student around the state of Tasmania. The programme was designed to give students a chance to be educated in a relaxed and friendly environment by seeing the "real" mineral industry. The student's hands-on introduction to the Tasmanian Mineral Industry was aimed to educate beyond the classroom, and provide the opportunity to experience the potential that exists for a varied and challenging future associated with mining.

The inaugural ASMV in January 1996 was a huge success with students indicating that they found the easy-going, informal relaxed atmosphere an ideal environment in which to gain an insight into the mineral industry and have fun. Their very informative and practical experiences on the venture also greatly assisted them to choose career paths, with 22 out of the 24 deciding to undertake tertiary education aimed at a career in the mining industry.

The following thought provoking responses to an exit survey completed by attendees summaries the importance of offering such programs well into the future to maintain the growth and viability of the mineral industry.

"I always had a positive perspective of the mining industry and the ASMV has only made my will harder to succeed in this field. A great inspiration".

"Didn't think the industry was so diverse. A much better image!"

"I no longer believe the rumours that the mining industry is environmentally damaging and dangerous because I can see the efforts the industry is going to to repair bad aspects of the industry".

"It has made me aware of so many more opportunities in the minerals industry".

"I'd never really considered it seriously as a career prospect - but now it is most definitely an option with a high priority".

"I have seen the great diversity of opportunities".

"I didn't realise what the mining industry was like. I can't believe the media's presentation of the industry".

"I never realised how much was involved in the mining industry or how many people. The options are vast".

I feel that these quotes capture the whole essence of the ASMV. If we can capture the imagination of these outstanding young science students, then Australia's Mining Future will be assured.

Dr Paul A. Kitto
 Administrative Coordinator ASMV

Geology / CODES wins Special Research Centre

In November this year, the Federal Minister for Employment, Education, Training and Youth Affairs, Senator Amanda Vanstone, announced funding for eight (8) new Special Research Centres, including the Centre for Ore Deposit Research at the University of Tasmania.

The Australian Research Council selected the eight successful centres from an initial seventy-two applications from Universities across Australia. The successful institutions were:

- University of Tasmania (1)
- University of Sydney (1)
- Australian National University (1)
- University of Newcastle (2)
- University of Western Australia (2)
- University of Adelaide (1)

The new Centres cover the fields of Engineering, Science, and Social Science.

The New SRC for Ore Deposit Research brings together three research groups in the Geology Department, each with a proven track record; The CODES Key Centre lead by Professor Ross Large, the Petrology Group led by Associate Professor Tony Crawford, and the Volcanology Group led by Dr Jocelyn McPhie.

The Centre will undertake a program of basic and strategic research, in collaboration with other international research teams and Australian mining companies, to develop a better understanding of the formation and location of economic mineral deposits in volcanic and sedimentary settings.

At the celebrations to mark the granting of the SRC, Vice-Chancellor Professor Don McNicol said the selection of the University for the new Centre recognised the international standing of the Geology Department as the premier geology school in Australia for research and teaching relevant to the mineral exploration and mining industry.

"The Centre will be based on the high-calibre research team currently in the Geology Department, and will attract additional international specialists to build a very prestigious, multidisciplinary group" Professor McNicol said.

"The Centre for Ore Deposit Research will be the only Special Research Centre in exploration and minerals geology in Australia. It is therefore a very important development for the University, which clearly will have a distinctive and nationally leading role in this area".

"At the same time, the Centre will bring enormous benefit to the Tasmanian minerals industry, and will be a contributing factor to the wealth of the State."

Professor McNicol said direct funding from the ARC to the Centre would be \$825,000 per annum. This would be matched by further funding from a consortium which included the State Government, industry, the University and the Australian Mineral Industry Research Association.

"Over a nine year period, this will mean an injection of \$16 million to University of Tasmania research and infrastructure" he said.

Director of the new Centre, Professor Ross Large, said emphasis would be placed on understanding the tectonic and geological environment of mineral deposits of copper-gold and lead-zinc that form within volcanic and sedimentary rock sequences throughout Australia and the Western Pacific Region.

"Research will focus on the chemistry and physics of metal release, metal transport and metal precipitation involved in magmatic, volcanic and sedimentary processes", he said.

We have lift-off



Tony Crawford and Ross Large toasting the SRC success.

"The research programs will be multidisciplinary, covering the spectrum of basic, strategic and applied research".

Professor Large said research projects supported by the SRC would include:

- A study of the relationships between volcanism, magmatism and copper-lead-zinc mineral deposit formation in western Tasmania at Mt Lyell, Rosebery and Hellyer Mines. This project is designed to develop a new approach to the exploration and discovery of major ore deposits of significance to the Tasmanian economy.
- A study of factors controlling the formation of lead-zinc-silver ore deposits in the Proterozoic zinc belt of the Northern Territory and western Queensland. This area contains some of the world's greatest zinc deposits and is a natural laboratory for the application of leading-edge basic research to real world mineral industry problems.
- Analysis of melt inclusions to study the timing of gold and copper release during magma crystallisation. This research has major implications for the location and discovery of world-class copper-gold porphyry deposits in Tasmania, eastern Australia and the South West Pacific region (Papua New Guinea, Indonesia, the Philippines and South East Asia).

The establishment of this Special Research Centre is very timely. Over the last decade, Australian Earth Scientists have established an international track record of quality research combined with close industry collaboration. Ore deposit research is now a shining light of the Australian strategic research effort and regarded internationally as a model for other countries to follow (see e-mail message from Noel White elsewhere in this newsletter). Research in the SRC will help to underpin the future of the Australian minerals industry, and will enhance the push by Australia to become a global leader in mineral exploration and mining.

Another SRC in Earth Sciences was granted to the University of WA - the SRC for Tectonics, lead by Professor Chris Powell. It is noteworthy that four of the eight Directors of Earth Science Research Centres are graduates of the University of Tasmania - Professor David Green, RSES, ANU; Professor David Groves, Key Centre, UWA; Professor Chris Powell, SRC for Tectonics, UWA; and Professor Ross Large, CODES SRC, University of Tasmania.

30 YEARS OF QUALITY CHEMICAL ANALYSIS

The Geology Department has had a long history of X-Ray analysis thanks primarily to mineralogist, Ramsay Ford who introduced the technique in the mid 1960s. The Department currently runs a modern Philips PW1480 X-Ray fluorescence spectrometer which has coped with the bulk of the Department's needs since 1992. Current research in CODES and Geology has greatly increased the demand for analyses such that, as well as an analyst, three persons are employed in sample preparation along with the students themselves.

In the early 1970s Mike Solomon had much to do with recognising the need for a full time analyst. In 1978 he was also responsible, with David C. Green, for introducing Stable Isotope Mass Spectrometry and Vacuum Preparation Lines for carbon, oxygen, sulphur and hydrogen analysis. These facilities were moved to the University's Central Science Laboratory (CSL) in 1984.

Atomic absorption spectrophotometry (AAS) was a popular technique in the 1970s and 80s. Although generally superseded by ICP (inductively coupled plasma) techniques, a modern AA instrument, predominantly funded by the Science School, is available in the Chemistry Department. It is an essential method for geochemical analysis in carbonates and has been extensively used by Prasada Rao.

Rare earth element (REE) geochemistry was made possible in the Department by the development of a new analytical method in 1985 using ion exchange separation and XRF (Phil Robinson, Neville Higgins and George Jenner). A special laboratory was set up for this work which has continued for ten years.

Rick Varne was behind another new development, the setting up of a neodymium-strontium isotope separation laboratory in 1989, with the mass spectrometry done externally at Adelaide, Berlin and Amsterdam. This was expedited by help from George Jenner in Canada, John Foden in Adelaide and visits to Leeds and Cambridge Universities by Phil Robinson.

Current areas of development are in the XRF analysis of a wide range of ore related samples and the setting up of preparation facilities and methods for ICPMS analysis.

The CSL have a new Finnigan MAT "element" high resolution magnetic sector ICPMS and a Merchantek UV laser attachment which is capable of analysing samples down to sub parts per billion (ppb) levels. The ICPMS will be used routinely for measuring REE, high field strength elements (HFSE) and chalcophile elements. Techniques will be developed for measuring lead isotope ratios and platinum group metals at low levels. Plans have been formulated for an ultra clean laboratory for acid distillation, cleaning labware and sample preparation which are essential for quality analysis. Phil Robinson, Joe Stolz, Peter McGoldrick, Ashley Townsend (CSL) and Nilar Hlaing will be involved in this major project.

Today many of the analytical facilities, routinely used by the Department, are housed in the Central Science Laboratory. These include a Cameca SX50 electron microprobe and SEM, a Jeol 3FX electron paramagnetic resonance spectrometer, a Carl Erba 1108 elemental analyser (C, H, N and S analysis) and a Bruker IFS66 Fourier

transform infra-red spectrometer. There is a "state of the art" stable isotope laboratory with VG SIRA Series II, VG MS602, Micromass Optima stable isotope mass spectrometers with conventional and multi-preparation lines and a NdYAG laser probe for in situ S isotope analysis. A laser technique for C/O isotope measurements in situ in carbonates is currently under development by Mike Power and Peter McGoldrick.

Philip Robinson



Phil Robinson at the helm

C. Prasada Rao

I have been working in the geology department for the past 25 years. Last year I was selected, based on SETL scores, as one of the best lecturers in the University. My research all these years have been on carbonates from modern and ancient tropical, temperate and polar environments. I have published extensively on sedimentology, elemental geochemistry and isotope geochemistry and now has one of the best citation index among Australian geologists. The 1996 has been the best year because I have published a book on **'Modern Carbonates: tropical, temperate and polar - introduction to sedimentology and geochemistry'**. This book is considered as a valuable contribution and very well done by experts in both sedimentology and geochemistry. This year five of my papers have been accepted for publication (2 published and 3 accepted for publication). Topping off this existing year has been 9 papers presented at conferences and workshops. I have started writing another book on **'Sedimentary Textures: Cold to Warm'** largely based on our teaching collection I have built up for sometime in Sedimentology and Sedimentary Environment courses.

THE DAY OF THE BIG BANG

OR THE SAFE DISPOSAL OF A HAZARDOUS SUBSTANCE

The question was posed "How do you deal with bromine pentafluoride"? And the standard response was "First get the MSDS". Unfortunately there was not an MSDS, or Material Safety Data Sheet, available. It appeared as if there was no such chemical and yet there was a room in the Geology Building with several one litre stainless steel containers of this material. Three of the five cylinders were "empty" and two in use. Bromine pentafluoride is used in picomol amounts to dissolve silicate minerals for oxygen isotope analysis.

After many enquires contact was made with Professor Tom O'Donnell from Melbourne University who was able to throw some light onto the potential problem of disposal of the "empty" cylinders. On his recommendation, a procedure was produced to explode the empty cylinders. So began the second search, after contacting the Fire Service, Workplace Standards Authority and Army without success, approach was made to the local blue metal quarry. The "Shot - Firer" from the quarry was interested in the problem of disposal and visited the Department for an inspection of the cylinders and was willing to undertake the task.

The three empty cylinders were transported to the quarry in the explosives trailer. A hole had been prepared, approximately a cubic metre in size and the cylinders, with explosive charge attached to the valves, were placed in the hole. This first attempt was unsuccessful as only the valves were removed with the sealing part remaining intact. A second attempt was made by surrounding the cylinders with "ANFO" explosive, filling the hole with dirt, placing a "crash mat" on top and detonating the charge. Only a part of one cylinder was recovered following the resultant explosion, which shifted the crash-mat 20 metres away and emptied the hole of dirt.

After the isotope line had been dismantled a further disposal was required of a partly filled cylinder and two "traps". The safe disposal was achieved by placing the objects into three separate shot holes in the quarry face, on top of a detonator, surrounding them with "Anfo" and back filling the holes with dirt. There was no visible release to atmosphere, nor any bromine smell detected approximately three minutes after the explosion and no part of the cylinder or traps were recovered. Although the explosion spread debris over a 200 metre area, and expert advice suggests that the "bang" was greater than expected from the amount of "Anfo" placed in the holes.

Dennis Quinn

Hazardous Substance Coordinator, OHS&T Unit



Why don't you become a CODES sponsor and reap the benefits of contributing to an internationally renowned and dynamic team of researchers.

There are at present four Gold Sponsors (Aberfoyle, BHP, Copper Mines of Tasmania, RGC) and seven Silver Sponsors (Acacia, CRAE, Great Central Mines, MIM, North, Pasminco and WMC).

A Bronze Sponsor category has recently been created to enable involvement of smaller companies.

Benefits

Gold Sponsor \$30,000 pa

- membership and participation in annual advisory board meetings
- two scholarships for M.Econ.Geol. students (total value \$9000 pa)
- complete 16-volume set of short course manuals
- annual up-date on results from CODES research program
- 50% reduction in CODES short course fees for two people

Silver Sponsor \$10,000 pa

- membership and participation in annual advisory board meetings
- one scholarship for M.Econ.Geol. students (total value \$4500 pa)
- complete 16-volume set of short course manuals
- 25% reduction in CODES short course fees for two people

Bronze Sponsor \$2500 pa

- complete 16-volume set of short course manuals
- 10% reduction in CODES short course fees for two people

For more information please contact Professor Ross Large, CODES Special Research Centre, GPO Box 252-79, Hobart, Tasmania 7001. Phone 03 62 262472.

Geology Department Ranked No.1

The latest data compiled by the University of Tasmania's Office for Research shows our Geology Department to be the leading research department at the University (see table 1 below). The research index is a composite formula based on outside research income, publication output and research higher degree completions. As shown in table 1, Geology topped the list with 8.84% of the University's research quantum followed by Agricultural Science, Chemistry and Plant Science. In 1996 total outside research earnings by Geology and CODES amounted to 1,811,000. Research output during the 1995 year was 30 refereed publications, 40 conference papers and 31 research reports to industry. A list of our major research projects in 1996-97, funded by the Australia Research Council, Industry and State Government, is shown in table 2.

Table 1: University of Tasmania Research Index by Department (First ten of 51 rankings)

	Research Index %	Research Productivity Index
1 Geology	8.84	0.40
2 Agricultural Science	7.14	0.31
3 Chemistry	6.05	0.36
4 Plant Science	5.25	0.35
5 Zoology	5.00	0.36
6 Aquaculture	4.61	0.31
7 Geography & Env. Studies	4.37	0.23
8 IASOS	3.85	0.17
9 Education	3.85	0.17
10 PHYSICS	3.78	0.22

Table 2: Geology/CODES Research Grants 1996-97

ARC Fellowships	
Dr L. Danyushevsky	50,000
• Constraints on the composition of basaltic lavas	
Dr G. Davidson	65,000
• S-isotope geochemistry of hydrothermal terrains	
Assoc. Prof. A. Crawford	85,000
• Tectonic-magmatic evolution of SW Pacific	
Industry Collaborative Grants (ARC/AMIRA)	
Dr R. Berry (with AMIRA)	53,000
• Tectonic models of W Tasmania	
Prof. R. Large, Dr. B. Gemmel, Dr J. Stolz (with AMIRA)	370,000
• Studies of VHMS-related alteration, W Tasmania and Queensland	
Dr P. McGoldrick, Prof. R. Large, Dr. S. Bull (with AMIRA)	355,000
• Proterozoic sediment-hosted Pb-Zn-Ag deposits	
Dr J. van Moort, Dr D. Hutton* (with Pasminco)	130,000
• Lithogeochemical and paramagnetic studies	
ARC Large Grants	
Assoc. Prof. A. Crawford	60,000
• Tectonic and magmatic controls on arc volcanism	
Assoc. Prof. Crawford, Prof. R. Varne	40,000
• Mantle convection and mantle plume interactions	
Dr L. Danyushevsky, Dr T. Falloon	43,000
• P-T-fH ₂ O-fCO ₂ constraints on magma genesis	
Dr B. Gemmel, Dr Khin Zaw	52,000
• Fluid inclusion studies of VHMS ores	
Dr B. Gemmel, Dr R. Binns*	31,000

- Active ore deposition - Manus Basin

Prof. R. Large, Dr D. Cooke, Dr P Kitto 52,000

- Metal zonation around Devonian granitoids, W Tasmania

Prof. R. Varne, Dr M Gasparon* 40,000

- Mantle-crust interactions in orogenic settings

ARC Small Grants

Dr M. Roach, Dr R. Lewis 15,000

- Scale dependence of electrical properties of sulphide ores

(1997 Small Grants not announced at time of printing)

Research Infrastructure

Assoc. Prof. A. Crawford, Prof. R. Varne, Dr J. Foden* 20,000

- Contribution to radiogenic isotope facility (Adelaide Univ.)

Geology/CODES Block Grant 80,000

- Research resource centre

8 APA-I Scholarships (supported by Aberfoyle, Placer, BHP, WMC, RGC, Normandy) 160,000

AMIRA Grants (additional to above Collaborative Grants)

Dr Khin Zaw 110,000

- Tectonics and metallogenic relations of SE Asia

Tasmanian Government support for CODES 168,000

Industry support for CODES

(BHP, RGC, Aberfoyle, CMT, CRA-RTZ, Alcoa,

GCM, Pasminco, MIM, WMC and Norths 190,000

\$2,169,000

* from other dept/university

The Rock Store

The Rock Store currently has well over 130 000 specimens catalogued. Samples are categorised as "rocks" (52 000 specimens), "ores" (12 500 specimens), "fossils" (47 500 specimens) and "minerals" (5000 specimens).

Many of these were collected for teaching, and all students and staff members research material ultimately finds its way to the basement and the departmental collection. All but the most transitory visitor to the Geology Department has left a memento of their visit in the Rock Store. Except for those samples consumed for teaching thin sections, they are still there!

Business is escalating downstairs, with anywhere from 2000 to 5000 specimens catalogued each year, which is indicative of the scope and quality of research at all levels in this Department.

The inaugural curator, Bruce Cameron, has subsequently qualified as a medical practitioner, and practises in Hobart. The work of Sue Cameron, who established the first computer catalogue in an Australian university geology collection, continues with a user-friendly, searchable catalogue available today. Another previous curator, Ron Bugg, is now with the Tasmanian Chamber of Mines. Penny Partridge, now Williamson, left Hobart in 1992 after 15 years in the Rock Store, and is still curating at the University of Wollongong. The curator is now Kathi Stait, a former graduate of the Department, and also of Memorial University of Newfoundland, Canada.

CODES/ Dept of Geology PhD PROGRAM

Over the last 5 years, the number of fulltime PhD students has stabilized around 25-30, and the peak year for graduations was 1995, during which 8 students successfully qualified for the degree. A further 8 students have completed their PhDs in 1996, and the challenge ahead for the Department and the new Special Research Centre will be to continue to attract top calibre students from both elsewhere in Australia, and from overseas. Imposition of the full fees for foreign students has slowed down enrolments of PhD candidates from overseas. However, a number of the students who recently completed, or are now completing PhDs, have brought with them foreign bursaries, from countries including Iceland, Indonesia, Iran, Italy, Germany and Thailand.

Of the PhD students who recently graduated, and a number of those nearing completion of their theses, a significant percentage were geologists who chose to return to fulltime study after 3-8 years in the exploration industry. These students have proved to be a highly focussed, hard working and particularly successful group, as might anyone be who has taken a 300% pay cut and opted for 3-4 years of relative poverty to improve their qualifications. However the rewards are worthwhile, with many of these students moving on to senior positions in industry.

It is fair to say that the PhD students, together with the Honours students, are the lifeblood of the Department/Key Centre. Their contributions not only to the research effort, but also to the more 'humanizing' aspects of the place, particularly the tearoom gossip, the corridor banter, room decorating (take a bow Alicia, Robina, Cathryn, Rowan and the long-suffering Fernando), volleyball, superfrisbee, staff-student footy/cricket, and so on, is immense and vital.

CURRENT PhD STUDENTS

- ADABI, Mohammed** — Sedimentology and geochemistry of U Jurassic and Precambrian carbonates
ALLEN, Neil — Magnetic mineral processing employing rotating magnetic fields
AMINI, Zohra — Sedimentology and faunal variations in temperate carbonates, Tasmania
ANDERSON, Bruce — Geology and genesis of the Nifty Cu Deposit, WA
BODON, Steve — Geology and genesis of the Cannington Pb-Ag-Zn deposit, Mt Isa Inlier
DELLA PASQUA, Fernando — Field and experimental study relevant to petrogenesis in island arcs
DIREEN, Nicholas — Geophysical and geological studies of western NSW and western Victoria
DOYLE, Mark — Volcanic facies architecture and massive sulphide mineralisation, Qld
DUFFETT, Mark — Geophysical and GIS studies of north Australian Proterozoic sediment-hosted Pb-Zn mineralization; setting and signatures
DUNSTER, John — Sedimentary setting of Proterozoic zinc-lead-silver deposits, Qld
GIFKINS, Cathryn — The Mount Black Volcanics, W Tasmania
HUNN, Steve — Style and setting of volcanic-hosted Au and base metal, Qld
JABLONSKI, Wieslaw — The development of electron microscopy and X-ray microanalysis
LI, Xu — Characterization of some Australian Au deposits by EPR
MCNEILL, Andrew — Basalt-eclogite transition and melt inclusion studies of plagioclase in MORB
ORTH, Karin — Geology and mineralisation of the Koongie Park Pb-Zn deposit, WA

- PAULICK, Holger** — Thalanga VHMS - alteration and structure, Qld
RAE, Andrew — Palinpinon hydrothermal system, Philippines
RAOS, Alison — Petrological and volcanological evolution, Efate Island, Vanuatu
RAWLINGS, David — Tawallah Group Cu and volcanics, McArthur Basin
REID, Catherine — Permian palaeogeography of Tasmania
ROACHE, Mike — Geology and genesis of the Menninne Dam prospect, SA
SELLEY, David — Structure of the Dundas Mineral Field, western Tasmania
SHARPE, Robina — Gossan Hill massive sulphide deposit, WA
SINCLAIR, Briony — Volcanic architecture, structure and mineralization of the Myra Falls VHMS deposit, British Columbia
VERBEETEN, Alicia — Petrology, geochemistry and tectonic setting of W Pacific island arcs
WINEFIELD, Peter — Carbonate diagenesis, McArthur Group, NT
WOLFE, Rohan — Dinki Di Porphyry Cu deposit, Philippines
WYMAN, Bill — Cambrian granite-related mineralization and alteration, W Tasmania

RECENTLY COMPLETED PhDs (1995/96)

- HARTONO, Udi** — Petrology and geochemistry of Lawu and Wilis volcanoes, E Java
HEIN, Kim — Structure and geochemistry of Au mineralization, Mt Todd, NT
HILL, Anthea — Geology, volcanology and ore genesis of the Thalanga massive sulphide deposit, Qld
KITTO, Paul — Structural and geochemical controls on mineralization, Renison, W Tasmania
KAMPERMAN, Marcel — Experimental petrology of diamond-bearing rocks and indicator minerals
LANYON, Ruth — The Balleny Plume and Australia-Antarctic Discordance: basalt geochemistry
MCARTHUR, Gary — Mineralogical and textural zonation of the Hellyer massive sulphide, W Tasmania
PWA, Aung — EPR and lithogeochemistry, Rosebery, W Tasmania
ROACH, Michael — Regional geophysical setting of Au mineralization, NE Tasmania
ROGERS, Jamie — Structure and basin development, southern McArthur Basin, NT
RUSSELL, David — Characterization of quartz and Au, Lefroy and Beaconsfield, N Tasmania
SIGURDSSON, Ingvar — Primitive magmas in convergent margins and intra-oceanic settings
SMITH, Stuart — Geology and mineralization, Warabarty Prospect, WA
TUNKS, Andrew — Structure and origin of gold mineralization, Tanami Mine, NT
WHITE, Matthew — Sedimentology, volcanology and structure, Tyndall Gp., W Tasmania

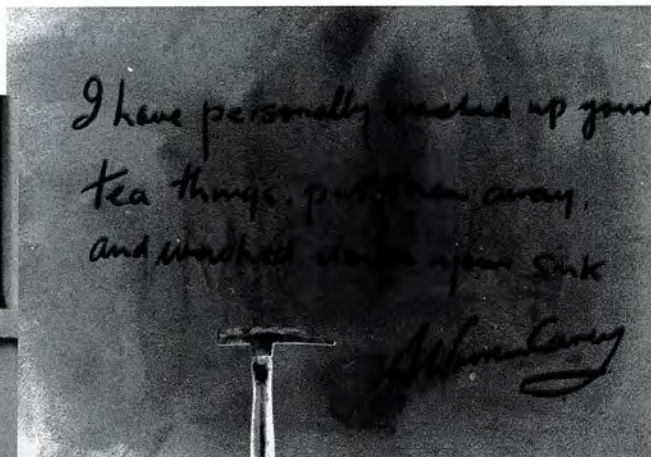
MSc STUDENTS

- CORBETT, Keith** — Sedimentology and tectonic implications, Owen Conglomerate, W Tasmania
RICE, Peter — Application of GIS to mineral exploration in western Tasmania



Memories

Joe Jennings, Alan Condon, Marjorie Robey, A A Opik, Alan Voisey, Sam Carey, George Thomas — Hobart 1956.



Lesley Read, Ian Ripper and USGS technician ponder the mysteries of the newly installed seismic station, 1962.



Back: Derry Scott, Alan Sprey, Ken Brill, Max Banks, Bruce Gulline.

Front: Henry Bartlett, Doris Ingram, Maureen Kellate, June James, Win Hawley, Jim Campbell in Front of Geology Department, 1953.



Doug Turner, Max Banks, Joan Elliston (nee Bashfield), John Bradley, John Elliston, Mary Purdon, Bruce Ellis, Edith Smith, Adrian Page.



Max Banks, Beryl Scott, Mrs. Skipworth, Prof. Carey, Mr. Skipworth, Edith Smith — King Island, 1950.

— 50 years & still expanding —

Updating The Photo Gallery

After ten years of inactivity, the photo gallery along the Geology Department's upper corridor has been updated (see below). All photographs have been mounted onto boards in various shades of blue, with Honours and Bachelor of Science graduates in class groups. The previously isolated larger format photos of Masters of Science, Doctors of Philosophy and Doctors of Science are grouped onto boards showing the sequential order of graduation. Visiting and Research fellows have also been included as Former Academic Staff in acknowledgement of the contribution of this Department to international research. With both Ross Large and Rick Varne joining S. Warren Carey and David Green as Professors, a new category for Professors of Geology is also displayed in the gallery.

Many past students and staff responded to requests for missing photographs, with only 5% remaining unavailable. These gaps have been filled with cartoons decrying their absence. An example is shown below. It is hoped that many of these may later be replaced by the appropriate happy smiling face. We are still missing photos from:

B.Sc. class of 1994 - Tim Hunt, Adrian Ferguson, Cecelia Abbott
 class of 1992 - Mark Wapstra, Geoffrey Tindall, Gavin Barr
 class of 1991 - Z. Steve Varga
 class of 1990 - Andrew Harvey, Ross Burdon
 class of 1984 - Nigel Ricketts
 class of 1983 - Paul Featherstone
 class of 1982 - Peter Lange
 class of 1974 - Gary Mulner
 class of 1971 - T. Stephen Rust
 class of 1970 - Gerald McCulloch, Ron Bugg
 class of 1968 - David Reeve, G. Anthony Rault, Anthony Luyendyk, Simon Houghton
 class of 1959 - Anthony Finney, William A. Brook
 class of 1958 - Graham Harrington
 class of 1956 - Peter Radel
 class of 1952 - Richard B. Bender
 class of 1951 - Hilton Shea
 class of 1950 - Henry A. Hudson

Honours:

1995 - Trent Woods
 1991 - Brendan Dower, Robert Gibson, Justin Haines, Fiona Hunt, David Jenkins, Dean Turnbull, Nigel Wilson
 1989 - John W. Hills
 1988 - Sven Rand
 1987 - Harry Horvath
 1986 - Luke Swift, Roger Mason, Andrej Blaha
 1980 - Patrick Creenaune

Masters of Science: 1990 - Douglas J. Jack

1988 - Terry C. Lees
 1957 - J.B.A. McKellar

Doctors of Philosophy:

1995 - David Russell
 1994 - Sjafra Dwipa
 1992 - M. Richard Wedekind
 1990 - Margaret Wallace
 1987 - Wolfgang Barth

Previous staff:

1987-1991 Greg Jenkins
 1989-1990 Robert Musgrave
 1988-1989 Mark Rattenbury
 1987-1988 Wolfgang Barth
 1986 Philippe Bertrand
 1985 Kurt Mengel
 1979-1981 Christopher Hatton
 1980 Jim Collinson
 1978-1980 Robert Duncan

Missing In Action

We would appreciate the loan of photographs of any of the above people, to be copied for the "Rogues Gallery".



Part of the newly updated and renovated "Rogues Gallery"



The Honours Program

As anyone who has been through it will testify, the honours year in the Geology Department at the University of Tasmania is one of the most intensive, stressful, but (hopefully) highly rewarding years that University students can undertake. The honours course currently runs over a period of 40 weeks, and assessment consists of an independent research thesis (60%), reading essay (25%) coursework (10%), and seminars (5%). Those familiar with the honours course will realise that the structure of the honours year has not changed much, with seminars the most recent addition to the assessment procedure in the early 1980's. The relative weighting of each component has changed with time. The most recent modification was in 1995, when more weight was given to the research thesis, as this is the most significant and time-consuming exercise that the honours students undertake.

Prior to 1990, only a few students had joined the Geology Department's honours programme from other Australian universities. With the advent of CODES in the late 1980's, combined with the generous Tasmanian Government Mining Scholarships provided by the Mines Department, there has been a marked increase in the number of interstate students enrolling in the honours programme. Up to one-third of the honours students in the 1990's (including some of our best recent graduates) have come from interstate and overseas universities. This has caused class sizes to increase, with approximately 20 students enrolled in honours in 1995 and 1996, and a similar number anticipated for 1997. In addition to attracting high calibre 'mainland' students, the department continues to produce excellent graduates from its own undergraduate programme. The winner of the 1995 University Medal for the top honours student in the University of Tasmania was Nick Direen, a home-grown product of the Geology Department.

Because of the large influx of interstate students into the honours programme in recent years, a new 8-day honours mapping course was introduced in 1994. This course runs in late January-early February each year, and has been highly successful in achieving its aims, which are to: (1) provide a solid introduction to Tasmanian geology for the interstate students, (2) 'refresh' the geological knowledge of the local students; (3) ensure that all honours students have a similar level of mapping skills prior to the start of individual mapping projects; and (4) give the local and interstate honours students, postgraduate students and staff members an opportunity to get to know each other in an informal setting. The bonus for the students is that the mapping camp allows them to complete half of their coursework requirements prior to the start of their research projects. In 1994, the camp was run on the north coast of Tasmania, between Goat Island and Sulfur Creek. Since 1995, the camp has been held in the Duck Creek area on the West Coast. Not for the faint-hearted, this area has nonetheless proved highly popular due to the challenging geology, superb exposures, and

spectacular setting, although the 4WD skills of some of the course leaders have raised a few eyebrows at times (mmmm - dangerous!). The trip has been led by a combination of staff and postgraduate students (David Cooke, Stuart Bull, Andrew Tunks, Paul Kitto, Jamie Rogers, David Selley and David Rawlings), and their enthusiasm and willingness to brave the elements at all times has helped to inspire the students to get out there and map, even during the foulest west coast weather!

Figure 1 illustrates the proportion of first class (H1: 80-100%), upper second (H2A: 70-79%), lower second (H2B: 60-69%) and third class (H3: 50-59%) honours degrees awarded in Geology at the University of Tasmania from 1990 to mid-1996. Over this time period, more H1 students have graduated than H2B and H3 students, with H2A students comprising the largest proportion of honours graduates.

A criticism levelled at the honours course in recent years by some of the older staff members is that standards are slipping, and that 'bracket creep' has resulted in more students getting first class results in the 1990's than in previous decades. The alternative explanation is that the calibre of graduates is continually improving, and as the department's reputation continues to grow, we are attracting more high-calibre students. To test which hypothesis is correct, I randomly selected one of the first-class honours theses from 1969, and subjected it to the same rigorous examination procedure that we put the current crop of theses through. The results (summarised in the attached examination form) clearly indicate that the second hypothesis is correct - like a good wine, the department and its honours graduates continues to improve with age!

David Cooke
(Honours Coordinator)

450M

**GEOLOGY DEPARTMENT
THESIS ASSESSMENT FORM**

Author: R.R. Large

Topic: The Bold Head adamellite contact aureole, King Island

Time spent: 7 hrs Chapter D or B Content EXCELLENT Presentation EXCELLENT

MAP
REFS - LIMITED SCOPE

COMMENTS: An adequate thesis marred by overuse of vague adverbs, time terms and anthropomorphisms. Obscure and/or incorrect terminology abounds (e.g. "tilloid", "ordinary light", etc.), and the student clearly has some basic misconceptions about geology (eg, marble, biotite hornfels, actinolite hornfels and spillites are not sediments, as the candidate mistakenly claims on p.59). The most disappointing aspect of the thesis is the mineralisation chapter, which at just over 2 pages is totally inadequate for a study of the world's largest tungsten mine. The student should consider a career in metamorphic petrology, as he shows some promise there. He clearly has no aptitude for economic geol.

Recommendation: IIB - Lower Second (60 - 69.9%) IIA - Upper Second (70 - 79.9%)
III - Third (50 - 59.9%) Fail (< 50%)

Assessor: David Cooke Mark: 67 %
Signed: David Cooke Date: 29/11/96

NB. - those awarded a high first (say 1 in 20) might be considered for the University Medal

The Honours Program (cont) 1996 Honours Students

Name	Research Thesis Topic
Bellamy, Ian	Geophysical characterisation of quartz reefs at Lefroy, Northern Tasmania
Boyd, Douglas	The origin and timing of silica alteration and gold mineralisation in the Mount Picton area
Cooper, Suzanne	Stratigraphy and sedimentology of part of the Lower McNamara Group, Kamarga Dome, Northern Queensland
Crook, Graham	Geological applications of remote sensing in Tasmania
Froud, Jason	Geology and mineralisation of the Goosewacker vein system, Paterson Province, Western Australia
Gadaloff, Craig	Cambrian copper-gold vein mineralisation in the East Darwin area, western Tasmania
Garner, Andrew	Coarse lithic breccias of the Gawler Range Volcanic Province: Source, emplacement and significance
Glover, Darren	Timing and style(s) of Pb-Zn mineralisation in Gordon Group carbonates, Zeehan
Heath, Richard	Geotechnical risk assessment of the Claremont-Berriedale area
Jackson, Michael	The genesis of auriferous quartz veins at Lynch Creek, Western Tasmania
Jaeger, Oliver	Stratigraphy, facies analysis and structure of the Tyndall Group East of Mt Lyell
Jones, Ben	The geology of the Kamarga Volcanics and Lower McNamara Group on the southern edge of Kamarga Dome, NW Qld.
Kunda, Greg	Regional gravity survey of the Tanami Mine area
Lawrence, Jeremy	Environmental geology of the Heemskirk area
Le Clerc, Margaret	Geophysical modelling of the Housatop Granite, NW Tasmania
Mawdesley, Ann	The origin of metal zonation in the Farrell mineral district, western Tasmania
Maynard, Ben	Aspects of the petroleum geology of the Palaeozoic of Northern Tasmania
McCarthy, Carol	Alteration associated with late (D4) brittle faults, Cannington, NW Queensland
Nitschke, Liam	Structure and gold mineralisation in the Defiance, Sirius and Britannia Pits at Victory Au-Mine Kambalda
Parish, Sharnie	Groundwater quality from the Henty tailings dam
Parry, Hayden	Structural history and the origin of Au mineralisation at the Beaconsfield Au mine, Northern Tasmania
Randall, Cheryl-Lee	Palynology and stratigraphy of the Lower Permian in Tasmania
Shelverton, Mark	Proterozoic Cu-Au in the Mt Isa Inlier - mineralisation and alteration of the Jimmy's Creek Prospect
Slater, Michael	Geology and geochemistry of Sn and base metal mineralisation in the Zeehan mineral district, western Tasmania
Teen, Michael	Silicification and base metal mineralisation within the Earahedy Basin, Western Australia

Dear Ross

Sorry I will not be able to make it. I have a prior commitment in China and Indonesia which I tried to get out of, but could not.

I wish I was going to be with you, it should be a very enjoyable time. My best wishes to all attending.

Incidentally, your Net page has been getting some attention here. I learned that someone had picked up my article from it and was circulating it here to beat the locals over the head. Codes also came in for a lot of favourable mention at a meeting here last weekend of key economic geologists from around Europe, trying to revive European economic geology. Codes has definitely become the yardstick by which others are judged (always unfavourably!).

Best regards
NOEL WHITE
London

"Volcanic Textures" into THIRD Print Run!!

Sales of "Volcanic Textures — a guide to the interpretation of textures in volcanic rocks" by Jocelyn McPhie, Rod Allen and Mark Doyle have continued at a steady rate for the past 12 months. The third print run was recently ordered to satisfy the continuing demand. The book is used for undergraduate courses in Canada and New Zealand (as well as Australia).

Volcanic Textures can be ordered directly from CODES (fax +61 3 62 267662, phone +61 3 62 262472) for \$A75 per copy (plus \$A9 for postage within Australia; \$A20 for overseas economy air postage). Students and bulk orders receive significant discounts!



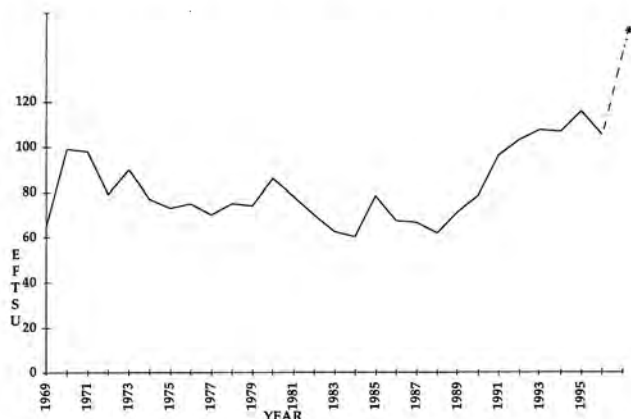
Undergraduate Student Numbers

The first boom

Student numbers in geology have fluctuated in the last 50 years. The big peak in undergraduate numbers coincided with the mineral boom of 1969-1971. During that boom even second year students were being offered jobs as geologists. The increase in student numbers was helped by two summer schools in January 1970 and 1971, which were hectic but enjoyable to teach. The large second year enrolment filled the laboratory to capacity in 1971 and 1972 and organising 70 students on east coast excursions was a logistic nightmare which Max Banks handled with his usual aplomb. There is little doubt that the 69-71 peak in enrolments was fuelled by the frenzy generated by the mineral boom.

How "scobes" saved Ron

Lower enrolments continued through the late seventies and eighties reaching a low point in the mid-eighties. By 1980 and with the prospect of losing valuable staff (i.e. Ron Berry) Dave Green introduced the telescoped course (soon to be known as 'scobes'). The scobes course involved science graduates with no geological knowledge, mainly from the mainland, doing 4 years of geology in two. Despite the horrendous workload, most scobes obtained good honour degrees and several have gone on to high profile positions in industry and academia. This increased our numbers just enough to retain Ron.



How Ron saved the department

By the mid-eighties we became worried at the viability of the department when first, second and third year numbers reached lows of 35, 11 and 5 respectively. The second year course had acquired a somewhat justified reputation as a horror course with a high failure rate mainly due to large slabs of crystallography and mineralogy and 'interesting' exam questions such as "Discuss the significance of amesite". A crisis committee consisting of the Head of Department (Rick Varne), myself and Ron Berry, was set up to save the department. After much soul searching by the committee, Ron came up with the brilliant idea to remove most of this unattractive material to third year, leaving second year as a basically 'soft rock' year. This strategy worked and second year numbers increased to an average of about 20 then to 30 and in 1997 we expect 40.

The second boom

Considerable effort was made by Jean McClenaghan to improve the first year course and with a smaller number of carefully chosen lecturers plus the responsibility for all first year excursions being given to the inspirational Dave Leaman, more first year students decided on geology as a career. This enrolment increase has continued through the nineties, again fueled by a steady growth in the minerals industry. The high profile of CODES helped in bringing in honours students from mainland universities. Provisional undergraduate numbers for 1997 show a doubling in enrolments and the highest EFTSU (=Equivalent Full Time Student Units) ever.

In 1998 we will be completely changing our courses. This has been driven by a university wide change in points value for courses, by a 1995 external review of the BSc degree and by financial cuts throughout the university sector. In late 1996 we have taken this opportunity to consider in detail the content of our main and optional courses. We have decreased the overall offerings by 9 credit units and moved material from the core courses to options and vice versa. Probably, this is the first time in fifty years that the department has its whole teaching program. The result, to be implemented in 1998, will, we hope, keep enrolments up but more significantly, lead to better educated geologists.

Happily, our anniversary motto "50 years and still expanding" applies also to undergraduate numbers and at a time when many departments are closing and retiring staff are not being replaced, our strong undergraduate numbers and high postgraduate/undergraduate ratio will help save us from the worst of the cuts being experienced elsewhere.

Clive Burrett

Professor Carey

.....Letting it all hang out!!!!

Can anyone date this photo



CODES short courses for geologists

CODES Key Centre at the University of Tasmania in Hobart offers a series of six short courses which run over a two-year period. These courses are designed to bring industry and government geologists up-to-date with recent advances in economic geology, ore deposit modelling and field mapping procedures, with special emphasis on applications to mineral exploration and mine geology. The volcanology course is totally field-based (New Zealand and western Tasmania), the tectonics course includes two field excursions, while all other courses consist of an intensive program of lectures, seminars and practicals, with emphasis placed on hands-on experience and group discussion. Course leaders are internationally-recognised experts in their field. Overseas geologists are encouraged to attend but it is essential that they have high level English language skills as all courses are very intensive. The courses are designed to be flexible and can be taken by the day or days, by the week or in their entirety.

Exploration Geochemistry and Hydrothermal Geochemistry

Week 1 covers recent developments in exploration geochemistry, with particular emphasis on the importance of the regolith, and the range of exploration techniques that are applied in arid, humid and temperate environments of Australia.

Week 2 provides an introduction to the chemistry of hydrothermal systems, including a review of the importance of metal solubilities and ore fluid chemistry in controlling types and locations of ore deposits. Applications of fluid inclusions and isotopes to ore genesis research and exploration models is covered. This course is particularly aimed at experienced exploration or mine geologists from industry and government.

Date: March 1997

Location: CODES, University of Tasmania

Cost: \$2000 for full course, \$1200 per week or \$250 per day

Exploration Geophysics, Remote Sensing and Image Processing

The course covers the principals of geophysical exploration and recent advances especially in magnetics, gravity and electrical techniques applied to the search for different types of ore deposits. The integration of regional geophysical surveys with remote sensing and image processing to improve geological interpretation is covered in detail. The application of GIS systems to mineral exploration will be evaluated. Hands-on practical experience with geophysical interpretation and GIS systems will be obtained. This course is designed for geologists or geophysics who wish to upgrade their knowledge of exploration geophysics.

Date: July 1997

Location: CODES, University of Tasmania

Cost: \$2000 for full course, \$1200 per week or \$250 per day

Economic, Management and Environmental Aspects of Exploration and Mining

The course includes an introduction to mineral economics, prospect evaluation, economic feasibility studies and requirements and preparation of environmental impact assessments. A session on ore reserve and ore resource estimations is included. Exploration philosophy, exploration management styles and the management factors contributing to exploration success are discussed and debated in a forum in which all students participate.

Date: November 1997

Location: CODES, University of Tasmania

Cost: \$2000 for full course or \$1200 per week or \$250 per day

Volcanology and Mineralisation in Volcanic Terrains

The course aims to cover current approaches to mapping, facies analysis and mineralisation in ancient and modern volcanic sequences. The course provides an introduction to the processes and products of different eruption styles, contrasts in scale and structure of volcanoes, identification of key volcanic facies associations, and interpretation of facies variations. In addition, the course covers mineralisation and alteration processes related to hydrothermal systems in subaerial and submarine volcanic terrains, and implications for mineral exploration. It is particularly suitable for government and/or industry geologists involved in mineral exploration in volcanic terrains.

Date: March 1998

Location: North Island of New Zealand (7-8 days), and western Tasmania (5 days)

Cost: \$1900 (NZ), \$1100 (W Tasmania) — not including airfares

Ore Deposit Studies and Exploration Models

The course covers all the major classes of ore deposits: volcanogenic massive sulphides, sediment-hosted Pb-Zn-Cu, carbonate-hosted Pb-Zn, Broken Hill type, Proterozoic Cu-Au, tin-tungsten, porphyry Cu, epithermal Au-Ag, Archean Au, nickel and PGE deposits. Important features of the deposits which relate to their genesis and exploration will be discussed, and exploration models will be presented for each style. It is particularly designed for economic geologists from industry, government or academia.

Date: July 1998

Location: CODES, University of Tasmania

Cost: \$2000 for full course or \$1200 per week or \$250 per day

Tectonics, Structure and Ore Deposits

A short course dealing with tectonic and structural controls on ore deposits is offered by CODES to geologists from industry and academia. The course will include field trips to northeastern (4 days) and western (5 days) Tasmania, and lecture and practical sessions which will examine structural techniques, and the broad tectonic setting and magmatism associated with ore deposits. The course will emphasize the application of structural techniques to geological problems relevant to exploration and mine geology. The relationship between modern tectonics, structure and ore deposits will be reviewed.

Date: November 1998

Location: NE and western Tasmania; and at CODES, University of Tasmania

Cost: \$250 per day

* costs (in Aust \$) as at December 1996

Enquiries should be directed to:

Ms Christine Higgins	Phone:	03 62 262475
Administrative Officer	International	61 03 62 262475
	Fax:	03 62 267662
	International	61 03 62 267662

CODES Key Centre
University of Tasmania
GPO Box 252-79
Hobart, Tasmania
Australia 7001

The Tasmania Seismic Network

The Tasmania Seismic Net is now 38 years old. From very humble beginnings in 1958, with just one station situated in the old vaults of Fort Nelson in Hobart, it has grown to the present 12 station network comprising 8 telemetered stations, 3 three-component digital event recorders (KELUNJIs) and an international IRIS/IDA broadband seismograph.

The eight channel Tasmania Seismic Net was the first telemetered seismic network in the world and largely the result of efforts by Professor S.W. Carey, who wanted to ascertain the seismicity of Tasmania. From its inception till today it has been strongly supported both financially and technically by the Hydro-Electric Corporation (HEC) of Tasmania. It is also assisted financially by the Australian Geological Survey Organisation (AGSO). The State Government and the Mines Department have also at various times in the past contributed financially to the net.



Rick Varne, Vagn Jensen, Prof. Carey, Chris Winther and June Pongratz mourn the closing of TAU WWSSS: 1962-1994

In April/May 1962 the United States Coast and Geodetic Survey established a station of the World Wide Network of Standardised Seismographs at the University of Tasmania. The six seismometers were situated at the newly built seismic vault at Bend 5, Mt. Nelson and the galvanometers and photographic recording drums installed in the basement of the still unfinished Geology/Geography building. The signals from the seismometers were sent from the vault to the Geology Dept. via an overhead cable strung from tree to tree down the hill to just above Churchill Avenue, from where it ran underground via the Engineering Dept. to Geology.

This cable proved very vulnerable to fires and lightning strikes. The 1967 fires badly damaged the cable and it had to be replaced a few years later. The actual replacement of the cable commercially was far beyond the budget of the seismic net, so John Shirley organised a free barbecue and beers for all the geophysics students and their friends provided they would help carry the cable down the hill through the bush. This proved quite a task. The cable weighed several tonnes. However both the barbecue and the cable hauling were very successful and communications were eventually reestablished.

But alas, in February 1995 another fire raged up the bush around the vault and this time all the trees that carried the communications cable were burned out too. It was decided to cut our losses and install a microwave link between the vault and the Geology Dept. Insurance money from the loss of the old cable together with a contribution from the Mines Department paid for most of this new installation, which has been running successfully since late 1995. In December 1996 a second microwave link was installed to provide communications lines between the HEC and the Geology Department via the TAU vault site where a 12 m mast carries the microwave repeaters (these can provide 30 data channels) together with a phased array of aerials for the Moorlands UHF transmissions.

The link to the HEC will provide greatly improved data lines, via its new statewide digital microwave network, from each of our 8 telemetered stations. We envisage upgrading at least some of these from single component into three component digitised seismographs after this data link is commissioned.

The WWSSS station was replaced in 1994 with the next generation of seismographs in the newly established IRIS/IDA global seismic network. The station consists of three wideband seismometers, a 24 bit digitising circuit, a GPS receiver, for accurate timing, together with local DAT tape recording facilities and a SUN computer accumulating data and transferring this via Internet to San Diego, California, every few minutes.

The December 1989 Newcastle earthquake was a catalyst for provision of Commonwealth funding for the Joint Urban Monitoring Network of seismographs covering major population centres. Two of these event recorders are operating in Launceston with a third to be installed just south of Gladstone. This latter station will monitor the West Tasman Sea earthquake zone. Events recorded by these three stations are downloaded via telephone lines and modems at regular intervals.

It is envisaged that within year or two the Tasmania Seismic Net will be fully upgraded to conform to the standards now expected of modern seismograph networks throughout the world.

Some statistics: until a copy was made by ANU several years ago, the seismic drum in the foyer of the Geology Department was the largest seismic drum recorder in the world. The drum was manufactured by the HEC at their Moonah workshops.

In 34 years the seismic drum has used over 48 km of tracing paper and produced more than 12,000 records. These records contain over 33,000 km of ink traces! (Poor June!).

The Tasmania Seismic Net database contains more than 2,000 local events recorded since 1958.

People who have been involved with the seismic net over the last 34 years: Hazel Baynes, Keith Bradshaw, Prof. S.W. Carey, Chris Dampney, Ron Green, Lesley Read (now Hodgson), Jock Howard, Vagn Jensen, Leonie Jones, David Leaman, Roger Lewis, Frank Ludbey, Mr Nakamura, Prof. Gordon Newstead, John Palmer, Dudley Parkinson, June Pongratz, Robert Richardson, Ian Ripper, John Shirley, Rob Underwood, Paul Waller, Peter Watt, Arthur Wherrett.

Mark At WORK??

Mark Duffett (Ph.D. student) at work on his project "Regional setting of north Australian Stratiform Sediment-Hosted Base Metal Mineralisation from Geophysics and GIS"

This project is attempting to elucidate regional three-dimensional geologic controls on the metallogeny of SSHBM deposits such as HYC, Century and Lady Loretta. Forward models of gravity and magnetic data are the primary source of 3-D structural information in a geographic information system constructed for the metallogenic study.



Volcanology Short Courses Prove Very Popular

Continuing professional education is a fact of life for industry and academic geologists, and many choose to participate in short courses in order to keep up-to-date with the latest advances or to refresh their knowledge base. Demand for courses in volcanology has increased substantially in the past few years. CODES offers a two-week totally field-based course, run both in New Zealand and western Tasmania and taught mainly by Drs Jocelyn McPhie and Rod Allen. The course provides an introduction to physical volcanology and to the volcanic settings of important ore deposit types (especially massive sulfide epithermal deposits). The next course is scheduled for March 1998.

Monash University offers a one-week course on modern and ancient volcanic successions, that is a combination of lectures and field work. This course is taught by Professor Ray Cas (Monash University), Dr Jocelyn McPhie (CODES) and Professor Stephen Self (University of Hawaii).

Jocelyn McPhie and Ray Cas have also teamed up to conduct "in house" volcanology short courses, for example, for AGSO (May 1996) and for the University of Ljubljana, Slovenia (September, 1996). The latter course grew out of links between CODES and the University of Ljubljana established with the visit of Uros Herlec to CODES during 1995. This course involved lectures in Ljubljana followed by field work on active volcanoes in Italy. The McPhie-Cas team have been booked to perform in Western Australia and Croatia(!) in 1997.

Masters Degrees and Short Courses for Industry

Our Master of Economic Geology course is now very highly regarded throughout Australia and overseas with strong enrolments from industry, universities and government departments. Now entering our 8th year, we're proud to report we have had a record number of enrolments in 1996. Our course lecturers include industry, CSIRO, AGSO and academic specialists and course content is constantly reviewed and updated to keep it at the forefront of current geological trends and relevant to the needs of the exploration and mining industries. So far we've graduated 25 Master of Economic Geology students over the seven years. We currently have 21 enrolled in the Master of Economic Geology and 5 in the MSc in Exploration Geoscience. The course is becoming known by overseas students with one already graduated, one currently enrolled and the probability of another two next year.

Master of Economic Geology

- For geoscientists who want to gain a thorough up-date on advances across the spectrum of economic geology applied to mineral exploration, combined with a minor research study
- Specifically designed for industry geologists who remain employed whilst completing their degree
- Entry qualifications - BSc (Hons) or BSc with at least two years industry experience
- 60% coursework (3 x 2 week units per year)
- 40% minor research thesis
- Duration of course is 2 - 2 1/2 years
- Most students are either fully or partially supported by industry with benefits to a sponsoring company being:
 - Thesis and in-depth study on a company project/prospect
 - CODES six industry short courses free (approximate value of \$12,000)



Mt Edgecombe, N.Z.

Enquiries should be directed to Dr Jocelyn McPhie (e-mail j.mcphie@geol.utas.edu.au) or Professor Ray Cas, Earth Science, Monash University (e-mail rcas@artemis.earth.monash.edu.au)

- Access to CODES high-quality short course manuals
- Interaction with other industry geologists
- HECS taxes apply

MSc in Exploration Geoscience

- For geoscientists who wish to select certain fields of economic geology for detailed study combined with an in-depth research thesis topic
- 30% coursework (choose 3 units from the 6 offered in M. Econ. Geol)
- 70% major research thesis
- Duration of course is 1-2 years
- Most students are either fully or partially supported by industry (see above)
- HECS taxes do not apply

Short Courses for Industry

The coursework units of the two masters degrees are also offered individually as fee-paying short courses for industry. Each two-week unit is taught either at CODES or in the field in Tasmania or New Zealand. The courses are updated and repeated every two years. Current registrations range from 10 to 100 per course. The field-based courses have strictly limited numbers so please enrol early if you wish to attend. To be added to our short course mailing list, please complete the form and return to CODES.

For more information please contact Christine Higgins or Ross Large: phone 03 62 262472 or fax 03 62 267662.

Belting through the Belt Basin or Sleepless in Montana

Stuart Bull and Peter McGoldrick flew out of a wintery Hobart on the 2nd September and arrived in a rainy Vancouver on the same day twenty six hours later! The flight marked the start of a whirlwind journey through the Mesoproterozoic Belt Basin of Canada and the USA. The bed and breakfast lodgings in Gastown turned out to be a late night live music venue, not the ideal therapy for jet lag. Forty eight hours later, after a few strong coffees and a day of presentations at Cominco Canada's office we flew out of Vancouver to Cranbrook, a small mining and timber (lumber in North American parlance) producing centre in the Rocky Mountains in eastern British Columbia.

Cranbrook is twenty minutes drive from the Sullivan mine. The Sullivan, is one of the world's great base metal orebodies, and contained more than 200 million tonnes of massive and banded zinc-lead-silver ore. It is nearing the end of its life, with mining due to cease early next century. Unlike the northern Australian 'Carpenterian Zinc Belt', which has several giant stratiform zinc-lead deposits, no other deposits of comparable size are known from the Belt Basin.

Our hosts at Cranbrook were Kootenay Exploration geologists, Doug Anderson and Paul Ransom. After a visit to the mine, the tour continued for a couple of days around Cranbrook and Kimberley and then south across the Canadian border into Idaho and Montana. A few miles into Idaho we had the first of three ursine experiences when a black bear ran out in front of our truck. Jim Finch, a Cominco USA geologist, our driver and guide, hit the brakes. But the bear was clipped by the truck, knocked flying into the scrub, and (probably lucky for us) never seen again. Jim claims to have run over many types of animals during eighteen years of field work in the Belt Basin, but this was his first bear! Stuart and I felt very privileged indeed.

The next day the trip took a turn north through Glacier National Park in western Montana near the Canadian border. Lots of tourists, spectacular scenery, excellent exposures of upper Belt rocks, and yet another bear. This time a grizzly being chased by rangers with guns, much to the consternation of dozens of nearby tourists.

That afternoon we continued east out of the Rocky Mountains and into "Big Sky Country" in western Montana, home of the Marlborough man, and *Maia*saurus. Late that night we arrived at our destination, White Sulphur Springs (population 480), Meagher County to rendezvous with Garry Davidson, and Cam Allen and Gerry Zieg from Cominco USA for a late night soak in the thermal pools. Meagher County is reminder of an interesting historical link between Tasmania and Montana. Thomas Meagher was an Irish separatist exiled with six others to VanDieman's Land in 1848, from whence he fled after four years, never to return to Ireland, but to ultimately become acting

Governor of Montana in the 'wild west' of the 1860s.

The geological part of the trip for the next two days involved a stratigraphic tour of the lower Belt sediments and copper/cobalt mineralisation known as the Sheep Creek (pronounced 'ship crikk' by the locals) deposit. This part of the trip was led by Gerry Zieg, a Cominco geologist born and bred in White Sulphur Springs. Gerry was so keen to show us his part of the world that we did the last stop of his tour in the dark.

By this time we were beginning to realise that when it comes to food America is the land of weak coffee, big pieces of meat, and multiple choice questions e.g. if you order a steak you will be asked if you want 8oz, 12 oz or 16 oz; a response of "rare 8 oz please" will elicit further questioning as follows: salad or vegetables?; responding salad the questions continue: French, Italian, vinaigrette, or blue cheese dressing etc?

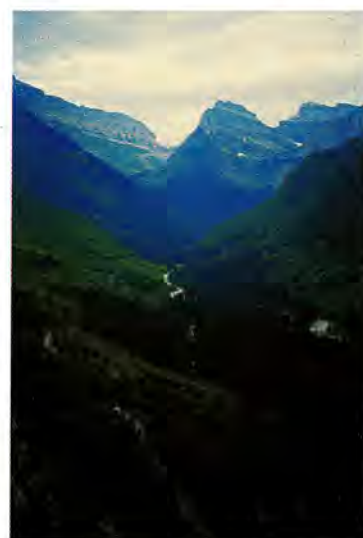
After two nights in White Sulphur Springs we drove south and west back into Idaho to stay two nights in the town of Salmon. Salmon is a popular tourist and fishing resort, and the starting point for a seven day river rafting trip through one of the largest remaining wilderness areas in the continental US. The next day we drove (in an enormous 4WD station wagon known as a Chevrolet Suburban) into the Beaverhead Range to visit stratabound copper/cobalt mineralisation in the Yellowjacket Formation. Stuart's abilities as a bear magnet were confirmed when another black bear was spotted shortly after lunch. Our guide, Kathy Turek, had never seen a bear in seven years of field work in this area! The days activities concluded with excellent dinner of elk and grouse, washed down with too much beer and tequila.

The next day our whole party visited the less accessible Lemhi Ranges. This trip was helicopter supported, and allowed spectacular views of the Lemhi and Beaverhead Ranges, which are plateaus, capped by Tertiary volcanics and sediments, dissected by the Salmon River and its tributaries. Stuart and I left the rest of the group at lunchtime to ferry Jim's truck the 300 miles from Salmon to Spokane in Washington, where we would rendezvous with the others who returned in the helicopter (dodging thunderstorms along the way).

Stuart and I had no major dramas with our first North American driving experience aside from a minor coffee spill and occasionally triggering the BPI (Bull proximity indicator) when passing trucks on interstate 80. By nightfall we had arrived in Wallace, Idaho, in the heart of Coeur D'Alene mining district — an area straddling the Montana - Idaho border of only about 500 km². Over 600 million ounces of silver have been extracted from structurally controlled veins in middle Belt Supergroup clastic sediments.

Thursday morning involved a 4.30 am start for an underground visit to one of the Coeur D'Alene deposits, the Lucky Friday mine, with our guides Randy and Andy (Andy Buddington from Cominco, and Randy Anderson from the Hecla Mining Company). After lunch, we made the short trip to Spokane to do some laundry, catch up on some sleep, and prepare for the the following days de-briefing and presentations. Stuart and I departed Spokane early on Sunday and went separate ways back to Australia, but that's another story.

Spectacular North American scenery



Glacier National Park

