



GSWA 99

A mountain of new geological information

GSWA 99, the second GSWA annual 'open day', was held on the 30th of March at the Advanced Manufacturing Technologies Centre in East Perth. The day was a great success, and industry feedback suggests that those who came along to hear and see what GSWA has been up to over the last twelve months or so felt they got more than their money's worth, as they did at the inaugural GSWA 98 open day.

GSWA Director Dr David Blight said the one-day seminar aimed to promote and enhance the prospectivity of the State by showcasing the results of his organisation's work programs and products.

"GSWA 99 provides the resources industry with a chance to see first-hand the fruits of the Survey's labour and meet the people behind the Survey's programs and products".

Dr Blight also said that innovation, technology and determination had enabled the Geological Survey to provide the high-quality level of service and products which helped the State's mineral explorers put Western Australia on the global mineral map.



Ian Satchwell, CEO Chamber of Minerals and Energy, opening GSWA 99.

A highlight of the GSWA 99 Seminar was the official launch of the new edition of the State Geological map. Chamber of Minerals and Energy Chief Executive Officer Ian Satchwell, who officially opened the event, launched the latest State Geological Map in a series that now spans more than one hundred years. The display of historical state maps ranging in age from the 1880s through to the current 1998 edition also drew a lot of interest. Mr Satchwell commented that the succession of maps on display gave a real insight into how our

understanding of the geology of the state has changed over the past one hundred years or so.

He said, "the State map is just the crest of the mountain of geological information when it comes to the Survey's output and work in progress ... GSWA 99 is all about showing industry what it is getting for its tax-payer dollar. 1998-99 has and will continue to be a big year for the Geological Survey."

Mr Satchwell elaborated on the volume of published output to be completed in 1998-99:

- 54 books including Explanatory Notes, Mineral Resource Bulletins, Reports and Records;
- 26 printed maps; and
- 2 GIS-based Mineral Occurrence and Exploration Potential packages, each comprising a Report, geology and mineral occurrence map, and a user-friendly CD package. ►

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Geological Survey of Western Australia

DEPARTMENT OF MINERALS AND ENERGY OF WESTERN AUSTRALIA

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He said, "This level of output means that in 1998–99 the Survey will, for the second successive year, break all previous records for annual published output.

"What is also impressive, and especially pleasing for the private sector, is that the Survey, after listening to industry feedback a couple of years ago, is now producing more of what industry wants, more often, and at a high level of quality."

Survey Director David Blight said the seminar also highlighted that the Survey was continuing to pursue a *digital data* direction.

"Finalised requirements for the submission of statutory mineral exploration data were announced at the open day as well as plans for a Department of Minerals and Energy on-line bookshop at the Department's website".

The on-line bookshop will be initially based on the Geological Survey's published output and will allow customers to use the Internet to select items from Survey catalogues, and use their credit cards for payment and delivery.

"With a mobile phone and laptop computer explorers will be able to order the latest Survey products no matter where they are," Dr Blight said.

During the day GSWA staff made technical presentations on work in progress covering the following topics.

- Two-stage degassing of the Archaean mantle: evidence from the 3.46 Ga Panorama volcano, Pilbara Craton: *Martin Van Kranendonk*
- New tectono-stratigraphic interpretations of the Pilbara Craton: *Arthur Hickman*
- West Pilbara mineralization mapping: *Ian Ruddock*

- Implications of the discovery of c. 2.0 Ga crust in the southern part of the Gascoyne Complex: *Steve Sheppard*
- Acceptance of statutory mineral exploration reports in digital format, and proposed National standards: *Jeff Haworth*
- Devonian stromatolites and exhalative mineralization, Canning Basin: *Phillip Playford*
- Assessing the effects of grain size on chemistry — results from the GSWA's regolith geochemical program: *Paul Morris*
- Localized metasomatic alteration and mineralization of the Mount Belches Beds, southern Eastern Goldfields: *Matt Painter*
- Advances in Neoproterozoic correlation: an integrated approach: *Kath Grey*

- The new 1:2.5 million scale State geological map: *Roger Hocking*

Extended Abstracts of all talks presented were published as GSWA Record 1999/6 and were given to all registered participants. This Record is available for purchase from the Mineral House Information Centre for \$10.

During breaks, registrants were invited to view over 100 linear metres of material on display covering all elements of the current GSWA work programs. GSWA specialist staff were on hand at these times and there was a lively exchange of ideas relating to preliminary findings on show, and the future direction of Survey work.



We are pleased to be able to say that all feedback received about GSWA 99 has been positive, and we are already starting to think about GSWA 2000.



From the Director's Desk

This issue of FIELDNOTES has a distinctly petroleum exploration flavour about it. This is really quite appropriate at this point in time as we approach the home straight in what we have called the GSWA 'Petroleum Exploration

Initiatives'. This 17 million dollar, six-year program started in 1994–95 with the aim of providing the geoscientific framework fundamental to the development of a viable and vibrant onshore petroleum exploration industry in Western Australia. Recent low oil prices, and industry perceptions of prospectivity onshore, have dictated the current low level of onshore exploration activity. From our perspective, this is not a deterrent, but encourages us to redouble our efforts to enhance the prospectivity of onshore basins of the state for petroleum. We take the view that when interest shifts and refocusses onshore, the datasets we have built will provide the springboard for accelerated exploration and, with a little luck, some major discoveries.

Over the last five years of our 'Petroleum Exploration Initiatives' we have drilled ten major stratigraphic wells, which have provided almost eight kilometres of core.

We have also released more than 45 publications on the petroleum geology of Western Australian onshore basins. The database of petroleum data has grown considerably in that time, and will continue to do so as long as funding for our Petroleum Exploration Initiatives continues. We have recently been exhibiting our work and promoting the prospectivity of onshore WA at international and national conferences such as AAPG and APPEA (see separate article), and we are receiving very positive feedback on our work to date. Western Australia has vast tracts of land that are grossly under-explored for petroleum and we need to do more. This is the message coming from APPEA and industry in general. If we do not continue to build our basic geological understanding of onshore basins, we are in danger of losing exploration dollars to other states and countries who have embarked on a more aggressive approach. From our parochial viewpoint this is not an attractive outcome, and we look forward to continuing industry support and encouragement in 1999–2000 to continue our work in the promotion of onshore Western Australia as an attractive area to explore for hydrocarbons.

David Blight
Director

Get the BIG picture

Two publications just released by the Geological Survey provide the perfect means of getting the BIG PICTURE about the minerals and petroleum industries in Western Australia.

The *Atlas of Western Australian Mineral Deposits and Petroleum Fields* (1999) is a 33-page book showing Western Australia's mineral and petroleum resource projects and deposits against a back-drop of geology derived from the 1998 edition of the State geological map. It is made up of page-sized colour maps at 1:2.5 million scale, showing the location, project or deposit name, and commodity for deposits and development projects throughout the State. In crowded



areas, 1:1 million scale windows have been provided to allow more detailed information to be displayed. Indexes at the back of the Atlas make it simple to locate particular commodities and project owners displayed on individual maps.

The book *Western Australia: Mineral and Petroleum Exploration and Development (1997–98)*, also 33 pages in length, opens with an overview of exploration in WA for 1997–98. This is followed by discussion of levels of exploration, significant discoveries, new developments, and changes to resource inventories both during the year and in a historical context. Major commodities and commodity groups are individually dealt with to give a detailed analysis of the current state of the resources industry in Western Australia.

Both books can be purchased for \$10 (each) from:
Information centre, Mineral House
100 Plain Street, East Perth,
Western Australia 6004
Ph: (08) 9222 3459
Fax: (08) 9222 3444



More information for petroleum explorers

Data from 243 exploration wells from the Carnarvon Basin

The Geological Survey has released two new publications covering petroleum exploration wells drilled in Western Australia. These are the fourth and fifth in a series under the banner of *Schedules of Petroleum Exploration Wells* and provide details of wells drilled in the Carnarvon Basin of Western Australia. The two new volumes detail all exploration wells drilled in the onshore Carnarvon Basin, which is one of the areas currently being reviewed for petroleum prospectivity by the Geological Survey.

The two Schedules cover:

- the Lambert and Peedamullah Shelves and the Exmouth Sub-basin (164 wells), and
- the Merlinleigh and Byro Sub-basins and the Gascoyne Platform (79 wells).

Where available, details provided include:

- Location and date drilled
- Well logs run
- Velocity surveys
- Formation tops
- Show descriptions
- DST and RFT results
- Sidewall core descriptions
- Core data
- Porosity and permeability
- Rock-eval pyrolysis
- Vitrinite reflectance
- Biostratigraphy
- Casing, mud and plug data

The information is provided in both hardcopy and digital format. Digital data are provided in MS Excel (v.5.0) format, ready for import into databases and GIS systems. The data can also be made available in ASCII format on request.



These publications provide explorers with the most up-to-date information in the most accessible form.

Previously released *Schedules of Petroleum Exploration Wells* cover:

- The Bonaparte and Browse Basins
- The Perth Basin
- The Canning, Officer, Bremer and Eucla Basins

All can be purchased from the Information Centre for \$100 each (in printed and digital formats) at the Department of Minerals and Energy 100 Plain Street, East Perth, Western Australia 6004
Ph: 08 9222 3459; fax: 08 9222 3444

New Catalogue of GSWA maps and publications

The new, improved March 1999 edition of the GSWA catalogue is now available in hardcopy and via our website.

This 70-page new edition, with 17 index maps, brings together the two previously separate map and book catalogues into one volume covering all published output of the Geological Survey between 1980 and March 1999 (for older publications, the existing 'Pre-1980 Catalogue' remains the current reference).

Some new features of the 1999 catalogue are:

- ♦ pointers to new publications added since the last edition,
- ♦ a section devoted to GIS packages available,
- ♦ for maps, an indication whether they are also available in digital format, and
- ♦ simplified postage and handling charges to help you fill out the order form (we understand them now, and therefore hope that you do too).

You can access our catalogue on the WWW

The catalogue is also now viewable (in pdf format) at our website — www.dme.wa.gov.au/geology. Using Acrobat Reader (freeware from Adobe) you can now read our catalogue on your PC, carry out

simple searches, download it on to your hard drive, or print all or part of it with your own printer.



If you want to know what's really new, go to the "Hot off the press" button at our website where you will find details of our latest published output — those items that haven't yet been included in our hardcopy catalogue. You'll find it at www.dme.wa.gov.au/geology.

Chief Government Geologists' Conference comes to Perth

The Geological Survey of Western Australia hosted the 1999 Chief Government Geologists' Conference on 12th and 13th of April in the Department of Minerals and Energy's Mineral House offices. This annual conference brings together the Directors of all the Geological Surveys in Australia, and Papua New Guinea as well as representatives from New Zealand. The Conference constitutes an advisory group to the Australian and New Zealand Minerals and Energy Council (ANZMEC) that consists of minerals and energy ministers from Australia and New Zealand. ANZMEC's mission is to promote the general welfare and progressive development of the Australian mining and minerals industry, and to consult on the nation's energy needs, resources and policies.

This two-day conference provides an important forum for examining current issues affecting the role of Geological Surveys in the Australian exploration industry.

One of the important outcomes of this year's conference was the adoption of National guidelines for the submission by exploration companies of geoscientific reports

to government in digital form. Uniform guidelines adopted by all States will mean that exploration data are more useable by companies undertaking exploration in the future and that companies working in more than one State do not have to meet a variety of reporting requirements.

GSWA Director David Blight said that "a great deal of exploration information is stored in digital form by companies, so why shouldn't we accept it in that form? The guidelines were developed with the aim of ensuring that digital geological information can be accepted and preserved in similar form across all States".

Dr Blight stressed that at this stage, submission of statutory reports in digital format is not compulsory in Western Australia, but he felt that many mineral tenement holders would welcome the opportunity to do so.

"We have been working on this project for the past twelve months. Endorsement of the guidelines in a national forum is the final, satisfying step that marks the start of a new era of more efficient handling of information of immense

value to industry" Dr Blight said.

A copy of the new requirements for submitting statutory mineral exploration data in digital format is available on the DME web site at www.dme.wa.gov.au/statdata.

The Chief Government Geologists also raised their concerns about the current downturn in the exploration industry.

This led to a discussion on the need to attract new investors to the Australian exploration industry. The Chief Government Geologists will be emphasising to ANZMEC that the wide availability of geoscientific information represents a significant comparative advantage Australia has over many other countries. Dr Blight said, "we need to promote Australia's prospectivity to potential new investors using geological data compiled by geological survey organizations. This means mounting displays highlighting our geological information at investment seminars both in Australia and overseas."

The Geological Survey of Western Australia has already increased its efforts to publicise available open-file data both at industry conferences and via the World Wide Web. □

Promoting the prospectivity of Western Australia

Our vision for the State of Western Australia and the Geological Survey as an organisation is stated as follows in the preamble of our Annual Review: *to make Western Australia the focus of international mineral and petroleum exploration by becoming the benchmark for the delivery of prospectivity-enhancing, high-quality geoscientific products and services.*

Becoming the *international* benchmark for government delivery of geoscientific products to industry

is a tall order, but one that we aspire to. We may not have achieved it yet, but we believe we are well on the way.

We also need to make sure we let our customers and potential customers know what it is we produce, and that it is of value to them. One of the ways we have been doing this in recent years is by displaying our wares both nationally and internationally at industry conferences.

In March and April 1999, GSWA staff promoted the prospectivity of WA at the following conferences:

- Prospectors and Developers' Association of Canada (PDAC) Annual Conference in Toronto
- American Association of Petroleum Geologists (AAPG) Conference in San Antonio
- Australian Petroleum Production and Exploration (APPEA) Conference in Perth
- 19th International Geochemical Exploration Symposium (IGES) in Vancouver



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Prospectors and Developers Association of Canada (PDAC)

At PDAC in Toronto, we were part of the Australian Pavilion, which was jointly organised by AGSO and AusTrade. Dr Ivor Roberts represented GSWA and oversaw our display on the theme of: *Western Australia: Proven resources and untapped potential.*



Ivor Roberts at PDAC

Our display material featured the new 1998 edition of the State geological map annotated with all operating mines and known mineral deposits to show that we have an extensive array of both operating resource projects and deposits with potential for future development. This was complimented by a display of the Eastern Goldfield region showing the extent of the seamless geological map and GIS dataset currently being assembled by staff in our Kalgoorlie regional office.

There was considerable interest shown in Western Australia, both at the PDAC venue, and at a number of meetings arranged by the Australian contingent with mining companies and financial institutions. As expected, gold was of interest to many, but there were also numerous questions about lateritic nickel projects, diamonds, and vanadium.

American Association of Petroleum Geologists Conference (AAPG)

This year was the second time in recent years that we have travelled to the United States to attend AAPG, the largest petroleum conference in the world (more than 6000 attendees). Phillip Playford and Greg Carlsen (GSWA), and Bill Tinapple (Petroleum Operations) attended the conference this year. Dr Playford presented a poster session on his work on the Devonian reefs of the Canning Basin and Greg Carlsen spent much of his time fielding questions about our display material. The theme of the display was — *Western Australia: Proven production and untapped potential.* Our major emphasis was on new data developed for onshore basins over the last five



Phil Playford (right) and co-worker Dr Gil Klapper (University of Iowa) at AAPG 99

years of our 'Petroleum Initiatives' program; in particular, the onshore Carnarvon Basin and the Officer Basin. Our presence at AAPG went some considerable way to raising international awareness of the breadth and scope of the work we are doing onshore and the petroleum potential of Western Australia.

Australian Petroleum Production and Exploration Conference (APPEA)

The annual APPEA Conference is the most important petroleum conference on the Australian Calendar.

It was held in Perth this year and several staff members from our Perth office, and staff from the Department's Petroleum Operations Division, attended.

Greg Carlsen, Project Leader of the Petroleum Initiatives (Interior Basins) team presented a paper on the '*Petroleum potential of the western Officer Basin*'. A combined GSWA and Petroleum Operations Division display was mounted reinforcing the petroleum potential of huge areas of onshore Western Australia that remain largely unexplored. Our recent work has been focussed on providing an information base that will underpin discovery by industry of new petroleum resources onshore for the 21st Century. There was again considerable interest in the results we are now presenting as an outcome of five years of funding for the onshore Petroleum Initiatives program.

19th International Geochemical Exploration Symposium (IGES)

Paul Morris, GSWA Chief Geochemist, attended IGES in Vancouver and presented a paper on the GSWA regolith and geochemical mapping program. In discussion with other delegates after his presentation it became clear that the GSWA program differs to similar programs being carried out by Geological Surveys elsewhere in the world. In particular, the fact that GSWA systematically collects data on regolith and surrounding geology at all sample sites, and incorporates that information in interpretation of the geochemical analyses obtained, is unique. The economies of scale achieved by simultaneous collection of regolith samples and gravity data was also of interest to the international audience. □



Bush Telegraph — Where we are working

<i>Location</i>	<i>Map sheets</i>	<i>Dates</i>	<i>Activities</i>	<i>Team members</i>	<i>Contact details</i>
Bangemall Basin	MARONAH, MANGAROON, and EDMUND 1:100 000 sheets	Mid April – October	Field mapping, stratigraphic, structural, and sedimentological analysis, sampling for geochemistry and geochronology.	Alan Thorne, David Martin	Alan Thorne Email: a.thorne@dme.wa.gov.au Ph: (08) 9222 3335
Southern Cross; about 250 km north of Southern Cross and 150 km west of Leonora; eastern side of Lake Barlee	BARLEE, MARMION and RICHARDSON 1:100 000 sheets; MENZIES 1:250 000 sheet	May – November	Field mapping, structural studies, whole-rock geochemistry, SHRIMP U-Pb zircon geochronology on granites and greenstones	Stephen Wyche, She Fa Chen, Angela Riganti, John Greenfield	Perth: Stephen Wyche; Ph: (08) 9222 3606 Email: s.wyche@dme.wa.gov.au Kalgoorlie-Boulder : Angela Riganti Ph: (08) 9021 9425
Southern Gascoyne Complex	GLENBURGH 1:250 000 sheet	May – June	Field mapping, whole-rock geochemistry sampling, geochronology sampling	Ian Tyler, Sandra Occhipinti	Ian Tyler Ph: (08) 9222 3605 email i.tyler@dme.wa.gov.au
Margaret River and Geraldton	COWARAMUP, KARRIDALE, LEEUWIN, HOWATHARRA and GERALDTON 1:50 000 sheets	16/4–7/5, 24/5–11/6, 19/7–6/8, 23/8–10/9, 27/9–15/10	Regolith terrain unit mapping, bedrock mapping, gravity survey, shallow regolith drilling, sample analysis	Richard Langford, Glennis Hall, Jodi Marnham	Richard Langford Ph: (08) 9222 3632 Email: r.langford@dme.wa.gov.au
Officer Basin, Waigen Sub-basin	COOPER 1:250 000, V INES 1:100 000 sheets	April – August	Stratigraphic coring investigating petroleum systems	Greg Carlsen, Henry Moors, Mark Stevens, Neil Apak	Greg Carlsen Ph: (08) 9222 3760 Email: g.carlsen@dme.wa.gov.au
Earaheedy Basin	MUDAN, WONGAWOL, LEE STEERE 1:100 000 sheets	May – October	Geological mapping, petrography, geochemistry, geochronology and palaeomagnetism studies	Franco Pirajno, Roger Hocking, Amanda Jones	Franco Pirajno Ph: (08) 9222 3155 Email: f.pirajno@dme.wa.gov.au
Earaheedy Basin	STANLEY 1:250 000 sheet	Late May – early June	Regolith mapping, geochemical sampling, gravity survey	Regolith geochemistry : Paul Morris, Julian Coker Gravity data : Sergei Shevchenko, David Howard	Regolith geochemistry : Paul Morris Ph: (08) 9222 3345 Email: p.morris@dme.wa.gov.au Gravity data : David Howard Ph: (08) 9222 3331 Email: d.howard@dme.wa.gov.au
Carnarvon Basin, Capricorn Orogen	WINNING POOL – MINILYA 1:250 000 sheet	Late July –early August	Regolith mapping, geochemical sampling, gravity survey	Regolith geochemistry : Andrew Sanders Gravity data : Sergei Shevchenko, David Howard	Regolith geochemistry : Paul Morris Ph: (08) 9222 3345 Email: p.morris@dme.wa.gov.au. Gravity data : David Howard Ph: (08) 9222 3331 Email: d.howard@dme.wa.gov.au
North Pilbara	TAMBOURAH, SPLIT ROCK, SATIRIST, WALLARINGA, WHITE SPRINGS, MOUNT EDGAR, COOYA POOYA, MARBLE BAR, NULLAGINE, EASTERN CREEK 1:100, 000 sheets, and PYRAMID 1:250 000 sheet	April – October	Geological mapping, sampling for petrography, geochemistry and geochronology. Conducting public geological excursions from mid-June to early July.	Arthur Hickman, Ian Williams, Leon Bagas, Hugh Smithies, Martin Van Kranendonk, Terry Farrell	Arthur Hickman; Ph: (08) 9222 3220 Fax: (08) 9222 3633 Email: a.hickman@dme.wa.gov.au





SOME RECENT PUBLICATIONS

Lead, Zinc, and Silver deposits of Western Australia MINERAL RESOURCES BULLETIN 15

by K. M. Ferguson \$50.00

Six mineral deposits of significance in Western Australia: bentonite, feldspar, kaolin, micaceous iron oxide, talc and tourmaline

REPORT 67 by J. M. Fetherston, P. B. Abeyasinghe,
J. Shanqing, and W. Guowu \$35.00

Stratigraphy and petroleum exploration objectives of the Permo-Carboniferous succession on the Barbwire Terrace and adjacent areas, northeast Canning Basin, Western Australia

REPORT 68 by S. N. Apak and J. Backhouse \$35.00

GSWA 99 extended abstracts: new geological data for WA explorers **RECORD 1999/6** by GSWA \$10.00

Barrabiddy 1 and 1A well-completion report, Wandagee Ridge, southern Carnarvon Basin, Western Australia

RECORD 1999/3 by A. J. Mory and A. R. Yasin \$20.00

EXPLANATORY NOTES

Geology of the CUNYU (2945) 1:100 000 sheet

by N. G. Adamides, F. Pirajno, and T. R. Farrell
(map and notes) \$20.00

Geology of the MARQUIS (2446) 1:100 000 sheet

by S. Sheppard and C. P. Swager (map and notes) \$20.00

Geology of the MOORARIE (2956) 1:100 000 sheet

by S. A. Occhipinti and J. S. Myers (map and notes) .. \$20.00

Geology of the MUCCAN (2956) 1:100 000 sheet

by I. R. Williams (map and notes) \$20.00

Geology of the YULE (2556) 1:100 000 sheet

by R. H. Smithies (map and notes) \$20.00

Geology of the EDJUDINA (SH 51-6) 1:250 000 sheet Western Australia (2nd edition)

by S. F. Chen (map and notes) \$15.00

Geochemical mapping of the COLLIER (SG 50-4)

1:250 000 sheet by J. Coker and J. A. Faulkner
(maps, notes and digital data) \$100.00

Also available in GIS format (ARC/INFO, ArcView,

MapInfo) \$100.00

1:100 000 GEOLOGICAL SERIES MAPS

COORAGOORA (2957) by I. R. Williams \$10.00

ERRABIDDY (2347) preliminary release

by S. A. Occhipinti and S. Sheppard \$10.00

FAIRBAIRN (2947) by F. Pirajno, N. G. Adamides and

R. M. Hocking \$10.00

MARQUIS (2447) by S. Sheppard, C. P. Swager, and

S. A. Occhipinti \$10.00

MOORARIE (2446) by S. A. Occhipinti and

J. S. Myers \$10.00

OTHER MAPS

Interpreted geology of the Palaeoproterozoic Yerrida Basin (Plates 1 & 2 to accompany report 60, in prep.),

by F. Pirajno \$10.00

MISCELLANEOUS PUBLICATIONS

Western Australia: Atlas of mineral deposits and petroleum fields (1999)

by GSWA \$10.00

Mineral and petroleum exploration and development in Western Australia in 1997-98

by D. J. Flint, P. B. Abeyasinghe, Mai Gao, D. B. Townsend,
and R. H. Bruce \$10.00

Schedule of petroleum exploration wells - Carnarvon Basin: Merlinleigh and Byro Sub-basins, and Gascoyne Platform (includes digital data)

by J. H. Haworth and L. M. Arden \$100.00

Schedule of petroleum exploration wells - Carnarvon Basin: Lambert and Peedamullah Shelves, and Exmouth Sub-basin (includes digital data)

by J. H. Haworth and L. M. Arden \$100.00

Summary of petroleum prospectivity, onshore Western Australia: Canning, Officer, Perth, and Southern Carnarvon Basins

by GSWA free of charge

Catalogue of geological maps and publications (March 1999 edition)

by GSWA free of charge



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

This and earlier issues of Fieldnotes can be accessed at: www.dme.wa.gov.au/geology