



## From the Director's Desk

In this first issue of Fieldnotes for 1999, I felt it was an appropriate time to reflect on some of our achievements for 1998. It was a good year for the Geological Survey in which we broke all previous records for volume of published output (for the 1997-98 financial year). In particular, 1998 was a year in which we received recognition for the quality of both our people and our work from several external sources.

During the year we were honoured by the following awards:

- Dr Walter Witt was awarded the Geological Society of Australia's *Gibb Maitland Medal* in recognition of his work in the Eastern Goldfields (Walter has now moved on and is applying his expertise in industry).
- Dr Phillip Playford was rewarded for a lifetime of geological and historical work when, in the Queen's Birthday Honours List, he was admitted to the *Order of Australia*.
- The Survey received the Australian Geological Survey Organisation Award for *Excellence in a Geoscientific Theme* from the Mapping Sciences Institute of Australia for geochemical mapping on the NABBERU 1:250 000 sheet, and also received a *High Commendation* for the digital data package accompanying the Bangemall Basin mineral occurrences and exploration potential study (GSWA Report 64).
- GSWA's Sensitive High-Resolution Ion Microprobe (SHRIMP) geochronology team won the *StateWest Achievement Award* for their outstanding performance in recent years, including recognition of efficiency gains resulting from process improvement initiatives, and 'world's best' practice in rapid and efficient dissemination of results.
- GSWA's regolith geochemistry team was a finalist in the *Process Improvement* category of the *1998 Premier's Awards* for the efficiencies gained in combining helicopter-supported regolith sample collection with gravity data acquisition.

We have always taken considerable pride in the quality of our people, and our work. We have been striving to maintain that quality over the past few years in an environment where we have been responding to industry calls for more output, and faster output. I believe the quality of our work has not been compromised by the recent increase in the output of geoscientific data for industry. The Geological Survey of Western Australia can be justifiably proud of the external recognition of the quality of our people and work by virtue of these 1998 awards.

**David Blight**  
**Director**



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**NEW RELEASE**

## New Edition State map

A new 1:2.5 million-scale geological map of Western Australia was released by the Geological Survey of Western Australia in December 1998. The State map was compiled by John Myers and Roger Hocking.

This map superficially resembles its predecessor, which was published in 1988, but has been extensively revised. Large portions of the map are based on regional mapping over the past 10 years by GSWA, especially in the Eastern Goldfields, Glengarry, Southern Gascoyne, Rudall, Pilbara, and Kimberley areas. In addition, the map contains a substantial amount of new structural and tectonic interpretation, based on the integration of geological mapping with airborne magnetic and gravity data. Many observations and interpretations appear for the first time on this map.

The geology is subdivided and portrayed in a similar manner to the 1988 map, with largely the same colour scheme and style of legend.

Precambrian geology is displayed as either lithostratigraphic packages of formations and groups that are relatively little deformed or metamorphosed, or by lithology in belts of more highly deformed and metamorphosed rocks. New geochronological results obtained during the past ten years have enabled the ages of Precambrian geological units to be defined with greater precision. This information has been used to place most Precambrian rock units into time slots of 100 million years.

The Phanerozoic geology is presented as major depositional rock packages, but more finely subdivided.

The main new features of the 1998 State geological map are:

- Completely new compilation of the geology of the eastern part of the Yilgarn Craton, southern part of the Capricorn Orogen, Pilbara granite–greenstone terrain, the Rudall portion of the Paterson Orogen, and the Halls Creek and King Leopold Orogens — all largely based on new mapping at 1:100 000 scale.
- Geological structures have been substantially reinterpreted by integrating geological mapping with the latest airborne magnetic and gravity data.
- Reinterpretation of the eastern part of the Albany–Fraser Orogen based on new geological reconnaissance mapping, geochronology, and geophysics.
- Interpretation of the geological structure of crystalline basement beneath the Canning, Officer, and Eucla Basins.
- The addition of major offshore fault structures interpreted and compiled from both published and unpublished sources, including GeoSat and ERS-1 satellite data, and linked with structures on land.
- Major fault systems and movements are indicated at both near-surface and sub-surface levels.

- Major revisions of lithostratigraphy in the southern part of the Capricorn Orogen and the Centralian Superbasin.
- Contours showing the thickness of Neoproterozoic sedimentary rocks in the Officer Basin.
- A revision of the geology of the Perth and Carnarvon Basins.
- Contours showing the thickness of Phanerozoic sedimentary rocks offshore, and in the Canning, Officer, and Eucla Basins.
- Dolerite dykes interpreted from airborne magnetic data and mapped exposures.
- Location of the pre-Miocene palaeodrainage systems.

The map is available in both paper and digital form from the Information Centre, First Floor, Mineral House, Department of Minerals and Energy, 100 Plain Street, East Perth, WA 6004;  
Ph: (08) 9222 3459;  
Fax (08) 9222 3444.

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**(for Phanerozoic geology)**









# Submission of statutory mineral exploration data in digital format

For a number of years the Department of Minerals and Energy (DME) has accepted statutory mineral exploration data in digital format on an ad hoc basis. Currently, the Department holds some 1200 digital files submitted in this way. However, several factors have encouraged DME to begin acceptance of digital data on a more formal basis.

Firstly, the increasing adoption by industry of low-cost, user-friendly, desktop spreadsheet, database, and GIS software has meant that more mineral exploration data are being generated and stored in digital format.

Many industry representatives have commented that they would prefer to submit digital data to DME, rather than printing large tables from their databases and submitting them in hard copy format.

Secondly, on release to open file, digital data are far more flexible and useable to the exploration industry than analogue data. Digital data can be added to mineral district or regional databases, enhancing the value of each individual piece of data. Once downloaded to the larger data set, the new data are immediately available for analysis

in desktop GIS software. If desired, digital data can also be printed out or plotted on paper.

Thirdly, the present method used by DME to release open-file data is by microfiche. This means that data originally generated in a digital environment by tenement holders are subsequently submitted to DME in hard copy. On release to open file, users of the data must scan either the microfiche or a hard copy using optical character recognition software or, worse still, re-enter the data by hand into databases so they can be manipulated with other digital data.

Clearly, there are economies to be gained by both DME and industry if exploration data can be submitted and released to open file in digital format. A further problem with microfiche is that the technology is fast approaching its use-by date, and microfiche readers are becoming less common items of office equipment.

Finally, most data submitted today will probably not be released to open file for at least five years, and possibly ten. By then, almost all mineral exploration data will be captured, manipulated, stored and traded in digital formats. Within ten years, common standards for the capture, storage and transfer of mineral exploration data should have developed or evolved in much the same way as in the petroleum exploration industry.

DME therefore wishes to provide for the release of open-file mineral exploration data in digital format by accepting digital data now. ►

## *Requirements for the submission of mineral exploration information in digital format*

<b>Policy</b>	Submission of digital information <i>is not compulsory</i> A small concise hard copy report is still required Formats for digital data to be consistent with industry standards, be flexible, affordable, and preferably cross-platform Metadata and file header data must be sufficient to enable effective use of data when released to open file
<b>Starting date for submission</b>	February 1999
<b>Media accepted</b>	3.5 inch floppy disk CD-ROM Exabyte (for large geophysical datasets)
<b>Types of data accepted</b>	Tabular (geochemical, drill logs, etc.) Geophysical data Large maps, plans and drawings Text (text figures, photographs, and tables)
<b>File formats</b>	
Tabular	ASCII (SDTS for spatial data)
Geophysical data	ASEG GDF2 (gravity, magnetics) SEG Y (field and processed seismic data) UKOOA (location data)
Large maps, plans, drawings	EPS, PDF (images)
Text	PDF
<b>Metadata</b>	Some metadata and file header fields are compulsory Detailed guidelines for these are available
<b>Location data</b>	Must be expressed as either AMG or geographic coordinates (lat/long), preferably with elevation relative to AHD Metadata, including zone, datum, and projection, are required

### Requirements for digital data submission

The accompanying table summarizes the requirements that have been circulated to the W.A. Chamber of Minerals and Energy, the Association of Mining and Exploration Companies, and the Mineral Industry Liaison Committee.

The development of detailed requirements for specific data types (drill logs, geochemistry, and spatial data) has involved meetings with industry focus groups. These detailed requirements will be circulated to industry in February.

### Common Australia-wide standards for statutory data?

All States have either implemented or are in the process of developing guidelines for submission of statutory mineral exploration data in digital format. The issue of developing submission requirements with a degree of commonality with respect to format for each data type will be discussed at the Chief Government Geologists Conference to be held in April 1999 in Perth. Adoption of such a strategy by the States would assist tenement holders in meeting reporting requirements throughout Australia.

### Need more information or assistance?

Although submission of digital data is not compulsory, DME is keen to obtain as much quality data as possible. There will undoubtedly be teething problems in both DME and industry with submission of digital data. DME welcomes comments concerning the requirements and is willing to help tenement holders with any inquiries they may have concerning formats and standards for different data types. If you have any problems, please contact us **before submitting data.** □

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**NEW RELEASE**

## GSWA Annual Review 1997–98

The 1997–98 Annual Review of the Geological Survey of Western Australia has just been released. As well as reviewing all projects that make up the Survey's program for the year, the Review contains the:

- Director's review of the year.
- Overview of mineral and petroleum exploration and development in WA for 1997–98.
- Eleven short technical papers on a variety of subjects offering a glimpse of the types of research and mapping undertaken during the year:
  - several papers cover the west Pilbara, including papers on Archaean volcanism in the Fortescue Group; mapping of the North Shaw 1:100 000 map sheet; compositional changes in Archaean granites; and structures in the Cape Preston area;
  - a paper on the Marymia Inlier;

**Free of charge**



- an interpretation of the type section from the Irregularly Formation (Bangemall Basin);
- a discussion of compressional structures in the Edjudina–Laverton area;

- the use of regolith geochemical mapping as an adjunct to mineral exploration;
- a report on micaceous iron oxide from Mount Gould; and
- results of GSWA Empress 1A stratigraphic hole.

The Annual Review provides a neat 'package' of information about the Geological Survey — its work programs, contact personnel, publications for the year, brief papers outlining current findings on ongoing research and mapping projects, as well as proposals for future work programs. □

**Copies 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**



## SHRIMP Geochronology Team receives Achievement Award

The exceptional performance over the last five years of the Geological Survey's Sensitive High-Resolution Ion Microprobe (SHRIMP) team was recognized in December 1998 when the team won the 1988 StateWest Achievement Award for 'Excellence In The Workplace'.

The Western Australian SHRIMP is one of only six in the world, and since it was commissioned, GSWA's geochronology team has produced a wealth of information on rock age determinations. These have been of immense value to GSWA's regional mapping program, the mineral exploration industry, and research institutions in Western Australia and elsewhere.

The award was won because of several of the SHRIMP team's achievements:

- Process improvement initiatives in laboratory sample preparation techniques provided a 65% increase in productivity in the three years to 1997. These levels of output represent the 'world's best' and have been maintained in 1998.
- Equipment and processes were designed to allow improved efficiency in the separation and analysis of minerals such as titanite, baddeleyite, and monazite.



*The Shrimp Team — David Nelson (Team leader), Marianna Brzusek (Senior Laboratory Technician) and John Williams (Laboratory Manager).*

- The rapid dissemination of results to customers — from sample collection to analysis and publication within 12 months. The annual publication of zircon age determinations in GSWA's Record series over the last four years was recognized as being exceptional customer service.

Complimentary testimonials from the Australian Geological Survey Organisation's Geochronology Laboratory and the Australian National University's Geochronology and Isotope

Geochemistry group were also instrumental in demonstrating peer satisfaction and admiration of the GSWA's geochronological output.

David Nelson (Team Leader), John Williams (Laboratory Manager) and Marianna Brzusek (Senior Laboratory Technician) are all to be congratulated on the award. □

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**The East Yilgarn Terrane Custodianship Team** have completed field checking along map boundaries of nineteen 1:100 000 map sheets in the southern Eastern Goldfields for phase 1 of the

seamless geological database. Fieldwork is also complete for the MOUNT BELCHES 1:100 000 map sheet and is still in progress for the WOOLGANGIE 1:100 000 sheet.

Despite record breaking rainfall in the Gascoyne area this winter, the **Bangemall Team** have completed mapping Bangemall Group rocks on the ULLAWARRA and CAPRICORN 1:100 000 map sheets. Fieldwork ►

## Bush Telegraph — Where we are working



on MAROONAH and MANGAROOON 1:100 000 and EDMUND 1:250 000 map sheets is due to be completed early in the 1999 field season.

The **Interior Basins Team** will return in April 1999 to the VINES 1:100 000 sheet, about 90 km south of the Blackstone Range on the COOPER 1:250 000 sheet in the Warburton region, to prepare for their next stratigraphic drillhole — Vines 1. This field program includes site selection, water well drilling, drill-site preparation, a stratigraphic test programmed to a maximum depth of 2000 m, wire-line logging, and site remediation.

In the 1999 field season the **Southern Gascoyne Team** will complete remapping on the GLENBURGH 1:250 000 map sheet. This will involve mapping across the Errabiddy Fault on the ERONG and YALBRA 1:100 000 map sheets, which separates the northern edge of the Archaean Narryer Complex

from c. 2.0 Ga Palaeoproterozoic rocks of the Gascoyne Complex. Mapping of Palaeoproterozoic metamorphic and igneous rocks will also be carried out on the CARRANDIBBY and DAURIE CREEK 1:100 000 sheets. A reassessment of Permian rocks on these sheets will be carried out in conjunction with the **Western Margin Petroleum Studies Team**.

In 1999 the **Regolith and Geochemical Mapping Team** will be collecting regolith samples and gravity data over the KINGSTON, STANLEY, BYRO, and WINNING POOL 1:250 000 map sheets. The sampling program will commence with KINGSTON in April.

During 1998 the **Pilbara Craton Team** undertook fieldwork on MARBLE BAR, MOUNT EDGAR, PATERSON, TAMBOURAH, SATIRIST, and WODGINA 1:100 000 sheets. About 60 samples are now being processed for SHRIMP U-Pb zircon

geochronology and new dates are expected early in 1999. Collaborative work with AGSO (on WODGINA and WALLARINGA) and the Vrije University in the Netherlands (on NULLAGINE) continued. A very successful GSWA-AGSO field excursion for industry to the west Pilbara was completed mid-way through the 1998 season (a public excursion is planned for the east Pilbara in June-July 1999). The first half of 1999 will see completion of field mapping for SATIRIST and TAMBOURAH, and commencement of mapping on COOYA POOYA and SPLIT ROCK.

The **Urban And Development Areas Geology Team** have completed mapping of the GERALDTON 1:50 000 sheet. In 1999 1:50 000-scale mapping will continue on the COWARAMUP, KARRIDALE-LEEUEWIN (Southwest Region), and HOWATHARRA-GERALDTON (Mid West Region) 1:50 000 map sheets. □

## GSWA 99 Seminar — New geological data for WA explorers

Following the success of the inaugural GSWA open day in 1998, the Geological Survey of Western Australia will again hold a one-day seminar and poster presentation showcasing new geological data for W.A. explorers.

Our aim is to show explorers early results of the Survey's ongoing work program to promote and enhance the prospectivity of Western Australia for minerals and petroleum.

Throughout the day, selected staff will make technical presentations on work in progress. As well as technical presentations, both recent published work and work in progress will be highlighted in a number of poster displays, and staff will be on hand to field questions.

The detailed program and registration details will be publicized in late February or early March. □

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### SEMINAR



### NEW GEOLOGICAL DATA FOR WA EXPLORERS

on

**30th March 1999**

at the

**Advanced Manufacturing  
Technologies Centre  
Royal Street, East Perth**



## SOME RECENT PUBLICATIONS

**GSWA Annual Review 1997–98** ..... *free of charge*

**Archaean felsic volcanism in parts of the Eastern Goldfields region, Western Australia**

**REPORT 55** by P. A. Morris ..... \$40.00

**Lithostratigraphy and structure of the Palaeoproterozoic lower Padbury Syncline, Milgun 1:100 000 sheet, Western Australia**

**REPORT 62** by D. McB. Martin ..... \$35.00

**GSWA Mooka 1 well completion report, Gascoyne Platform, Southern Carnarvon Basin, Western Australia**

**RECORD 1998/6** by A. J. Mory and A. R. Yasin \$20.00

**Petroleum source-rock potential and thermal history of the Officer Basin, Western Australia**

**RECORD 1998/3** by K. A. R. Ghorri ..... \$20.00

**Program 2 — Industry Support: Geological Survey plan for 1998–99 and subsequent three years**

**RECORD 1998/1** by GSWA ..... \$20.00

**Armour-stone investigation north of King Bay, Burrup Peninsula, Western Australia**

by S. J. Brice and P. B. Abeyasinghe ..... \$20.00

### NEW EDITION (1998) STATE MAP

**Geological map of Western Australia, 1: 2.5 million scale**

by J. S. Myers and R. M. Hocking ..... \$11.00

### 1:250 000 GEOLOGICAL SERIES MAPS

Map only ..... \$10.00

**DIXON RANGE (SH 52-6)** by I. M. Tyler

### 1:100 000 GEOLOGICAL SERIES EXPLANATORY NOTES

Map and explanatory notes ..... \$20.00

**ANGELO (4361) 1:100 000 sheet**

by T. J. Griffin, I. M. Tyler, K. Orth, and S. Sheppard

**DARLOT (3142) 1:100 000 sheet**

by J. M. Westaway and S. Wyche

**DOCKRELL (4360) 1:100 000 sheet**

by I. M. Tyler, T. J. Griffin, and S. Sheppard

**DUKETON (3342) 1:100 000 sheet**

by R. L. Langford and T. R. Farrell

**MOOLOOGOO (2745) 1:100 000 sheet**

by F. Pirajno, N. G. Adamides, and S. A. Occhipinti

**MOUNT WOHLER (2455) 1:100 000 sheet**

by R. H. Smithies

**PEARANA (3154) 1:100 000 sheet**

by I. R. Williams and A. F. Trendall

**RUDALL (3352) 1:100 000 sheet**

by A. H. Hickman and L. Bagas

**SIR SAMUEL (3042) 1:100 000 sheet**

by S. F. Liu, T. J. Griffin, J. M. Westaway, and S. Wyche

**THADUNA (2846) 1:100 000 sheet**

by F. Pirajno and N. G. Adamides

### 1:100 000 GEOLOGICAL SERIES MAPS

Map only ..... \$10.00

**YULE (2556)** by R. H. Smithies

**BLANCHE–CRONIN (Parts Sheets 3552 & 3551)**

by L. Bagas and R. H. Smithies



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