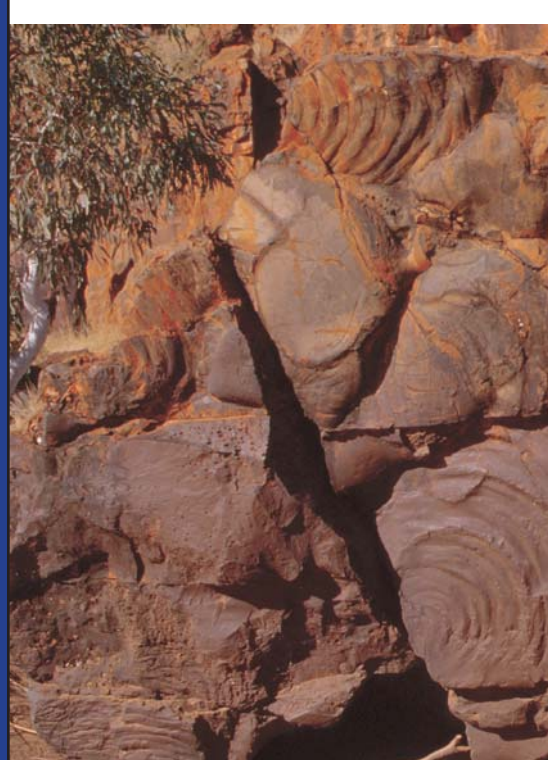


WAG

West Australian Geologist

Number 476 — April/May 09

*Bi-monthly newsletter of the Western Australian Division of the
Geological Society of Australia Inc.*



*Photo: Pahoehoe lava flow,
Fortescue group. Photo courtesy
of Tim Blake.*

CALENDAR OF MONTHLY TALKS

Wednesday 1st April, 2009

**W.A. Division Annual General Meeting
followed by
Genesis Modelling for the Hamersley BIF-
Hosted Iron Ores**

Dr Richard Morris
CSIRO

Wednesday 6th May, 2009

Space 2020: To the Moon and Beyond

Dr Brent McInnes
CSIRO

**Meetings commence 5:30 pm, Irish Club of
WA (Inc), 61 Townshend Rd, Subiaco (see in-
side for map)**

IN THIS ISSUE

- Australia's involvement in scientific ocean drilling
- Annual reports and financial statements
- Honorary doctorate for Jim Ross
- Jarrah forest restoration
- Annual Dinner invitation

FUTURE EVENTS

3 June 2009: Monthly talk by Graham Begg on Lithosphere evolution, geodynamics and metallogeny.

1 July 2009: Monthly talk by Rob Hough entitled "Revealing the hidden gold distribution in regolith and hypogene samples"

This issue of WAG is kindly sponsored by:

SNOWDEN

Editorial

This is my last edition as editor of WAG. Over the past two years I have tried to keep the membership informed of new arrivals, both people and equipment, in the geology departments at our two universities. While CSIRO and GSWA, and some centres within the universities, e.g. the Centre for Exploration Targeting, have their own newsletters the doings of other researchers are less well known to the profession and I have tried to remedy that. I have also tried to keep readers informed about scientific breakthroughs based on Western Australian rocks, as well as the history of geology in the state through John Glover's excellent articles. I hope you have enjoyed some of these items, or found them informative.

The WA Division's Annual General Meeting and election of office bearers for 2009-10 will be held on April 1st. We could do with some new blood on the committee, particularly from UWA, as some members are standing down and we need time to groom future office bearers, so please consider either nominating, or being nominated, for a place on the committee.

The AGM will be followed by a presentation by Richard Morris on Genesis Modelling for the Hamersley BIF-hosted Iron Ores, evaluating supergene models and more recently proposed hypogene origins. In May, Brent McInnes will give us an insight in to Space 2020: to the Moon and Beyond.

This year, the 56th Annual Dinner and Awards Presentation will be held on Friday May 8, at the East Fremantle Yacht Club. The menu and booking form are on pages 11-12, so complete the form and return it before Friday, 24 April, to reserve your place.

Best wishes

Janet Muhling

Please note copy for the next issue (June/July) of the *West Australian Geologist* closes May 5th



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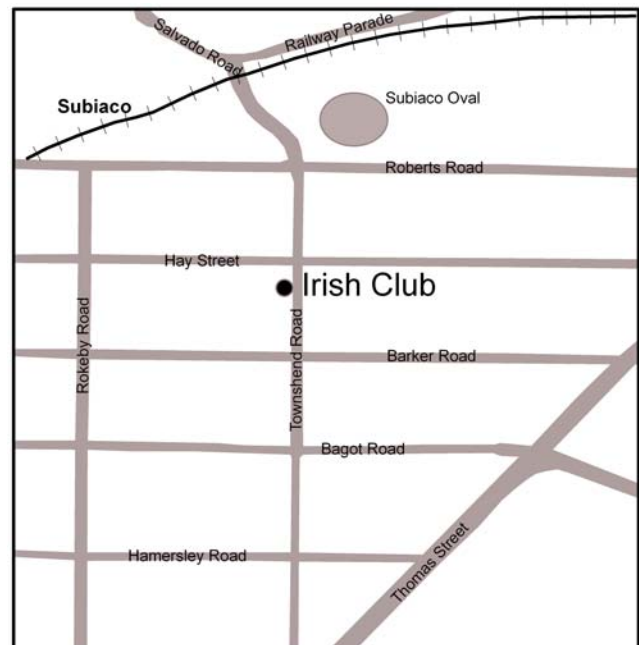
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See WAG in colour on the Web: <http://www.wa.gsa.org.au>

Timing and venue of talks

Meetings are usually held on the first Wednesday of the month at 5:30 pm at the Irish Club of WA (Inc.), 61 Townshend Road, Subiaco, between Hay Street and Churchill Avenue. This is the same venue as used for AIG meetings, but for those who are not familiar with it, the location is shown on the mud map below..



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APRIL ABSTRACT

GENESIS MODELLING FOR THE HAMERSLEY BIF-HOSTED IRON ORES

by R C Morris

CSIRO Honorary Research Fellow
richard.morris@csiro.au

CSIRO-AMIRA research (1976-1994) on BIF-hosted ores classified two major ore types, the dominant, “supergene” martite-goethite (M-G) ores (ca Mesozoic), and the premium martite-microplaty hematite (M-mpH) ores (~2000 Ma) and their sub-types. Both ore types have their counterparts around the world, but the supergene M-G ores are not common outside the Hamersleys.

The CSIRO research suggested the younger ores were electrochemically-formed, deep-seated (below normal atmospheric access) supergene-driven deposits. BIF magnetite was oxidised largely to hematite (and kenomagnetite) as martite pseudomorphs, and the matrix minerals were pseudomorphed in part by goethite, superbly preserving the BIF microtextures, and were in part leached by groundwater, resulting in

stratigraphic thinning. These ores are not lateritic. Burial metamorphism of similar “supergene” ore deposits in the Proterozoic converted the matrix goethite in part to microplaty hematite. Residual goethite was later leached from these ores following exposure, leaving the typical premium mainly goethite-free martite-microplaty hematite ores of Tom Price and Whaleback, whereas residual goethite is common in the less eroded Paraborndoo ores.

This model was generally accepted for nearly two decades from 1980. However, new hypogene modelling from the University of WA (1999) and Rio Tinto Mining (2001), based on data from unweathered metasomatic residuals in two areas of the Tom Price deposits has become popular since 1999, forming a basis for a wide variety of international models. There are major problems in the chemistry, redox mechanisms, and heat/fluid sources for of all these hydrothermal models.

More recent hydrothermal modelling for the North Deposit at Tom Price (2004) followed a suggestion that a non-redox reaction in which magnetite was leached of its ferrous content by acid solutions, forming hematite, would not require a meteoric oxidation stage. The model argued that (acid) hydrothermal brines from the underlying dolomite leached ferrous iron from the magnetite, simultaneously removing the silica matrix and precipitating microplaty hematite from the released ferrous iron. This modelling introduced further difficulties in that the precipitation of microplaty hematite from ferrous iron requires a redox reaction.

In no published case has textural data from “metasomatic” zones associated with the deposits been matched to the textural features of the typical martite-microplaty hematite ore bodies themselves. Objective evidence shows the Tom Price metasomatism is a post-ore phenomenon and that no evidence of such metasomatism has been found in deposits such as Whaleback and Paraborndoo.

Note: A PDF text version of this talk is available from the author.

R.C. Morris has a BSc in geology (WA 1959) and a PhD in iron ore (WA 1985). He joined CSIRO in 1976 as a petrologist to work on an AMIRA program (1976-1994) on iron ore, retired in 1996, and has been a CSIRO Honorary Research Fellow since then. He was awarded the Gibb Maitland Medal in 1989 and the Stillwell Award in 2008 for his research.

PLEASE NOTE: The W.A. Division’s Annual General Meeting will be held (very briefly) before the talk.

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MAY ABSTRACT

SPACE 2020: TO THE MOON AND BEYOND

by Brent McInnes

CSIRO Exploration and Mining

NASA plans to return to the Moon by 2020 with a new generation of rockets, cargo ships and lunar rovers in order to establish an international lunar base by 2025, as a proving ground for an eventual manned mission to Mars. Unlike the Apollo Program where astronauts spent a couple of days in the sun-bathed equatorial regions on the face of the Moon, the Constellation Program will establish a permanently manned outpost at the Moon's south polar region. The deciding factor in the location of the lunar base will be the availability of two resources of critical importance in supporting life: solar energy and extractable water. Dr McInnes will speak on NASA's plans to return to the Moon, the next generation of technologies being developed for the Constellation Program, the new discoveries that await Constellation astronauts as well as the problems they face, and the opportunities for Australia in this new era of international space exploration.

Brent McInnes is a Chief Research Scientist at CSIRO Exploration & Mining in Perth. He was a recipient of the 2007 Fulbright Professional Business/Industry Award that supported a 3 month Fellowship at NASA's Goddard Space Flight Center in Maryland, where he investigated opportunities for collaboration between CSIRO, NASA and affiliated US institutions on the potential development and application of robotic/analytical geochemical platforms in terrestrial and planetary exploration.

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AUSTRALIA'S INVOLVEMENT IN SCIENTIFIC OCEAN DRILLING

from Neville Exon

Visiting Fellow, Australian National University

Neville.Exon@anu.edu.au

In January 2008, Australia joined the Integrated Ocean Drilling Program (www.iodp.org), which is the world's largest multinational geoscience program and includes almost all OECD countries. IODP carries out deep scientific coring in all the world's oceans using a variety of platforms, and provides 'ground truthing' of global geoscientific theories that are often developed largely on the basis of remote sensing techniques. New technologies and concepts in geoscience are continuously being developed through IODP. It is a long-term program and IODP membership will have important scientific outcomes for us.

The Australian IODP Office is at ANU, with Neville Exon as Program Scientist, and Sarah Howgego as the IODP administrator. The office is now well established and a web page has been set up (www.iodp.org.au). The Australian IODP members are fourteen universities and three government agencies, and the bulk of our funding comes from the Australian Research Council. Scientists from all member organizations can work on coring proposals designed to solve global geoscience problems or questions related to deeply buried extremophile microbes, can apply for shipboard or shore-based positions, and may get involved in various national and international research committees.

IODP Research Areas

The key research areas are spelt out in IODP's 'Initial Science Plan' (www.iodp.org/isp) and are:

- Deep biosphere and ocean floor. This research area deals with 'extremophile' microbes which live below the seafloor and could be of industrial importance, and also with gas hydrates that are a huge potential energy resource and have been shown to trigger bursts of global warming in the past.
- Environmental changes, processes and effects. This research area covers rapid climate change and extreme climates, climatic cycles, and evolution of oceanic currents and boundaries. Ocean drilling has been and will be a key to understanding past climate change on all time scales and at many locations, and hence in helping predict future climate changes.
- Solid earth cycles and geodynamics. This research area deals with continental breakup and sedimentary basin formation, which are especially

important in petroleum exploration; large igneous provinces; drilling to the Earth's mantle; and understanding earthquakes and the generation of tsunamis (important to Western Australia in the context of Indonesian tsunamis).

IODP's coring platforms

IODP's array of drilling vessels (<http://www.iodp.org>) is capable of taking continuous cores of sediments and rocks in almost all our marine environments, and up to 5 kilometres below the seafloor. The primary tools are dynamically positioned Japanese and American coring vessels, with the European Union chartering coring platforms to drill where the primary vessels are not suitable. The Japanese vessel *Chikyu* is capable of riser drilling in 2500 m water depth, with 10,000 m of drill string. The riser-less American vessel *JOIDES Resolution* is capable of drilling in water depths of 6000 m and several kilometres beneath the sea floor.

Neither vessel is completely funded, so both are seeking commercial work. Perhaps an industry grouping might consider using one of them to drill a stratigraphic hole in an Australian frontier area where little is known of the basic sequences - the Lord Howe Rise springs to mind. Some time for potential work in the Australian region by *JOIDES Resolution* is available in early 2010 after drilling off Wilkes Land.

Australia's involvement

Australia became an associate member of IODP in January 2008 and New Zealand has joined us in the ANZIC Consortium as a smaller member. ANZIC has access to positions on three *Chikyu* and three *JOIDES Resolution* expeditions per year, and one alternative platform position. New Zealand is entitled to one of the *Chikyu* or *JOIDES Resolution* positions per year. ANZIC is also entitled to several voting and non-voting positions in IODP committees.

There will be a number of IODP expeditions in the Pacific Ocean in mid 2009, and ANZIC expects six shipboard positions (five of them Australians, of whom three have already been accepted). In late 2009, there will be three Australians involved in a coring study of post-glacial sea level rise off Eastern Australia. There are two Australians aboard a Neogene sea level expedition in the Canterbury Basin in late 2009, and one Australian and one New Zealander aboard a Cenozoic glacial to post-glacial climate history expedition to Wilkes Land off Antarctica in early 2010.

Western Australian involvement

There are several proposals before IODP which are in the western Australian region. Proposal 667, entitled "*North West Shelf Australia: the next step in the*

global approach to understanding the role of eustacy in the generation and preservation of stratigraphy", is highly ranked. A university group in Austin, Texas, led by Craig Fulthorpe, is working on the huge Woodside 3D seismic data oceanward of the Rankin Platform to pick the best drilling sites.

Chris Yeats, Chairman of the WA Division of the Geological Society and CSIRO hydrothermal systems' expert, is a member of our Governing Council. There are two members of our Science Committee based in Western Australia: Lindsay Collins, sedimentologist and petroleum geologist at Curtin University; and Mary Gee, petrologist and specialist in basaltic magmatism at the University of Western Australia. Lindsay Collins is organizing a meeting of the Consortium of Ocean Geosciences (COGS) in Perth from 5 to 7 July, and ideas for new IODP proposals will be discussed at that meeting. Contact Lindsay if you would like to be involved.

Conclusions

There are exciting opportunities for Australian scientists from our member organizations to become involved in IODP research expeditions in our region and beyond. We encourage you to become involved in developing proposals for drilling legs, and in applying to participate in drilling legs as shipboard or shore-based investigators (see www.iodp.org). Three expeditions are already scheduled for our region starting late this year. Background information is available through the IODP home page (www.iodp.org), but applications for shipboard or laboratory involvement should be made through the Australian IODP Office at ANU (www.iodp.org.au). Don't hesitate to contact me with any questions. If you send me your email address, I'll add you to our mailing list so that you will be automatically informed of opportunities as they arise. There are also extensive under-utilized resources available through IODP itself (www.iodp.tamu.edu/curation/repositories.html), which normally have only a one-year moratorium on them. The vast repositories of existing ODP and DSDP cores can be accessed by any *bona fide* researchers (<http://www-odp.tamu.edu> and <http://www.odplegacy.org>).

HONORARY DOCTORATE FOR JIM ROSS FROM CURTIN UNIVERSITY

Curtin University of Technology has awarded leading WA geoscientist Dr Jim Ross with an Honorary Doctorate of Science. Curtin Vice-Chancellor, Professor Jeanette Hackett, said Dr Ross had been recognised for his untiring advocacy for geoscience research and teaching.

"Dr Ross has also had a distinguished career in the exploration and mining industry and he embodies the University's commitment to excellence across education, research and industry. He is renowned for his groundbreaking research on the origin and geology of the Kambalda nickel deposits, he played a significant role in WMC Resources' success through his technical leadership, and he has contributed to innovations in exploration and mining in India, Ecuador, Spain and Tanzania."

"Dr Ross has made a huge contribution to geoscience by committing his broad experience to policy and planning issues for a wide range of organisations in exploration, mining, research and education. Since 1980, he has served on committees and advisory councils for the Geological Society, the WA Chamber of Mines, State Government (Science Industry and Technology Council), CSIRO, Geoscience Australia, the Australian National University, The University of WA and Curtin."

Professor Hackett said Dr Ross had given exceptional service to Curtin in his role as Chairman of the John de Laeter Centre of Excellence in Mass Spectrometry and Earth Science WA.

"He was the Inaugural Chairman of the Board of the John de Laeter Centre of Excellence in Mass Spectrometry at Curtin and still fills this important role with distinction," she said. "Dr Ross has played an integral role in the on-going success of the Centre, and he has had active involvement in the acquisition of equipment, the recruitment of staff, and interaction with the State Government funding agencies."

Dr Ross, of Jolimont, has been the driving force in the establishment and direction of Earth Science WA, a consortium involving Curtin, UWA, CSIRO, GSWA and the WA Museum. He has helped raise more than \$1.25 million to resource the initiative, which is successfully reinvigorating geoscience teaching in secondary schools.

"Dr Ross is a remarkable individual of the highest integrity who has made an outstanding commitment to tertiary education and the geosciences, and we're very proud to be able to recognise him with this Honorary Doctorate," Professor Hackett said.

CHAIRMAN'S REPORT 2008-2009

Chris Yeats

*Chairman, Geological Society of Australia
Western Australia Division*

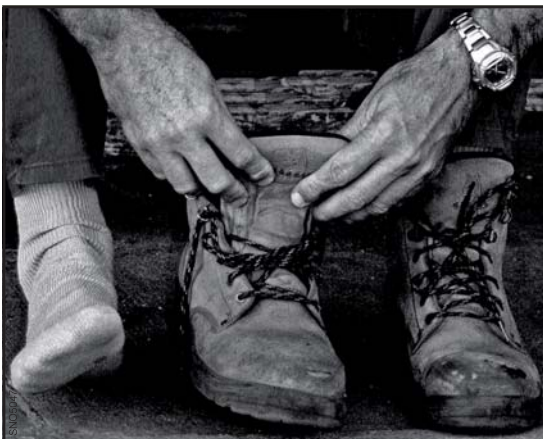
As generally happens every two years, the 2009 Annual General Meeting will mark a changing of the guard in the Committee of the Division, with the majority of those currently filling Executive roles not seeking re-election. I would like to take this opportunity to thank my Vice-Chair, Marcus Willson, Secretary, Catherine Spaggiari, Treasurer, Website Manager and West Australian Geologist (WAG) Business Manager, Peter Haines, and WAG Editor, Janet Muhling, for their tireless work on behalf of the Division over the past two years. It has been both a pleasure and a privilege to work with these dedicated people, and indeed all of the Committee (see Table 1). Their effort on behalf of the members of the Division has made the role of Divisional Chair much less onerous than it may otherwise have been. Although most of the current members will remain active for the coming year, increasing work and other commitments mean that Marcus will resign from the Committee at the AGM, after 4 years service. His input will be sorely missed. In addition, the role of Convenor of the Education and Vocation Subcommittee has remained vacant for 12 months. Although, as you'll see below, I do not believe that the Division has failed to engage in this area over the past year, I would hope that the position can be filled for 2009-2010. Despite adding a handful of new members for the coming year, we remain a very streamlined group and, as I did last year, I would urge anyone entertaining the possibility of joining the Committee to just take the plunge and do it.

The Division's bimonthly newsletter, the West Australian Geologist (WAG) remains the principal means of communication with our membership, although this is supplemented by regular emails

to those members who have provided email addresses. The WAG is clearly the highest quality GSA Divisional newsletter by a significant margin, providing what we believe is a good balance between information on upcoming meetings, articles and advertising. In addition to the black and white hard copy that is mailed to members, a full colour digital version of WAG is provided in PDF format for download from our Divisional website (<http://www.wa.gsa.org.au>), with most editions available electronically a few days before members receive their hard copies. As a result of a small downturn in the number of advertisers, coupled with an unanticipated slight increase in printing and postage costs, the WAG returned a small net loss of \$935 in 2008, following on from surpluses for the preceding two years. Despite this small loss, overall the Division recorded net surplus of \$2,430 in 2008, testament both to the oversight of our Treasurer Peter and the accounting skills of Jocelyn Thomson, who once again has handled our accounts this year.

The Committee has worked hard to maintain a varied program of monthly meetings (Table 2) with talks by a mix of speakers from academia, government, and industry covering a diverse range of topics including geochronology, geothermal energy, petroleum exploration, plate tectonics and of course economic geology. Details of the talks, including abstracts, are available on our Divisional Website, which has an archive of talk abstracts stretching back to August 2004. In addition to our regular monthly meetings, the Division sponsored refreshments at a seminar given by the SEG Distinguished Lecturer for 2008, Cornel de Ronde entitled '*The Kermadec arc, New Zealand; a 10 year odyssey of discovery along the world's most hydrothermally active intraoceanic arc*' on October 17th and also supported a book launch and introduction to Geoheritage on December 10th.

After careful consideration, late last year the Committee made a decision to move the monthly meeting venue for 2009 from UWA to the Irish Club



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TABLE 1: DIVISIONAL COMMITTEES

Position	2007–2008	2008-2009
Chair	Chris Yeats (CSIRO)	Chris Yeats (CSIRO)
Vice Chair	Marcus Willson (Australian Mineral Fields)	Marcus Willson (Australian Mineral Fields)
Secretary	Catherine Spaggiari (GSWA)	Catherine Spaggiari (GSWA)
Treasurer	Peter Haines (GSWA)	Peter Haines (GSWA)
WAG Editor	Janet Muhling (UWA)	Janet Muhling (UWA)
WAG Business Manager	Peter Haines (GSWA)	Peter Haines (GSWA)
Committee	Frank Bierlein (UWA) Craig Buchan (Task Geoscience) Ian Fitzsimons (Curtin) Erin Gray (Curtin student) Craig Hart (UWA) Derek Marshall (UWA student)	Craig Buchan (Task Geoscience) Craig Hart (UWA)* Erin Gray (Curtin student) Russ Gregory (UWA Student) Katy Evans (Curtin)** Chris Kirkland (GSWA)**
		*Left Committee during the year **Joined Committee during the year
Sub-Committee Convenors:		
Awards	Charles Butt (CSIRO)	Charles Butt (CSIRO)
Education and Vocation	Ian Fitzsimons (Curtin)	Vacant
Geological Heritage	Margaret Brocx (Consultant)	Margaret Brocx (Consultant)
Stratigraphic Nomenclature	Roger Hocking (GSWA)	Roger Hocking (GSWA)

of WA, in Subiaco. With the resignation of our final UWA-based Committee member during 2008, we were finding it increasingly difficult to coordinate access to UWA after normal working hours. It was also felt that, given the large number of members who work in nearby West Perth, Subiaco was a more convenient location for most. At the same time a decision was made to hold Committee meetings at the same venue immediately prior to monthly meetings, with the hope of encouraging more members to participate. Although our scheduled February meeting was cancelled due to an inability to secure an appropriate speaker, a very healthy turn out at the March meeting gives an early indication that the move meets with the approval of our membership. The 2008 Annual Dinner and Award Presentation was held on Friday May 23rd at the East Fremantle Yacht Club in South Perth and attended by 56 people, including the winners of the 2008 TEE Prize and GSA Medal. Attendance was down on the previous year, perhaps due to the fact that no Gibb Maitland Medal was awarded. The 2009 Dinner will be held on Friday 8th May at the same venue. For the first time in a number of years, all four Divisional awards will be presented this year (Table 3). Daniel Townend and Callum Standing are the 2009 winners of the GSA Medal and the WACE (formerly TEE) Prize respectively. At the time of writing, a number of Honours theses from UWA are under consideration for the Talbot Medal. I also am pleased to announce that David Philip Commander will be awarded the 2009 Gibb Maitland Medal for his substantial and

sustained contribution to geoscience in Western Australia, particularly in the field of hydrogeology. Philip Commander is the first hydrogeologist to be awarded the Medal. Further details of his achievements are summarised in the Awards Subcommittee report.

The W.R. Browne Medal is awarded by the Federal Executive Committee of the Geological Society of Australia every two years, at the Australian Earth Science Convention (AESC), to “a person distinguished for contributions to the geological sciences in Australia”. As foreshadowed in my previous report, the Medal was presented to Dr Jim Ross at the Convention in Perth in July 2008, in recognition of his distinguished career in geological research, exploration management and, in particular, his unceasing commitment to policy and planning issues for a wide range of organizations in exploration, mining, research, education and the profession. The AESC was jointly hosted by the GSA and AIG and attracted more than 800 registrants and 53 trade exhibitors.

The Division once again supported the annual GSA-AIG Christmas Cruise along the Swan River, held in early December, which was yet again sponsored by Southern Geoscience Consultants and attended by a large number of WA geoscientists.

On the education front, the Western Region Australian Student Mineral Venture took a one year hiatus in 2008, but will return in July 2009 and our Division will again be a sponsor. The WA Division has also

TABLE 2: MONTHLY MEETINGS, MAY 2008 – APRIL 2009

2008		
6 May	Katy Evans	Speciation of sulphur in silicate melts: implications for ore-forming systems.
3 June	Klaus Regenauer-Lieb	The Perth Basin geothermal opportunity.
1 July	Chris Clark	Event timing in the Southern Granulite Terrane, India
5 August	Peter Eadington	Reflections on fluid inclusions, petrophysics, structural geology and petroleum systems: addressing some challenges in the search for oil in Australia.
2 September	John Walshe	Is fluid mixing a major factor in the formation of Archaean gold deposits?
7 October	Paul Hoffman	Prisoners of their own knowledge: the glacial theory and the discovery of climate warming, mantle flow and continental drift.
11 November	Tim Ivanic	Diamonds and mantle xenoliths from kimberlites and lamproites.
5 December	Joint AIG–GSA Christmas Cruise	
2009		
4 March	David Evans	The current state of pre-Rodinia supercontinent reconstructions.
1 April	Annual General Meeting	
	Richard Morris	Genesis modelling for the Hamersley BIF-hosted iron ores.

continued to provide financial support to Earth Sciences WA (ESWA), a consortium comprising key educational and research organizations and industry representatives whose immediate aim is to encourage WA high schools to take up the new Year 11 and 12 Course of Study in Earth and Environmental Science (EES). The Division also sponsored the registration of six students from UWA and Curtin University to attend the AESC.

It has certainly been a very interesting year (to say the least) for the resources sector in which most of our members work in some capacity. When I sat down to write my previous report to the Division, many pundits were predicting a “Superboom” that would never end. Just twelve months down the track, the same people are asking just how long the current commodity slump can last. Suddenly all that glitters really is gold. Against this background, it is important that professional societies such as ours remain relevant to their members and provide the best value possible in what will be a difficult time for many of us. It is obvious to me that the proposed merger between the GSA and AIG, which is being worked on at the National level, can only improve the service provided to members by both organisations and I look forward to our membership broadly supporting the move, when it is put to the Society’s consideration.

In conclusion, I would once again like to thank my fellow Committee members for their hard work over the past twelve months. All of us have significant family and/or work commitments, but all have proved more than willing to commit their time to the activities detailed above. It’s been a pleasure working with you.

TREASURER’S REPORT FOR 2008

Peter Haines
Treasurer, Geological Society of Australia
Western Australia Division

A preliminary Balance Sheet and Profit and Loss Statement for the 2008 calendar year are attached. Our 2008 financial records are currently with the auditor, but unfortunately final audited statements were not received in time for the AGM. I wish to thank Jocelyn Thomson for her accounting skills throughout the year and providing the attached preliminary statements.

I will highlight the following points from the statements:

- As of 31 December 2008 the WA Division had total equity of \$81,711, this amount being divided between investments with JB Were and our working cheque account.
- Interest paid to our investments and working account totaled \$4,319. Note that with falling interest rates, this figure is likely to be reduced in 2009.
- Membership dues (capitation) received from Head Office amounted to \$7,560.
- The printing and postage cost of the West Australian Geologist (WAG) totaled \$7,785, largely offset by income from advertising totaling \$6,850.
- Accounting fees (\$1,474) include casual hire of an accountant and the annual audit.
- A number of events were subsidized to members including the Annual Dinner, Annual Christmas Cruise jointly held with AIG, and monthly meetings. Such subsidies totaled \$1,498.
- During 2008 the Division made significant donations to Earth Science WA (a consortium set up

TABLE 3. DIVISIONAL AWARDS 2009

Award	2009 Recipient	Basis for the award
Gibb Maitland Medal	David Philip Commander	Substantial contributions to geoscience in Western Australia, with particular consideration given to contributions that relate to the occurrence or discovery of mineral resources
Talbot Prize	To be advised	Best Honours thesis at The University of Western Australia with a significant fieldwork component
GSA Medal	Daniel Townend	Best undergraduate results in the final year of the BSc (Applied Geology) degree at Curtin University of Technology
WACE Prize	Callum Standing	Best aggregate score in the Earth and Environmental Sensing WA Certificate of Education

to promote Earth Science Education in Western Australia), university student associations, donated prizes to the winners of the TEE Prize, GSA Medal, and Talbot Medal, and sponsored 6 students to attend the Australian Earth Science Convention. Such donations totaled \$5,210.

- The net financial result for the WA Division at the end of 2008 was a surplus rounded to \$2,430.

At the end of 2008 the Division's budget remains healthy, but it is always important to remember that making a surplus is not the main function of the Society. We are looking forward to another successful year during 2009 and do not anticipate any major changes in our financial situation.

WEST AUSTRALIAN GEOLOGIST (WAG) BUSINESS REPORT FOR 2008

Peter Haines

*WAG Business Manager, Geological Society of
Australia, Western Australia Division*

The West Australian Geologist (WAG) is the bi-monthly newsletter of the Western Australian Division of the Geological Society of Australia. During 2008 the WAG continued with the format and business model setup in 2006 and 2007. The role of WAG Business Manager continues to be combined with the role of Treasurer. Dr Janet Muhling was Editor throughout the year.

PUBLISHING AND CONTENT

During 2008 the six issues of WAG have run between 12 and 16 pages, and have continued to provide what we hope is a good balance between information on upcoming meetings, articles and advertising. Acquiring good and relevant articles remains one of the more difficult parts of the Editor's job, and I urge all members to keep an eye open for possible contributors/contributions. Our printer, Fineline Print, continues to produce a good quality black and white newsletter, delivered timely in a plastic sleeve. A full colour digital version of the WAG is provided in PDF

format for download at our divisional web site (<http://wa.gsa.org.au/>).

ADVERTISING

The printing and postage cost of the WAG is offset with advertising and sponsorship. Companies and organizations that sponsored issues of the WAG during 2008 include Snowden, Maxwell, Australian Mineral Fields, Rocklabs, and the Geological Survey of Western Australia. Other companies and organizations that advertised with us in 2008 included Data Directions, Cross Country Charters, Digirock, DoCEP, IO Global and Aspen Recruitment. I'll take this opportunity to thank all these companies and organizations for their valued support. Many of our former clients have returned to set up deals with WAG in 2009.

FINANCIAL SUMMARY

These figures are based on income and expenditure for the year to 31 Dec 2008.

- WAG printing and postage costs 2008: \$7,785
- WAG advertising and sponsorship income 2008: \$6,850
- WAG net loss 2008: -\$935

In summary, WAG has made a small loss in 2008, a result of a slight down turn in the number of advertisers and small increase in overall costs (which vary with each edition and are difficult to project in advance). This result must be seen in the light of the large profit we made in the previous year (\$2,244), and the realization that the main function of the WAG is to serve the members rather than to be a profit-making enterprise.

Finally, I'd like to thank again all sponsors and advertisers for their support, our printer, Fineline for efficient service, Janet Muhling for a very professional editing job, and all members who have provided content for the WAG during 2008.

*The Chair and Committee of the
Western Australia Division, Geological Society of Australia
invite members and guests to attend the*

56th ANNUAL DINNER AND AWARD PRESENTATION

Friday 8th May 2009

7.00 pm for 7.30 pm

The East Fremantle Yacht Club, north end of Petra Street, East Fremantle

MENU

Entrée

Seared Scallop & Chorizo Salad with a lime dressing

OR

Warm Chicken Tenderloin Salad with prosciutto & balsamic reduction

Main Course

**Grilled Tasmanian Salmon Fillet with duchesse potatoes & a lemon
butter sauce**

OR

Marinated Lamb Rump with chick pea puree & Moroccan spices

Dessert

Chef's Tiramisu with a Coffee syrup

Coffee and Tea

****NB: Vegetarians catered for by prior arrangement***

Cost \$70 per person (\$50 for students)

RSVP: Friday 24th April 2009

Further details and Booking Form below

Venue

East Fremantle Yacht Club is nestled on the banks of the Swan River at the base of Petra Street, in East Fremantle. Free on site parking, or easy access to jetties allows arrival by boat.

Meals

The Geological Society has again secured a good price for a fixed menu, and this is your chance to sample some outstanding food at a very reasonable price. The choice of entrée and main course from the menu will be made on the night.

Vegetarians

Please note that vegetarian meals must be ordered **by the RSVP date**, therefore please check the vegetarian option below to secure your request.

Drinks

Beer, wine, soft drinks and orange juice are included and will be served until 11.00 pm.

Payment

We can accept cash or cheque either beforehand or on the night.

Please complete and remove (or copy) this booking form and send to:

*Katy Evans, Dept of Applied Geology,
Curtin University GPO Box U 1987, WA 6845.
k.evans@curtin.edu.au*

Telephone (08) 9266 4682; Facsimile (08) 9266 3153
Please mark the envelope / fax/ email subject header "GSA Dinner"

Please book your place by Wednesday 24th April 2009.

Contact Name:.....

Telephone..... Email.....

Address.....

.....

Please enclose a cheque payable to: **Geological Society of Australia – WA Division**

Amount \$..... forpeople (@ \$70 per person/\$50 per student)

Names of people being paid for (add extra rows if necessary):	Vegetarian	
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO
	YES	NO

Other people in the group (for arranging table seating, up to 10 people per table).....

.....

.....

Cut along dashed line

Geological Society Australia WA Division

PO Box 6014
East Perth 6892
West Australia

Balance Sheet**As of December 2008**

3/03/2009
6:54:23 PM

Assets		
Current Assets		
Cash On Hand		
Commonwealth Bank	\$11,469.53	
Total Cash On Hand	<u>\$11,469.53</u>	
J B Were Call Notes	\$51,390.83	
J B Were Cash Trust	\$13,421.13	
Publications in Stock	\$3,163.00	
Aust Post Biz Account	\$46.00	
Trade Debtors	\$10.00	
Total Current Assets		<u>\$79,500.49</u>
Total Assets		<u>\$79,500.49</u>
Liabilities		
Current Liabilities		
GST Liabilities		
GST Collected	\$8,777.51	
GST Paid	<u>-\$10,988.51</u>	
Total GST Liabilities		<u>-\$2,211.00</u>
Total Current Liabilities		<u>-\$2,211.00</u>
Total Liabilities		<u>-\$2,211.00</u>
Net Assets		<u>\$81,711.49</u>
Equity		
Retained Earnings		\$25,996.89
Current Year Earnings		\$2,429.61
Historical Balancing		<u>\$53,284.99</u>
Total Equity		<u>\$81,711.49</u>

AUSTRALIAN STRATIGRAPHY COMMISSION, WA ANNUAL REPORT FOR 2008

Roger Hocking

*WA Commissioner, Geological Society of Australia
Western Australia Division*

The WA Stratigraphic Names Subcommittee (Roger Hocking, Alan Thorne, Kath Grey) continued through 2008 largely as in previous years, advising on stratigraphic questions as they occasionally arose, suggesting some changes to proposed names where ambiguity was possible, and pointing people at the Stratigraphic Units area and database on the GA website as necessary. Remember there is a lot more there than just a database – guidelines for lithostratigraphy, a back end to the database that provides an instant literature search for a unit, and so

on.

Midway through the year at the AESC, Alan Thorne advised that he wished to step down, so the sub-commission currently stands at two. We are not overworked except for brief flurries of activity. Albert Brakel also stood down as national convenor, after a record-breaking number of years. Cathy Brown, who has been associated with the committee off and on for an equally long time, took over the reins.

A few outcomes from the Commission meeting at the AESC in July. Incorrect stratigraphic terminology continues to be submitted to AJES, and it has been suggested that papers with undefined or unreserved new names (you've all heard all of this from me before, ad nauseum) may not be accepted. In particular, the use of "beds" is continuing, for new units rather than historical 'beds'. To the editor, this appears to be a way of avoiding a decision or going to the effort of thinking through and writing an adequate

Geological Society Australia WA Division

PO Box 6014
East Perth 6892
West Australia

Profit & Loss Statement
1/01/2008 through 31/12/2008

3/03/2009
6:55:45 PM

Income		
Capitation		\$7,560.00
Subscriptions received		\$20.00
Glover Book		\$145.45
INTEREST		
Interest Com Bank	\$78.71	
J B Were Call Notes Interest	\$3,386.11	
J B Were Cash Trust Interest	\$854.05	
WAG		\$6,850.00
FUNCTIONS		
Annual Dinner	\$3,418.17	
Total Income		<u>\$22,312.49</u>
Cost of Sales		
Gross Profit		<u>\$22,312.49</u>
Expenses		
Accounting Fees		\$1,474.00
Committee Meetings		\$257.05
Reimburse Subs		\$20.00
FUNCTIONS		
Annual Dinner	\$4,134.92	
Xmas Cruise	\$524.55	
DONATIONS/SPONSORSHIP		
Student Prize	\$900.58	
Earth Science WA	\$2,200.00	
Donations Student Bodies	\$300.00	
Student Sponsorship	\$1,809.08	
Miscellaneous		\$272.73
Postage		\$205.23
WAG		\$7,784.74
Total Expenses		<u>\$19,882.88</u>
Operating Profit		<u>\$2,429.61</u>
Other Income		
Other Expenses		
Net Profit / (Loss)		<u>\$2,429.61</u>

definition. While there is sometimes not enough information to define a unit properly because of geological or structural issues, this is not always the case/excuse. If you do write for AJES, or elsewhere for that matter, please try to avoid "beds". The editor and the Australian Stratigraphy Commission will be much happier. One should always keep the editor happy.

Those maintaining the Canberra database are starting to look at state borders, where a stratigraphic name may abruptly change between states. The Table Hill

Volcanics morph into the Kulyong Volcanics, or the Townsend Quartzite into the Pindyn Sandstone. The problem is far worse over east, particularly for South Australia, but there may be minor changes to names you've probably never heard of in Western Australia. Spelling. The spelling of a stratigraphic name should not change if the spelling, or even the basic name, of the locality after which it is named, is changed (e.g. Kosciusko to Kosciuszko). The spelling will be amended if unavoidable, but not as a matter of course.

Regolith units. These have different underlying concepts to traditional lithostratigraphic units, so any formal stratigraphic framework may be a little or a lot different. The Commission is thinking on it, or who to refer it to.

GEOLOGICAL HERITAGE SUBCOMMITTEE ANNUAL REPORT FOR 2008

Margaret Brocx

*Convener, Geological Society of Australia
Western Australia Division*

Geological Heritage Convener 2008 activities

During 2008, activities were undertaken on behalf of the Western Australian Division of the Geological Society of Australia (GSA) as outlined by the National Policy published by the GSA: http://www.gsa.org.au/pdfdocuments/management/POL_heritage_7Mar06.pdf

Within this framework, as Geological Heritage Convener, I carried out the following:

1. kept up to date with Policies and Legislation, as they relate to geoheritage in Western Australia and Australia, and those promulgated from GSA
2. continued to liaise with the National Convener and various stakeholders as required in relation to any matters of geoheritage
3. investigated the design of a systematic inventory-based approach to identifying sites of geoheritage significance beyond those identified by Lemmon et al (1979) and Carter (1987), including a specific geological region as a pilot study to test the system.
4. represented the Geological Heritage Standing Committee at the 2008 AESC.

2008 Geological Heritage Highlights

Globally, in September 2008, the IUCN incorporated the conservation of geological heritage and geodiversity into its agenda.

Nationally, Environment Australia has recently completed a study identifying places with outstanding karst and pseudokarst values across the continent.

In Western Australia, the DMP initiated action to create a Ministerial Reserve at Jack Hills.

AWARDS SUBCOMMITTEE ANNUAL REPORT FOR 2008

Charles Butt

*Convener, Geological Society of Australia
Western Australia Division*

The Awards Sub-Committee in 2008-09 comprised Charles Butt (Convener), Bryan Smith and Nick Archibald.

W.R. Browne Medal

As reported last year, the WA Division successfully nominated Dr Jim Ross for the W.R. Browne Medal for 2008. The W.R. Browne Medal is awarded by the Federal Executive Committee of the Geological Society of Australia every two years, at the Australian Geological Convention, to “a person distinguished for contributions to the geological sciences in Australia”. Fittingly, the Medal was presented to Jim at the Convention in Perth in July 2008, in recognition of his distinguished career in geological research, exploration management and, in particular, his unceasing commitment to policy and planning issues for a wide range of organizations in exploration, mining, research, education and the profession.

Gibb Maitland Medal

Nominations for the 2009 Gibb Maitland Medal closed on 1 December 2008. Three new nominations were received, in addition to others carried over from previous years. The latter had been considered in at least two previous rounds and considered again. Further information was needed for two of the new nominations, so the Awards Sub-Committee was unable to meet until 30 January 2009. The Sub-Committee was pleased at the quality of the new nominations. A unanimous decision to award the medal was reached after a short discussion; no referees reports were needed given the strength of the nomination and the Committee’s professional knowledge of the nominee.

The Sub-Committee is pleased to recommend that the 2009 Gibb Maitland Medal be awarded to Mr. David Philip Commander, Department of Water, Western Australia (nominators Roger Passmore and John Moncrieff).

Philip Commander has made a substantial and sustained contribution to geoscience in Western Australia, particularly in the field of hydrogeology. His career of 38 years with Western Australian Government Departments, including the Geological Survey, Department of Environment and Department of Water, has centred on the groundwater resources of the State. This has encompassed project work, professional papers, contributions to policy,

leadership positions within the International Association of Hydrogeologists, training young professionals, courses and workshops, and conference presentations. His major contribution to hydrogeology in Australia has been the inception and encouragement of hydrogeological mapping, for which there was no accepted methodology. He is an acknowledged expert and leader in the hydrology of Western Australia, and has an extensive knowledge of the State's groundwater resources, saline groundwater evaluation and mine hydrogeology. He has played a major role in providing technical advice to government on the management of the groundwater resources of the Perth area and on the investigation of the SW Yarragadee aquifer. Philip Commander is recommended for the Gibb Maitland medal not only for his technical capabilities but also for the respect in which he is held by his peers for his integrity and dedication to the profession.

The unsuccessful nominations will be eligible for consideration for the 2010 Medal, possibly with some revision.

Fertiliser a Conundrum for Jarrah Forest Restoration after Mining

by Tim Morald

*Centre for Land Rehabilitation, The University of
Western Australia
and Rachel Standish
Ecosystem Restoration Laboratory, Murdoch
University*

Mining and conservation are often considered to be incompatible land uses. Yet economically important mineral deposits often occur in areas with high biodiversity and therefore, high conservation value. The challenge then is for mining companies to maintain or enhance the conservation value of these sites, especially with regard to rehabilitation or restoration after mining.

An example is the northern jarrah forest south-east of Perth, Western Australia. It is botanically diverse; home to almost 800 plant species and it also contains vast bauxite reserves. Alcoa of Australia commenced mining here in 1963; they currently mine and restore approximately 600 hectares a year. Restoration is crucial because, among other considerations, their mining operations occur within Perth's drinking water catchments. The forest is also important for conservation, recreation and timber production. In fact, much of Alcoa's initial research into rehabilitation focused on their ability to return a productive forest. More recently, their aim has been to return a self-sustaining jarrah forest ecosystem.

This includes returning botanical diversity to pre- or unmined forest levels.

The soils in the jarrah forest are nutrient-poor, especially with regards to phosphorus. This has contributed to the high plant diversity and resulted in some interesting nutrient-acquisition strategies. These strategies include specialised root structures, such as cluster roots (particularly evident among the Proteaceae family). Another strategy common in many jarrah forest plants is the formation of mycorrhizal associations with fungi - whose fine hyphae can explore and extract nutrients from a much larger area than the plants own root system could.

At progressive mining companies like Alcoa, the restoration is regarded as part of the mining process. The first step in this process in bauxite mining is the removal of all vegetation. The soil is then stripped in two distinct layers: the organic rich topsoil (~15 cm); followed by the overburden (~35 cm) occurring between the cap-rock and the topsoil. The bauxite layer (including the cap-rock) which averages 4.5 m depth is then mined. After completion of mining, the mine faces are battered down and the pit is landscaped to meld it with the surrounding unmined forest. The area is ripped to relieve mining related compaction. Then overburden and topsoil are returned. Final scarification is undertaken with a multiple tine and a diverse native seed mix is applied. The landscaping, soil return and seeding occur over summer when the soil is dry and fertiliser is applied by helicopter in the following spring.

So, whilst nutrients, principally phosphorus, are required to replace the nutrients lost during mining, some plant species adapted to nutrient-poor soils are sensitive to fertiliser application. Our concern was that increased fertility would reduce plant species diversity and alter species composition - in short, that we would lose biodiversity. To test this prediction we utilised a field experiment established by Alcoa in 1994, where high levels of phosphorus (P) had been applied at establishment.

The experiment was conducted in four restored pits, two pits at each of two Alcoa sites (Jarrahdale and Huntly). We selected treatments that had received no phosphorus (P) and two or three times the current rate (40 kg P/ha). All treatments received 80 kg/ha of nitrogen and comparisons were made to surrounding unmined forest.

Fourteen years after fertiliser application we sampled the soil to see if the effects of high fertiliser application were still apparent. We sampled from the ripeline furrows because this is where the nutrients, leaf litter, seeds and moisture are generally concentrated. Incredibly, phosphorus

in the P fertilised plots was still five to ten times higher than in unmined forest. This is despite 14 years of vegetation growth and nutrient uptake on these sites. The fertilised soil was also up to five times higher in nitrate concentration and was more acidic. These results could have implications for the species composition in the restored sites. Whilst good vegetation growth and litter accumulation was apparent at all restored sites, soil organic carbon pools (1.2 – 2.9%) were lower than in the unmined forest (3.4 – 5.5%).

So, have these differences in soil fertility affected the vegetation on the restored sites? To find out we monitored 80 m² of vegetation in restored treatments and compared this to 80 m² of unmined forest. We used an ordination of the vegetation data to compare species composition. Remarkably, after only 14 years and despite all the mining related soil handling processes, restored sites with no added phosphorus were similar to the unmined forest in terms of native plant species richness, diversity and evenness. In contrast, the sites which had P fertiliser applied (at two or three times the current rate), were not similar to the unmined forest for these same measures. The species composition of restored sites was different to unmined forest. Differences in composition between Huntly and Jarrahdale (for both forest and restored sites) were apparent, but differences between restoration treatments were not apparent.

Finally, we looked at density of understorey species because this is where most of the diversity in the jarrah forest stems from. We also compared density of the Proteaceae family because their sensitivity to phosphorus is well documented and this family is well represented in unmined forest. Density of Proteaceae was greater in unmined forest than in the restored sites. In the restored sites, density of both Proteaceae and understorey plants decreased with application of phosphorus. In other words, phosphorus application resulted in restored sites that were less similar to unmined forest.

In conclusion, this research found that phosphorus fertiliser applied at two to three times the current application rate was still evident in the soil after 14 years. We also found that for some vegetation measures, restored sites with no added phosphorus are more like unmined forest. These findings have implications for mine restoration in other parts of the world where mining takes place in low fertility ecosystems. Further research aims to determine if botanical diversity of Alcoa's restoration can be enhanced by amending the current fertiliser application practices.

Fourth International Conference on Mine Closure 2009

PERTH, WESTERN AUSTRALIA

Sheraton Hotel

9-11 September, 2009

<http://www.mineclosure2009.com>

Rehabilitation issues and many more (from geotechnical, to social, financial and ecological) will be part of the now well established Mine Closure Conference series run jointly by the Australian Centre for Geomechanics and the Centre for Land Rehabilitation.

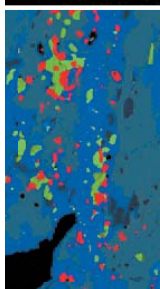
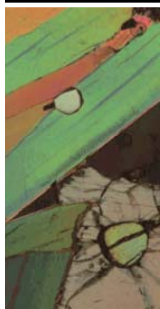
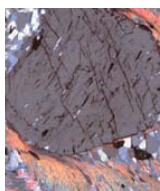
More than 330 delegates attended the First International Seminar on Mine Closure that was held in Perth, Western Australia in 2006. Following on from successful seminars held in Chile (2007) and South Africa (2008), the ACG and CLR are delighted to bring the Fourth International Conference on Mine Closure back to Perth in September 2009. Over 100 papers covering the topical geotechnical, social, financial and ecological mine closure issues are expected to be presented over the three day event.

Plenary speakers are Professor Martin Fey, The University of Western Australia, Professor Alan Baker from The University of Melbourne, Dr Gary Bentel of BHP Billiton, and Mr Howard Smith of the Northern Land Council.

The Australian Centre for Geomechanics is a not-for-profit mining research centre based at The University of Western Australia, Perth. The Centre undertakes research, education and training activities in the geomechanics disciplines to provide industry with the necessary tools and knowledge to ensure that safety is not simply a priority on a par with productivity, but rather a guiding ethic.

The Centre for Land Rehabilitation is a multi-disciplinary centre applying soil science, geomechanics, hydrology, soil and plant biology, plant nutrition, ecology and resource economics to the management of disturbed lands.

For conference themes and event updates please visit <http://www.mineclosure2009.com>



Biannual Conference of the
Specialist Group of Geochemistry, Mineralogy and Petrology

Kangaroo Island 2009

November 8th to 13th 2009

Acacia Hotel, Kangaroo Island: South Australia

First Circular

Format

This 'Gordon style' conference will address three main themes in consecutive sessions:
"New evidence and methods to illuminate the Earth's secular evolution";
"Unique Australia, how and why?";
"Cutting edge techniques: description and application".

Each theme will involve 20 minute talks from a small number of invited speakers plus ample time for discussion. Afternoon poster sessions will be associated with short introductory presentations by the other attendees. Field excursions will be integrated into the programme and will examine the stunning migmatites and other records of the Delamerian Orogeny of South Australia and will involve winery visits.

Preliminary contributor list (and affiliations)

Chris Hawkesworth (U Bristol)	Bill Collins (JCU)	Mike Brown (U Maryland)
Hugh O'Neill (ANU)	Martin Hand (U Adelaide)	John Mavrogenes (ANU)
Sasha Nemchin (Curtin U)	Tracy Rushmer (Macquarie U)	Daniella Rubatto (ANU)
Craig O'Neill (Macquarie U)	Bruce Schaefer (Macquarie U)	Joerg Hermann (ANU)
Mark Kendrick (U Melbourne)	Simon Turner (Macquarie U)	Joel Brugger (SA Museum)
	John Foden (U Adelaide)	Simon Harley (U Edinburgh)

Places limited, so please register your interest early. Student bursaries will be available: email name, affiliation, potential presentation title by 1st April to n.timms@curtin.edu.au



Geological Society
of Australia



AuScope

GSWA publications and events



Government of Western Australia
Department of Mines and Petroleum

Geological Survey of
Western Australia



April/May 2009

NEW RELEASES

■ GEOLOGICAL MAPS

MOUNT AUGUSTUS 2nd edition 1:100 000 Geological Series
by DMcB Martin, AM Thorne, and S Sheppard

YINNETHARRA 1:100 000 Geological Series
by S Sheppard, SP Johnson, PB Groenewald, and TR Farrell

PDFs available on website free of charge

■ NON-SERIES MAPS

Iron ore deposits of the Yilgarn Craton 2009
by RW Cooper and DJ Flint

Major resource projects Western Australia — 2009
by RW Cooper and DJ Flint

Mines — operating and under development Western Australia — 2009
by RW Cooper

Industrial minerals in Western Australia 2008 Plate 1
by JM Fetherston

Industrial minerals in Western Australia 2008 Plate 2
by JM Fetherston

PDFs available on website free of charge

■ RECORDS

2008/1 Geological Survey work program for 2008–09
by GSWA

2008/16 Industrial minerals in Western Australia: the situation in 2008
by JM Fetherston

2008/19 The west Musgrave Complex — new geological insights from recent mapping, geochronology, and geochemical studies
by RH Smithies, HM Howard, P Evins, CL Kirkland, S Bodorkos, and MTD Wingate

2009/2 GSWA 2009 extended abstracts: promoting the prospectivity of Western Australia
by GSWA

PDFs available on website free of charge

■ MISCELLANEOUS PUBLICATIONS

Geological Survey of Western Australia Annual Review 2007–08
by GSWA

Overview of mineral exploration in Western Australia for 2007–08
by PB Abeyasinghe and DJ Flint

Western Australia atlas of mineral deposits and petroleum fields 2009
by RW Cooper, PB Abeyasinghe, and DJ Flint

PDFs available on website free of charge

■ GEOLOGICAL INFORMATION PACKAGE

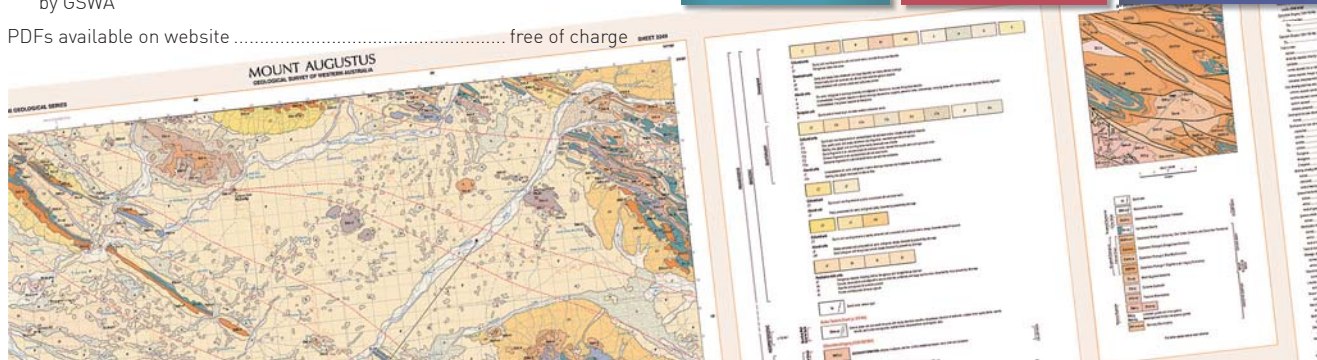
Pilbara 1:100 000 Geological Information Series 2008
by AH Hickman \$55.00

■ DIGITAL PRODUCTS

Western Australian petroleum acreage release, September 2008
by GSWA

Geothermal acreage release 2 – August 2008
by GSWA

Download from website free of charge



Further details of geological publications and maps produced by the Geological Survey of Western Australia can be obtained at <www.dmp.wa.gov.au/GSWA>.

To view or download PDFs free of charge, go to <www.dmp.wa.gov.au/GSWApublications>, and do a search on all or part of the title.

Publications are available from the Information Centre, First Floor, Mineral House, 100 Plain St, East Perth, WA 6004, AUSTRALIA [Phone: +61 8 9222 3459; Fax: +61 8 9222 3444] or can be purchased online from the bookshop at <www.dmp.wa.gov.au/ebookshop>. The majority of our printed publications are now also available free as PDFs on our website at <www.dmp.wa.gov.au/GSWApublications>.

If undeliverable return to:
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2009 WAG ADVERTISING AND SPONSORSHIP

ADVERTISEMENTS

The West Australian Geologist provides an ideal opportunity to advertise your company and services to the WA membership. There are ~600 members who receive the newsletter on a two-monthly basis. WAG is usually distributed about a week before every second monthly talk. **If submitting an Ad could you please ensure that the PDF is at least 300 DPI.** Please contact the WAG Business Manager, Peter Haines, for further details on advertising and the required formats.

Size	(width x height)	1 month	12 months
Full page	(17.2 x 24.1 cm)	\$220*	TBA
Half page	(17.2 x 11.9 cm or 8.4 x 24.1 cm)	\$165*	TBA
Quarter page	(17.2 x 5.8 cm or 8.4 x 11.9 cm)	\$88*	TBA
Business card	(8.4 x 5.8 cm)	\$55*	TBA
Half back page	(17.2 x 11.9 cm or 8.4 x 24.1 cm)	\$330*	TBA
Quarter back page	(17.2 x 5.8 cm or 8.4 x 11.9 cm)	\$176*	TBA

PAMPHLETS AND FLYERS (as an insert)

Pre-printed (depending on size and weight) ~\$385*

SPONSORSHIP

Each issue of WAG can be sponsored by a company or organisation whose name and logo will appear on the front page. A range of sponsorship deals can be negotiated with the Business Manager, including a package comprising an insert and up to two pages of promotional material inside WAG for \$660*. Sponsorship of an issue is also available for a small additional fee if you pay for 6 months of advertising.

*All rates include 10% GST

DEADLINES FOR COPY

5th of the month prior to publication

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