



## From the Director's desk



Having just been appointed Director of the Geological Survey of Western Australia, I take this opportunity to express my feeling of pride in being charged with leading such a highly respected organization. The current healthy state of GSWA is due to the efforts of the staff and Pietro Guj, my predecessor, who is now an Executive Director of the Department of Minerals and Energy. Pietro introduced substantial changes during his time as Director of GSWA, positioning the organization such that it was able to take maximum advantage of the reform currently sweeping through government. Under his direction GSWA's budget allocation doubled and its output of quality maps and reports tripled. My challenge will be to maintain the organization at this high level of functionality without compromising the standard of the geoscience upon which the well-deserved reputation of GSWA rests.

### Access to statutory exploration reports

I have recently returned from the annual Chief Government Geologists' Conference where, with my counterparts from the other States, Territory, and Commonwealth, we discussed a wide range of common issues.

Of universal concern to all attendees at the conference was the issue of providing easy access to statutory mineral exploration reports. The advances in digital technologies have demonstrated that the ability to manipulate data electronically has increased the worth of these data over their value as supplied in hard copy. In addition, many explorers already have the data in digital form and only convert to hard copy to comply with Government legislation. The GSWA is currently evaluating a way forward, but is very wary of embarking on what will be a major shift in culture without a clear objective and a workable strategy. In Western Australia we are facing a problem that is substantially larger than any other State or Territory, receiving on average about 4500 reports annually. This is more than 3.5 times what Queensland receives, being the next largest.

### Digital mapping

With the advent of digital mapping, issues of spatial accuracy are emerging Australia-wide. Topographic data gathered 20 years ago for 1:250 000 map production do not always stand the close scrutiny that modern GIS systems can apply, particularly when integrated with differential GPS-based data. Errors of 300 m, not evident in hard copy or fudged with a thick nib, are now revealed when data sets are digitally enlarged beyond the original intention. To this end, GSWA has had to undertake a costly, but necessary, resurvey of the area covered by the Capricorn Orogen. (see page 6). The positional data we are gathering ►

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- will be accurate to  $\pm 2$  m, and will provide a valuable resource for the future.

These two significant issues are examples of how we geoscientists need to adapt to the digital world, but be assured that GSWA still considers its core business as making regional geoscience data available in graphic form (i.e. the geological map). These maps will continue to be underwritten by comprehensive field observations enhanced by modern remotely sensed information. R. Logan Jack, the Queensland Government Geologist in the 1890s said 'The chief end of a Geological Survey is the construction of geological maps ...'. Things have not changed significantly 100 years later.

In our first issue of FIELDNOTES, Pietro Guj indicated that GSWA would welcome comments and suggestions for further issues. I take this opportunity to reiterate this sentiment and, in recognition of the digital era, advise you that my e-mail address is: [d.blight@dme.wa.gov.au](mailto:d.blight@dme.wa.gov.au).

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## Walter K Witt: 1998 Gibb Maitland Medallist

The award of the 1998 Gibb Maitland Medal to Walter Witt was greeted with much pleasure, and some pride, at GSWA. There is no doubt that the medal is awarded for outstanding individual contribution to geoscience in Western Australia. However, GSWA feels honoured by a little reflected glory for providing the working environment that allowed a dedicated geologist with a probing mind to blossom.

During his 12 years at GSWA Walter was not afraid to advance new, and at times radical, but always well-constructed theories, nor to debunk those of some of his predecessors in the Eastern Goldfields region.

His published output while at GSWA was prolific, both in number and in volume of material.

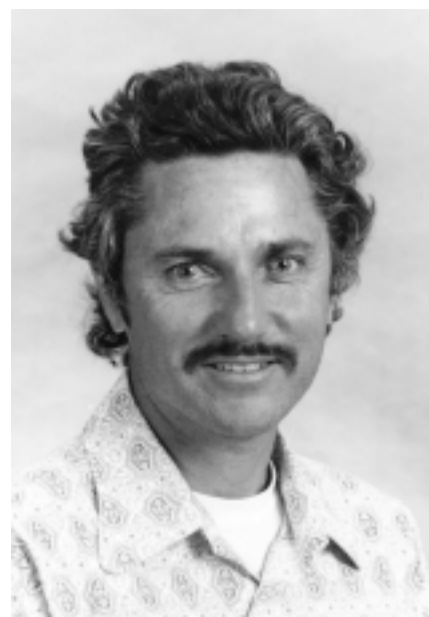
Externally, he published numerous papers in a variety of journals and, under the umbrella of GSWA, was either sole author or a major contributor to more than 15 significant manuscripts and eight maps. Walter's Report (no. 39) on 'Gold

mineralization of the Menzies-Kambalda region' and the three Records with supporting information were an immense undertaking. His work on the geology and geochemistry of granitoids from the

southwest Eastern Goldfields (Report 49), and on mineralization in the Ravensthorpe area (Report 54) are also important contributions to the understanding of the geology of Western Australia.

The complexity of his work, both in theoretical construction and in synthesis of huge volumes of information, will be long remembered by GSWA editorial staff, for whom the term 'Witticism' took on a new meaning.

Walter has been missed at GSWA since his departure in 1997, both for his significant contribution to the geoscientific output of the Geological Survey and for his part in maintaining the Survey's reputation as a geologically important and relevant organization. This is not to mention



that he is missed for being the 'essential' Walter. His preference for field garb that looked as though it originated in San Francisco in the 1970s will be long remembered by GSWA staff — and perhaps the odd, slightly bemused, prospector working the mine dumps of the Eastern Goldfields.

We at GSWA congratulate Walter on his award, and wish him well in his future endeavours to marry the science of geology with successful exploration in the private sector. □

## Dr Phillip Playford receives the Order of Australia

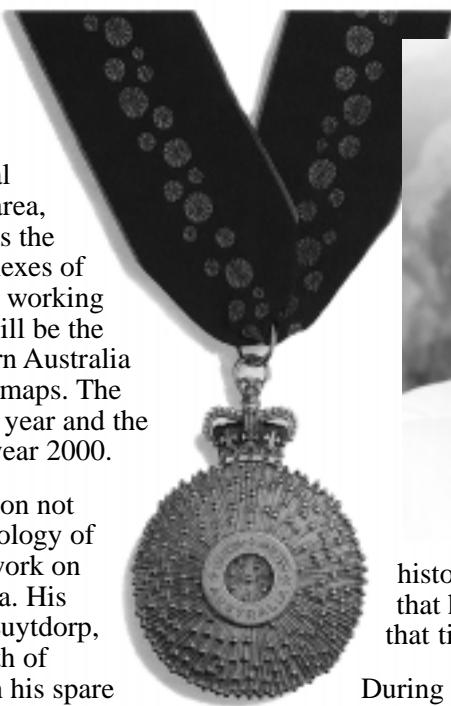
In this year's Queen's Birthday Honours List, Dr Phillip Playford was made a member of the Order of Australia. Dr Playford has had a long and distinguished career in geology, much of it with the Geological Survey of Western Australia. He has held the positions of Director of the Geological Survey and Assistant Director General of Mines.

Joining the ranks of the Order of Australia is a result of Dr Playford's dual contributions to both science and history in Western Australia.

Dr Playford is well known for his geological research in the Perth Basin, the Shark Bay area, and Rottnest Island. He is also recognized as the world authority on the Devonian reef complexes of the Canning Basin. Dr Playford is currently working as a consultant to GSWA, preparing what will be the definitive work on Devonian reefs in Western Australia — a massive Bulletin and seven geological maps. The first of the maps will be published later this year and the Bulletin is expected to be published in the year 2000.

The Order of Australia award is in recognition not only of Dr Playford's contribution to the geology of Western Australia, but his extra-curricular work on early Dutch exploration of Western Australia. His research on the wreck of the Dutch vessel *Zuytdorp*, lost in 1712 off the coast 65 kilometres north of Kalbarri, was a labour of love, completed in his spare time over a period of more than 40 years. It resulted in the publication in 1996 of his book 'Carpet of Silver: the Wreck of the *Zuytdorp*', which received a Premier's Book Award this year.

Dr Playford was Director of the Geological Survey from the initial planning stage to final publication (1990) of GSWA's Memoir 3 on the Geology and Mineral Resources of Western Australia. This was a monumental task that absorbed much time and effort at all levels within the Geological Survey, and resulted in a landmark publication. He also saw GSWA through its Centennial year (1988) and, given his appreciation of things



historical, it was entirely appropriate that he was there in a guiding role at that time.

During his term as Director of the Geological Survey (1986–92) Dr Playford introduced a five-year planning cycle to ensure that each year of the Survey's plan was part of a long-term strategy. He stressed the importance of GSWA's dual objectives of practical, field-based research and the provision of solid, unbiased geoscientific advice to Government, industry, and the public.

The Geological Survey and the Department of Minerals and Energy congratulate Dr Playford on his achievements and the recognition of their value to Western Australia in his elevation to membership of the Order of Australia. □

### GSWA maps reap rewards

Since 1982 the Mapping Sciences Institute of Australia (MSIA), formerly the Australian Institute of Cartographers, has been recognising outstanding achievements in the mapping sciences through the prestigious Excellence in Mapping Sciences Awards. With the expansion of MSIA to embrace the many disciplines involved in the measurement, management, and communication of geospatial information, these awards now encompass themes beyond cartography.

At the recent MSIA National Conference held in Fremantle, GSWA gained two of these awards.

The Australian Geological Survey Organisation (AGSO) Award for excellence in a 'geoscientific theme' was won by GSWA's NABBERU 1:250 000 Geochemical Map.

In addition a Highly Commended award was also gained by the digital data package for the Bangemall Mineral Prospectivity study in the category of Geospatial Information (Natural Resources).

Congratulations are due to the teams of geoscientists, cartographers, and editors who had a hand in the production of these two valuable products. □



## GSWA '98 — a showcase of work in progress

The GSWA '98 seminar, held at Challenge Stadium on 30 April, was a great success and will become a regular event. Our aim was to show customers our work in progress and to whet their appetites for work soon to be published.

The seminar was opened by the Hon. Norman Moore (MLC), WA Minister for Mines. The 75 attendees were addressed by the GSWA executive on the 'state of play' of current work programs, and plans for the future direction of the Geological Survey. The rest of the day was devoted to technical presentations by GSWA geologists, providing insights into recent results of ongoing work.

Topics covered included:

- an overview of the regional mapping program;
- results from mapping in the southern Capricorn Orogen, central Pilbara, and Earraheedy Basin;
- geochemical mapping in the northern Yilgarn and Capricorn Orogen;
- an overview of the activities of the Mineral and Petroleum Resources Branch activities;
- progress on regional mineralization mapping in the Eastern Goldfields, Bangemall Basin, and southwestern WA;
- results from GSWA's onshore stratigraphic drilling program;
- mineralization implications of the Shoemaker Impact Structure;
- discussion on the move towards submission of statutory exploration data in digital format.

Extended morning tea, lunch, and afternoon tea breaks allowed attendees to view more than 60 linear metres



Attendees at GSWA '98



*The Hon. Norman Moore, MLC, Minister for Mines and David Blight, Director of GSWA, at GSWA '98*

of display material focusing on work in progress and work soon to be published. Project geologists were on hand during these breaks to discuss the work displayed and answer questions.

In his opening speech, the Minister announced the release of an interpretive map of the Ravensthorpe–Cocanarup area, compiled by this year's Gibb Maitland Medallist, Dr Walter Witt, and the release of (digital) preliminary regolith geochemical data from the TUREE CREEK, MOUNT EGERTON, and GLENBURGH 1:250 000 sheet areas.

Feedback from participants has been positive, both from attendees who appreciated seeing work in progress and GSWA geologists who enjoyed the opportunity to discuss (and in some cases debate) their work informally in front of displays, as well as through the formal presentations. All present agreed that the \$30 registration fee was a good investment.

This event will be repeated. Whether we do it annually or biannually has not been decided, but we will do it again.

If you have a view on the timing of future seminars (should the next one be GSWA '99, or perhaps GSWA 2000?) or any other thoughts about this event, we would be pleased to hear from you.

*Please pass on your views to:*

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*Director, Geological Survey of Western Australia*  
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**[d.blight@dme.wa.gov.au](mailto:d.blight@dme.wa.gov.au)**



# Mineral prospectivity enhancement data packages

**New generation GIS packages with auto-run CD-ROM**

The Geological Survey of Western Australia has recently released three major new digital data packages for the north Eastern Goldfields (Report 63), Bangemall Basin (Report 64), and southwest Western Australia (Report 65) as part of GSWA's Mineral Prospectivity Enhancement Program.

The complete package for each includes a comprehensive Report, a colour printed map detailing known mineral occurrences and deposits against a background of geology at 1:500 000 scale, and the GIS dataset on CD-ROM. For the Bangemall Basin, the map and CD-ROM are available now, and the Report will be available in August.

Themes included in the GIS dataset are:

- solid geology;
- regolith geology;
- databases and spatial indexes to SPINDEX, WAMIN, MINEDEX, and MAGIX;
- gravity and magnetic images;
- gamma ray spectrometry;
- Landsat TM;
- TENGGRAPH.

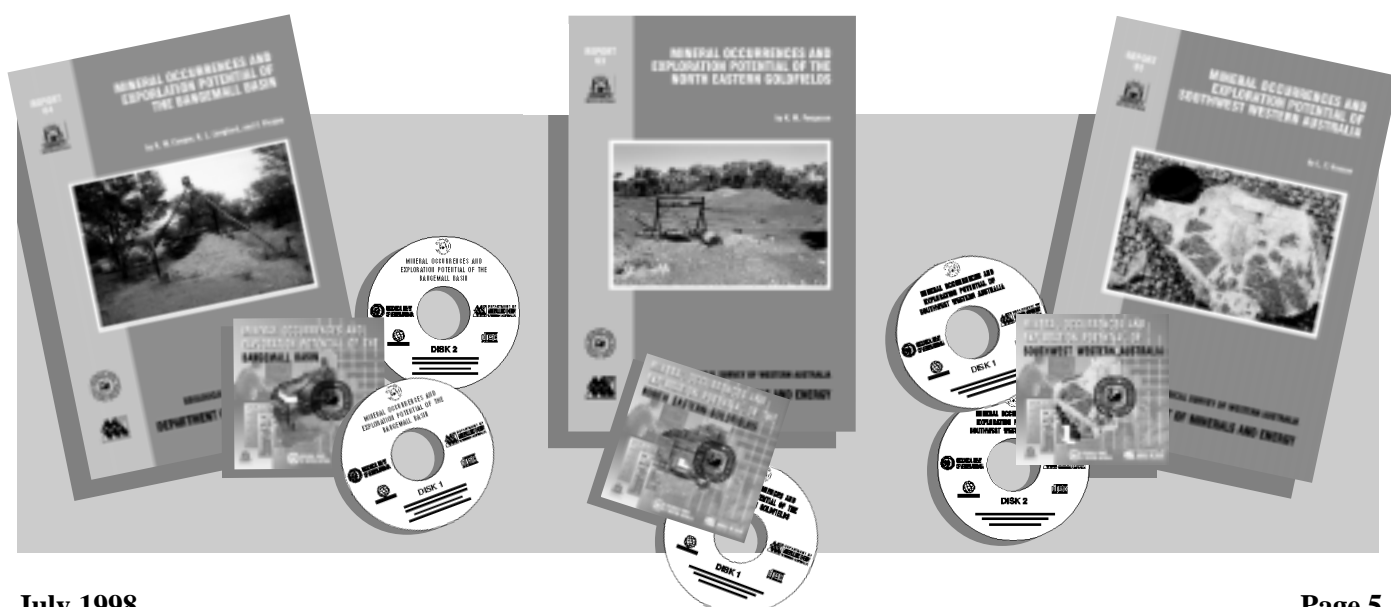
You don't need to have expensive and sophisticated GIS software on your PC to view and manipulate data on these latest release GIS packages. Through negotiation with ESRI, GSWA has incorporated a customized version of ArcExplorer with the three GIS data packages on CD-ROMs. The CD-ROMs have an in-built 'auto-run' facility.

You just have to load the CD-ROM into your CD drive and you are presented with three options:

1. View data using ArcExplorer software accessed from the CD-ROM.
2. Install a full version of ArcExplorer software on your PC's hard drive (from the CD-ROM) and run it from your hard drive to view the data.
3. View and manipulate the data through your own GIS software (ARC/INFO, ArcView, or MapInfo).

The cost of the complete package (Report, map, and CD-ROM) is \$200. The Report and map on their own can be purchased for \$40.

**These packages are available from the Information Centre, first floor, Mineral House, 100 Plain Street, East Perth, WA 6004. Ph: (08) 9222 3459; Fax: (08) 9222 3444.**



# New and accurate base maps for the Mid-west Gascoyne

The GSWA's Mid-west Gascoyne Imagery Project aims to provide up-to-date, accurate, high-resolution satellite imagery and digital topographic data in an area that in the past has only been mapped at small scales, and in insufficient detail for current geological mapping and mineral exploration. The new initiatives of Terrane Custodianship, and Gascoyne and Bangemall Region geological mapping have highlighted the need for better quality topographic-base mapping. As well as providing a quality base for GSWA products, the information will be available to the community for use in exploration, agriculture, conservation, land management, development, and tourism. The technology and methodology used in this project are relatively new, and a project of this size has not been tried before in Western Australia.

## Background

Modern geological survey products incorporate information derived from many different sources. These sources include:

- geological field mapping from interpreted aerial photography;
- interpreted data from remotely sensed imagery;
- airborne geophysical data;
- point data collected by using Differential Global Positioning System (DGPS) technology;
- geological and mineralization data derived from exploration activities.

These data may be in analogue or digital format.

This wealth of data needs to be accurately located when they are acquired so that they can be reliably integrated with other map-based data. Problems arise in the map compilation process when topographic data forming the base map have not been captured to the same precision as the geological data. These problems are more difficult to overcome when the data are in digital form and the compilation process is computer assisted. Data can now be collected easily with DGPS to  $\pm 2$  m accuracy; existing topographic information

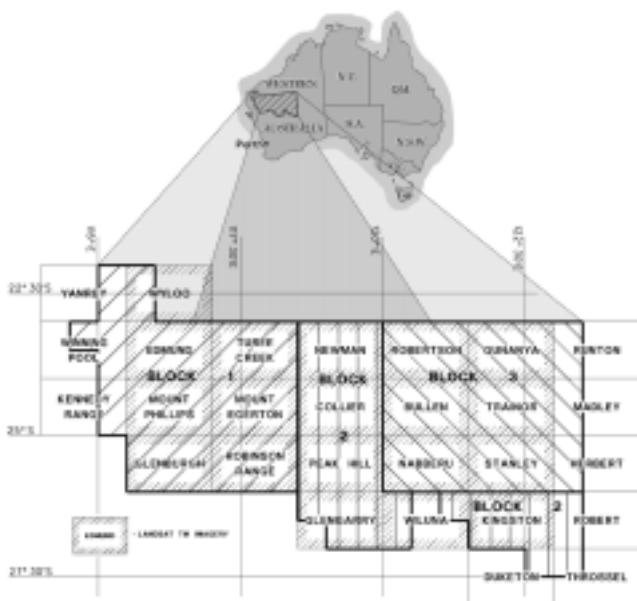
collected over 30 years ago is only accurate to  $\pm 300$  m. These problems are more likely in remote regions where digital topographic data are not sufficiently detailed for current geological mapping and mineral exploration purposes. The Mid-west Gascoyne is such a region.

## Solution

The solution adopted by GSWA is to obtain current, high-resolution satellite imagery from which topographic data can be derived. To be effective this imagery has to be rectified to provide an orthographic view, with its position controlled in space to an absolute accuracy of  $\pm 20$  m in the horizontal. The rectification and control process, known as orthorectification, for the Mid-west Gascoyne is being carried out by a contractor, McMullen Nolan and Partners Surveyors.

The imagery is being provided in digital form by SPOT Imaging Services through the Remote Sensing Services (RSS) of the Department of Land Administration (DOLA). The imagery is panchromatic (black and white) to a pixel resolution of 10 m. That is, the square dots in various tones of grey making up the image would measure 10 m across on the ground. These data will be rectified using Helava software, which essentially tries to accurately define the 'sensor' positions in three dimensions. As well as the raw image data, the software requires good identifiable ground control over the image and a reliable Digital Elevation Model (DEM), giving a good representation of the changes in elevation of the terrain. The software provides a rigorous solution of the sensor position and then projects the SPOT scene onto the DEM to give a true orthorectified image. Helava software also has a mosaic module enabling rectified scenes to be joined to create seamless composite images that can be reproduced as maps conforming with existing map sheet boundaries.

The ground control points need to be accessible, stable features that are visible on the imagery. Typically, control points comprise intersections of tracks, fence lines, and drainage patterns. Permanent structures and point data identified from visible existing survey control are also used. The locations of the control points are





defined using DGPS. The DEM is being derived from contours provided by existing mapping compilations enhanced by control points of known altitude. These control points will form a valuable asset for the future because they will still be valid as imagery resolution improves.

The rectified, seamless mosaic imagery will be available to GSWA geoscientists for geological mapping work. In addition, Landsat TM colour imagery (at 25 m pixel resolution) will be merged with the SPOT imagery to provide a rectified colour image. This imagery will be presented in hard copy format as 1:250 000 maps. The rectified SPOT imagery will be available to the community through Western Australian Land Information System (WALIS) as digital 1:100 000 map sheet tiles.

The final step in the project will be to derive digital topographic data in vector format as 1:100 000 map sheet tiles to enhance or replace existing digital topography. The vector format data will be extracted using onscreen digitizing methods to DOLA specifications. These topographic data will be used in GSWA maps, and DOLA will act as custodians for the

data, which will also be available to the community through WALIS.

The Mid-west Gascoyne project commenced in November 1997 and the planned delivery date of the last of the map products is November 1998. The project area comprises 123 map sheet tiles at 1:100 000 scale, and is somewhat bigger than the State of Victoria. The project has been prioritized into three blocks and work is well advanced. The figure illustrates the extent of the project, with the Landsat TM imagery highlighted.

As at 30 May 1998, the status of the project is as follows:

	<i>Block 1</i>	<i>Block 2</i>	<i>Block 3</i>
Imagery acquired	100%	100%	100%
Ground control	100%	100%	100%
Rectification process	100%	100%	100%
Topo data extraction	90%	0%	0%

**For more information contact:**

**Brian Dawson**

**Ph: (08) 9222 3122**

**b.dawson@dme.wa.gov.au**

## New home for GSWA rock and mineral teaching collection

The Geological Survey has loaned to the Chamber of Minerals and Energy a comprehensive collection of representative rock and mineral samples, previously housed on the ground floor of Mineral House. This collection has been incorporated in to the Chamber's new Minerals Information Centre on the ground floor of their offices at 12 St Georges Terrace, which was opened by the Minister for Resources Development on 13 May.

The Centre offers new interactive displays on the minerals industry and is a key component of an education program, in agreement with the Education Department of Western Australia, run for teachers and students on the minerals industry in Western Australia. About 5000 students from years 3 to 12 will visit the Centre during the next year, and a further 5000 students will participate in a variety of activities in country regions. The education program has been operating for 21 years and is thought to be the longest running industry education program in Australia. More information is available from the Chambers Internet site at <http://www.mineralswa.asn.au> or contact:

**Dr Irene Ioannakis,**  
**Chamber of Minerals and Energy**  
**Executive Officer — Education,**  
**Ph: (08) 9325 2955.**

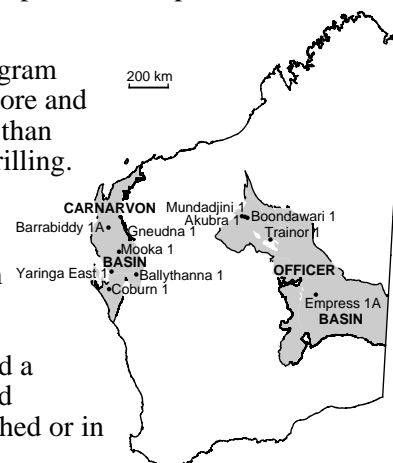
## GSWA onshore stratigraphic drilling program

Over the past three years GSWA has been involved in drilling eleven stratigraphic wells in onshore Western Australian basins.

The aim of this program has been to investigate the prospectivity for petroleum of under-explored onshore basins and to make data available to encourage industry to reinvigorate onshore petroleum exploration in Western Australia.

As a result of this program GSWA has acquired core and electric logs for more than seven kilometres of drilling.

The core is available for viewing in Perth by industry Data from these wells is being incorporated in well completion reports and a number of Reports and Records, either published or in preparation.



**Core is available for viewing in Perth by contacting:**

**Jan-Sandra Mason**

**Ph: (08) 9222 3499**

**j.mason@dme.wa.gov.au**



# SOME RECENT PUBLICATIONS

**Limestone and limesand resources of Western Australia**  
**MINERAL RESOURCES BULLETIN 18** by P. B. Abeyasinghe  
 (Book and 2 plates) ..... \$50.00

**Proterozoic zoned tungsten-bearing skarns and associated intrusives of the northwest Gascoyne Complex, Western Australia**  
**REPORT 53** by B. M. Davies ..... \$35.00

**Geology and mineral resources of the Ravensthorpe and Cocanarup 1:100 000 sheets**  
**REPORT 54** by W. K. Witt (Book and plate) ..... \$45.00

**A review of oil occurrences within the Lennard Shelf, Canning Basin, Western Australia**  
**REPORT 56** by A. Crostella ..... \$35.00

**Mineral occurrences and exploration potential of the north Eastern Goldfields**  
**REPORT 63** by K. M. Ferguson (Book and plate) ..... \$40.00  
 (+ CD-ROM) ..... \$200.00

**Mineral occurrences and exploration potential of southwest Western Australia**  
**REPORT 65** by L. Y. Hassan (Book and plate) ..... \$40.00  
 (+ CD-ROM) ..... \$200.00

**GSWA Trainor 1 well completion report, Savory Sub-basin, Officer Basin, Western Australia, with notes on petroleum and mineral potential**  
**RECORD 1996/12** by M. K. Stevens and N. G. Adamides ..... \$20.00

**A compilation and review of data pertaining to the hydrocarbon prospectivity of the Officer Basin**  
**RECORD 1997/6** by D. Perincek ..... \$20.00

**Compilation of SHRIMP U-Pb zircon geochronology data, 1997**  
**RECORD 1998/2** by D. R. Nelson ..... \$25.00

**Assessment and prediction of petroleum reservoir quality in the Moogooloo Sandstone and Keogh Formation, southern Carnarvon Basin, Western Australia**  
**RECORD 1998/4** by P. J. Havord ..... \$20.00

**A review of data pertaining to the hydrocarbon prospectivity of the Savory Sub-basin, Officer Basin, Western Australia**  
**RECORD 1998/5** by M. K. Stevens and G. M. Carlsen ..... \$20.00

**Geology and Permian coal resources of the Vasse River coalfield, Perth Basin, Western Australia**  
**RECORD 1998/7** by G. Le Blanc Smith and S. Kristensen  
 (Book and plate) ..... \$20.00

**Laterite geochemistry of the Yilgarn Craton and Albany–Fraser Orogen: digital data from CSIRO–AGE**  
**RECORD 1998/8** ..... \$20.00

**Mineral exploration and development in Western Australia in 1996–97** by D. J. Flint and P. B. Abeyasinghe ..... *free of charge*

## EXPLANATORY NOTES

**Geology of the ISABELLA 1:100 000 sheet** by I. R. Williams and A. F. Trendall  
 Map and explanatory notes ..... \$20.00

**Geology of the BRYAH 1:100 000 sheet** by F. Pirajno and S. A. Occhipinti  
 Map and explanatory notes ..... \$20.00

**Geology of the DOOLGUNNA 1:100 000 sheet** by N. G. Adamides  
 Map and explanatory notes ..... \$20.00

**Geology of the MOUNT BARTLE 1:100 000 sheet** by P. R. Dawes and F. Pirajno. Map and explanatory notes ..... \$20.00

**Geology of the BRAESIDE 1:100 000 sheet** by I. R. Williams and A. F. Trendall  
 Map and explanatory notes ..... \$20.00

**Geology of the PADBURY 1:100 000 sheet** by S. A. Occhipinti, J. S. Myers, and C. P. Swager. Map and explanatory notes ..... \$20.00

**Geology of the GUNANYA 1:100 000 sheet** by L. Bagas  
 Map and explanatory notes ..... \$20.00

**Geology of the GLENGARRY 1:100 000 sheet** by F. Pirajno, N. G. Adamides, and D. D. Ferdinando  
 Map and explanatory notes ..... \$20.00

**Geology of the SHERLOCK 1:100 000 sheet** by R. H. Smithies  
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**KALGOORLIE, Western Australia** by S. Wyche  
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**Geochemical mapping of the MOUNT EGERTON 1:250 000 sheet**  
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 Maps and explanatory notes ..... \$100.00

**Geochemical mapping of the GLENBURGH 1:250 000 sheet**  
 by A. J. Sanders, J. A. Faulkner, J. Coker, and P. A. Morris  
 Maps and explanatory notes ..... \$100.00

**Geochemical mapping of the TUREE CREEK 1:250 000 sheet**  
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**Geochemical mapping of the EDMUND 1:250 000 sheet**  
 by K. J. Pye, J. Coker, J. A. Faulkner, and A. J. Sanders  
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## 1:100 000 GEOLOGICAL SERIES MAPS

Map only ..... \$10.00

CUNYU (2945) by N. G. Adamides, T. R. Farrell, and F. Pirajno  
 DIXON (4562) by I. M. Tyler, R. G. Warren (AGSO), D. H. Blake (AGSO), and A. M. Thorne

MUCCAN (2956) by I. R. Williams

MOUNT WOHLER (2455) by R. H. Smithies

MARYMIA (2847) by L. Bagas

POISONBUSH (3252) by I. R. Williams and L. Bagas

COSMO NEWBURY (3442) First edition plot by T. J. Griffin and T. R. Farrell

DEPOT SPRINGS (2942) First edition plot by S. Wyche and T. J. Griffin

## 1:250 000 GEOLOGICAL SERIES MAPS

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EDJUDINA (SH 51-6) by S. F. Chen

DUKETON (SG 51-14) by T. R. Farrell

LISSADELL (SE 52-2) by A. M. Thorne, S. Sheppard, and I. M. Tyler

MOUNT RAMSAY (SE 52-9) by I. M. Tyler, T. J. Griffin, R. M. Hocking, and P. E. Playford

## GEOLOGICAL MAPS

**Interpreted geology and mineralization of the Ravensthorpe region**  
 by W. K. Witt ..... \$10.00

**Interpreted geology of the Palaeoproterozoic Bryah and Padbury Basins**  
 by C. P. Swager, S. A. Occhipinti, and F. Pirajno ..... \$10.00

**Geology of the Fortescue Group, Pilbara Craton (2 plates and legend)**  
 by A. M. Thorne and A. H. Hickman ..... \$20.00

**Lead–zinc–silver mines, deposits, prospects, and major occurrences of Western Australia** by K. M. Ferguson ..... \$10.00

## GEOPHYSICAL MAPS

**Onshore southern Carnarvon and northern Perth Basin Bouguer Gravity and 1st Vertical Derivative Images, 1:500 000 scale**  
 Price per image (2) ..... \$100.00

Publications are available from the Information Centre, First floor, Mineral House, 100 Plain St, East Perth, W.A. 6004.

Phone: (08) 9222 3459; Fax: (08) 9222 3444