

Fieldnotes



Government of Western Australia
Department of Mines and Petroleum

Geological Survey of
Western Australia



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Successful applicants for exploration drilling



GENERAL

1	Alloy Resources Ltd	20	Lamboo Resources
2	AngloGold Ashanti Australia	21	MacPhersons Resources
3	AngloGold Ashanti Australia	22	Magnetic Resources NL
4	Areva Resources Australia Pty Ltd	23	Millennium Minerals Ltd
5	Areva Resources Australia Pty Ltd	24	Ming Gold Ltd
6	Artemis Resources Ltd	25	Mithril Resources Ltd
7	Beadell Resources Ltd	26	MRG Metals Ltd
8	Breaker Resources Ltd	27	Northern Star Resources
9	Classic Minerals Ltd	28	Quadrio Resources
10	David Reed	29	Ramelius Resources Ltd
11	Echo Resources Ltd	30	Redcliff Resources Ltd
12	Encounter Resources Ltd	31	Reed Resources Ltd
13	Enterprise Uranium Ltd	32	Reward Minerals Ltd
14	Great Sandy Pty Ltd	33	Silver Lake Resources
15	Hanking Gold Mining Pty Ltd	34	Slatey Creek Pty Ltd
16	Horseshoe Metals Ltd	35	Tetra Resources Ltd
17	J. and J. McIntyre	36	Venus Metals Corp.
18	Kamax Resources Ltd	37	Windward Resources Ltd
19	Lamboo Resources		

PROSPECTORS

38	David Pascoe
39	Giles Rodney Dale
40	Linnie Harris
41	Maier Mining Contractors Pty Ltd
42	Neil Hass
43	Scott Wilson
44	Thomas Langley

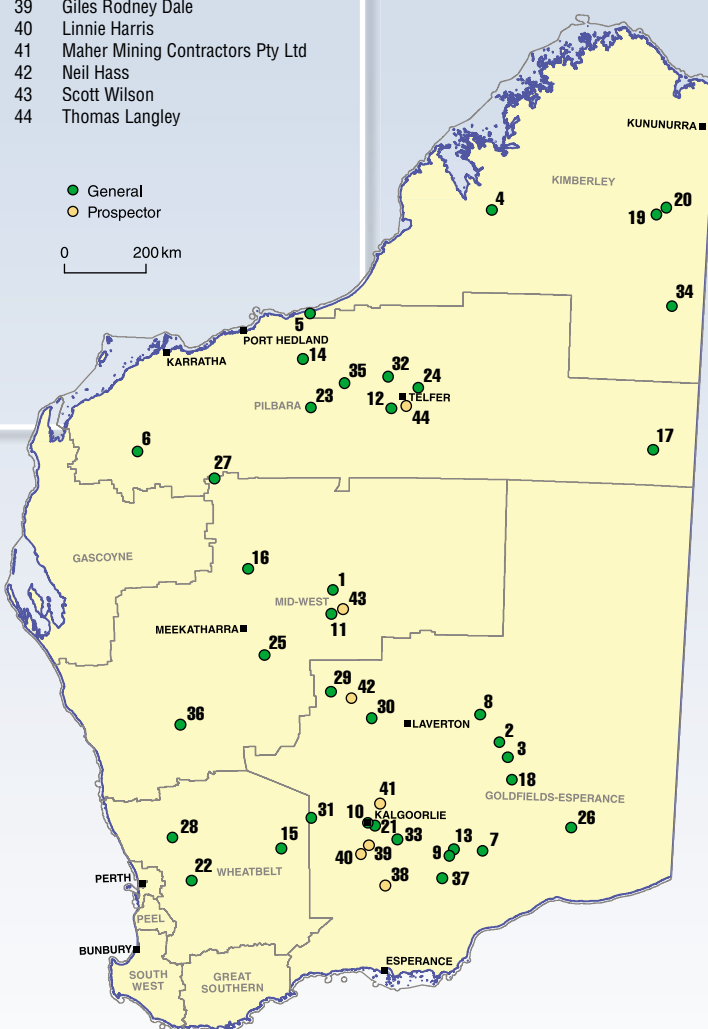


Figure 1. Project locations for Drilling Round 9, 2014–15

The State Government continues to support the exploration of underexplored regional areas with the recent release of the list of successful applicants for Round 9 of the Exploration Incentive Scheme's (EIS) Co-funded Exploration Drilling Program.

This round, which will provide co-funding to projects to be drilled in 2014–15, attracted 86 applications requesting \$8.78 million in co-funding and resulted in grants totalling \$4.68 million being offered to 44 projects, including seven prospector projects.

The EIS Co-funded Drilling Program provides incentives to drill in underexplored areas to ensure the continued economic prosperity of the State's resources industry, particularly in the continuing difficult financial environment being experienced by exploration companies.

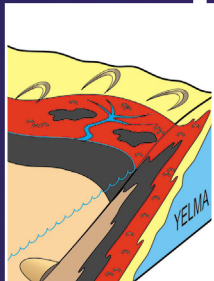
This highly competitive drilling program offers two rounds of co-funding a year and has been supporting co-funded drilling projects since early 2009. It was originally funded from Royalties for Regions, but is now funded from Consolidated Revenue.

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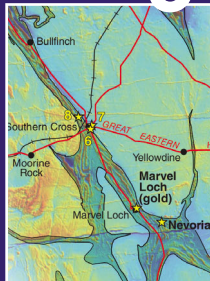
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FREE GSWA database training

The Geological Survey of Western Australia (GSWA) offers FREE training in its databases and online systems. The training is in the form of a presentation with hands on interaction in most systems.

Topics include:

- navigating the Department of Mines and Petroleum's (DMP) website
- searching for geoscience publications
- finding digital datasets using the Data and Software Centre
- searching for open-file mineral exploration reports using WAMEX
- searching the mineral drillholes and geochemistry databases
- bringing it all together with the interactive map viewer, GeoVIEW.WA and GeoMap.WA, a standalone GIS viewer for Windows.

The **morning session** will be a basic introduction of how to use all the programs. During the **afternoon session**, participants will be able to get more in-depth practice using the programs with their own examples, and get some one-on-one advice about individual issues.

Competent computer skills are **essential**. You can attend one or both sessions.

PERTH

Venue: Mineral House, ground floor training room, 100 Plain Street, East Perth

- Thursday 30 October

KALGOORLIE

Venue: Room 102 (computer lab), Goldfields Institute of Technology, Centre for Engineering and Mining Training (CEMT), Mining Hall of Fame, Kalgoorlie

- Thursday 6 November

REGISTER

To register or find out more details, send an email to publications@dmp.wa.gov.au including your details (name, company name, telephone number), the location and date of the training you wish to attend. You can also visit www.dmp.wa.gov.au/training for updates.

2014

PETROLEUM AND GEOTHERMAL OPEN DAY

Thursday 11th September 2014

8.30 am – 4.30 pm

Followed by a Sundowner

Esplanade Hotel Fremantle
Cnr Marine Tce & Essex St, Fremantle

*Immediately following the
GOOD OIL CONFERENCE*

***Find out what is going on with shale gas
and tight gas in Western Australia***

This is a great opportunity to hear presentations and view posters showing the recent activities and information relevant to the Western Australian petroleum and geothermal industries by staff from the Department of Mines and Petroleum as well as industry leaders.

Exhibits and staff from Geoscience Australia, WA:ERA, PESA and Australian Marine Complex will also be available.

REGISTER ONLINE

www.dmp.wa.gov.au/pod2014

For further information, call **(08) 9222 3273**



Government of Western Australia
Department of Mines and Petroleum

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	Applicant Name	Drilling Project Title	Target Commodity
1	Alloy Resources Ltd	Horse Well Project - Dusk Til Dawn Prospect	Au
2	Anglogold Ashanti Australia	Apocalypse, Tropicana JV	Base Metals
3	AngloGold Ashanti Australia	Belvedere Ni-Cu Prospect	Ni, Cu, PGE
4	Areva Resources Australia Pty Ltd	North Canning Project	U
5	Areva Resources Australia Pty Ltd	South Canning - Pardoo Project	U
6	Artemis Resources Ltd	Eastern Hills - Dugite Zone	Sb, Pb, Ag, Au
7	Beadell Resources Ltd	Zanthus AEM Anomaly	Au, Cu, Ni, Pb, Zn
8	Breaker Resources NL	Kurrajong South	Au
9	Classic Minerals Ltd	Fraser Range Diamond rilling	Ni, Cu, Co, Zn
10	David Reed	Kalgoorlie Project	Au
11	Echo Resources Ltd	Lucius Targets	Au
12	Encounter Resources Ltd	Millennium	Zn, Pb, Cu
13	Enterprise Uranium Ltd	Lake Harris	U, Ni, Cu, Co
14	Great Sandy Pty Ltd	Eginbah Iron Project	Fe
15	Hanking Gold Mining Pty Ltd	Jupiter Dilation Targets	Au
16	Horseshoe Metals Ltd	Horseshoe Lights Deep Drilling	Cu, Au
17	J. and J. McIntyre	Webb Diamonds	Diamonds
18	Kamax Resources Ltd	Peninsula Project	Ni, Cu, Co, PGE
19	Lamboo Resources	Panton North Graphite Project	Graphite
20	Lamboo Resources	Black Rock Graphite Project	Graphite
21	MacPhersons Resources	Brindabella Ag-Au	Au, Ag, Zn, Cu, Pb
22	Magnetic Resources NL	Kauring	Fe
23	Millennium Minerals Ltd	High grade feeder to Golden Eagle deposit	Au, Sb
24	Ming Gold Ltd	Havieron	Au, Cu, Ni, W
25	Mithril Resources Ltd	Nanadie Well	Cu, Ni, Au
26	MRG Metals Ltd	Loongana	PGEs, Ni & Cu
27	Northern Star Resources	Titus Prospect - Ashburton Project	Au
28	Quadrio Resources	Calingiri Diamond	Cu, Mo, Ag, Au
29	Ramelius Resources Ltd	Vivien Deeps Diamond Drilling	Au
30	Redcliffe Resources Ltd	Kelly Deep Drilling Initiative	Au
31	Reed Resources Ltd	Green Dam Prospect - Blind NiS target	Ni, Cu, PGE
32	Reward Minerals Ltd	Lake Waukarlycarly	Potash Brines
33	Silver Lake Resources	Mt Belches Strat. Correlation & Fluid Pathways	Au
34	Slatey Creek Pty Ltd	Selby Prospect Exploration Drilling	Cu, REE, Au
35	Tetra Resources Ltd	Midgengadge Manganese Project	Mn
36	VenusS Metals Corp	Yalgoo Ni-PGE Base Metals Project	Ni, PGE, Base Metals
37	Windward Resources Ltd	Fraser Range North Win-Eye	Ni Cu
38	David Pascoe	New Waverley	Au
39	Giles Rodney Dale	Breakaway Andalusite Project	Andalusite
40	Linnie Harris	Miracle7	Au, Ag, Cu & Fe
41	Maher Mining Contractors Pty Ltd	Gindalbie	Au
42	Neil Hass	Goanna Patch Extensions	Au
43	Scott Wilson	Cowza South Prospect	Au, Ni
44	Thomas Langley	Grace Gold Project	Au

Figure 2. Successful applicants for Drilling Round 9, 2014–15

Projects drilled with the support of the Program are showing significant results both economically and scientifically, with new discoveries being made every year.

Some discoveries, such as Sirius' 'Nova' discovery, are in the process of becoming mines and have encouraged further exploration in a previously underexplored region. Other drilling programs, such as Border Exploration's 'Top Up Rise' drilling program, have been part of the exploration in the West Arunta which is one of the least studied and least understood areas of the State.

The Geological Survey of Western Australia's (GSWA) precompetitive geophysics and geochemistry information, together with information being released as a result of collaborative research projects with Western Australian universities and CSIRO, are being used by explorers to identify exploration targets.

The Co-funded Drilling Program refunds up to 50 per cent of direct drilling costs with caps of \$150 000 for a multi-hole project, \$200 000 for a single deep hole, and \$30 000 for a prospector's project.

The Program, which has significant industry support and is subject to probity audits to ensure a fair and transparent process, will be open for applications again between 11 August and 3 October 2014, for drilling projects to be undertaken in the 2015 calendar year.

Funding for this highly successful scheme, which has seen an increase in Western Australia's ranking to be the world's top investment destination for explorers as measured by the world renowned Fraser Institute Survey, continues until the end of June 2017.

Information acquired by the companies is publically released on the Department of Mines and Petroleum (DMP) website. This adds to the geological knowledge of the State, and reduces the risk for subsequent explorers.

A list of successful applicants and a map of project locations are available at <www.dmp.wa.gov.au/eisdrilling>.

For more information, contact Margaret Ellis (margaret.ellis@dmp.wa.gov.au).

Sedimentology and stratigraphy of the iron formation, Frere Formation

Report 130 is the outcome of a cooperative MSc project written by Sara J Akin conducted by Acadia University (Canada) and the Geological Survey of Western Australia (GSWA). The report focuses on the sedimentology and stratigraphy of the iron formation of the Frere Formation of the Paleoproterozoic Earaheedy Basin.

The Paleoproterozoic Frere Formation (c. 1.88 Ga) of the Earaheedy Basin, Western Australia, is a c. 600 m thick succession of iron formation and fine-grained, clastic sedimentary rocks that accumulated on an unrimmed continental margin with oceanic upwelling. Lithofacies stacking patterns suggest deposition occurred during a marine transgression punctuated by higher frequency relative sea-level fluctuations that produced five parasequences. Decimetre-scale parasequences are defined by flooding surfaces overlain by either laminated magnetite or magnetite-bearing, hummocky cross-stratified sandstone that grades upward into interbedded hematite-rich mudstone and trough cross-stratified granular iron formation. Each aggradational cycle is interpreted to record progradation of intertidal and tidal channel sediments over shallow subtidal and storm-generated deposits of the middle shelf. The presence of eolian dunes, mud cracks and the absence of coarse clastics in nearshore and deeper subtidal settings indicate deposition along an arid coastline with wind-blown sediment.

Iron formation in the Frere Formation is almost exclusively peritidal, contrasting with other Paleoproterozoic iron formations. These continental margin iron formations also

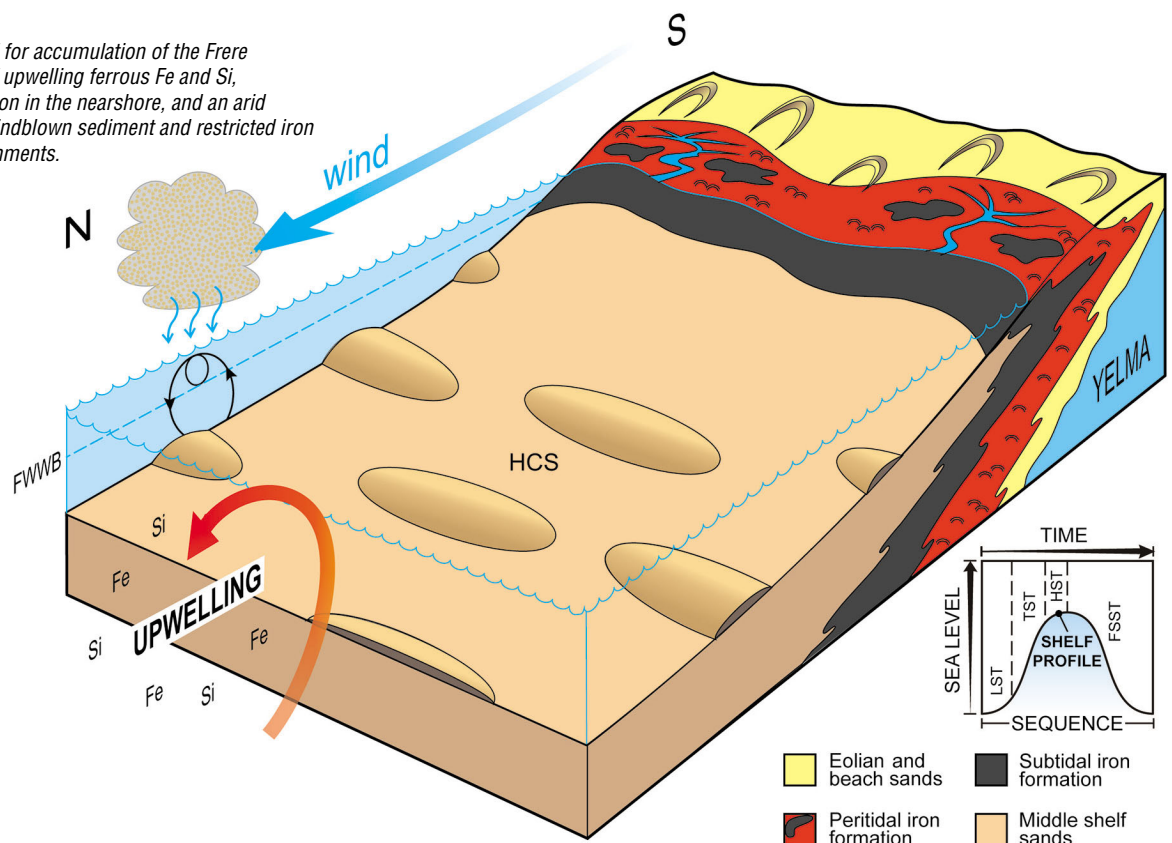
reflect upwelling of anoxic, Fe-rich seawater, but accumulated in the full spectrum of shelf environments. Dilution by fine-grained, windblown terrigenous clastic sediment likely prevented Frere iron formation from forming in deeper settings.

The accumulation of continental margin iron formation and associated lithofacies in the Paleoproterozoic Frere Formation of central Western Australia are discussed in this Report. The ubiquity of shallow-water, granular iron formation and lack of deeper, laminated Fe-rich facies in the Frere Formation is also atypical, and provides an excellent opportunity to examine the deposition of peritidal iron formation against a significantly different backdrop. Thus, the Frere Formation is an important counterpoint to understanding the environmental conditions that produced continental margin iron formation, further illuminating the evolution of the early atmosphere–hydrosphere system. Paragenetic pathways of minerals are evaluated to determine when redox-sensitive phases precipitated within the sediment. Such information assists in assessing the Eh of paleo-seawater and pore water, which when combined with the sedimentology and sequence stratigraphy permit the construction of a depositional model for the Frere Formation.

Download **Report 130 Sedimentology and stratigraphy of the Paleoproterozoic Frere Formation, Western Australia: Implications for the evolution of the Precambrian ocean** from <www.dmp.wa.gov.au/gswapublications>.

For more information, contact Franco Pirajno (franco.pirajno@dmp.wa.gov.au).

Figure 1. Depositional model for accumulation of the Frere Formation. A combination of upwelling ferrous Fe and Si, stromatolitic oxygen production in the nearshore, and an arid climate produced copious windblown sediment and restricted iron formation to peritidal environments.



Regolith geochemistry and mineral prospectivity

The prospectivity of the southeast Yilgarn Craton and east Albany–Fraser Orogen, a greenfields area in Western Australia, has been improved by the recent discoveries of the Nova Ni–Cu and Tropicana Au deposits. Surface anomalies detected by fine-fraction, low-density geochemical data from regolith may indicate additional buried mineralization in this region.

Multi-element geochemical data for 151 regolith samples from the southeastern Yilgarn Craton and east Albany–Fraser Orogen, following total and partial digestion, were used to assess the influence of grain size and sample digest on element concentrations. The relationship between regolith type and composition, in particular carbonate content, distribution of Au in regolith, effectiveness of various digests in relation to trace element concentrations in the fine fraction, and use of additive indices to examine trace element associations, were investigated.

The regolith geochemistry showed sampling and analysis should focus on the fine, <50 µm fraction using aqua regia as the preferred digest. All other digests yield much lower concentrations than aqua regia, with the exception of a hydrochloric acid leach, which seemed to work well for extracting rare earth elements. Lower concentrations were also determined in the <2 mm fraction, possibly related to dilution by commonly barren eolian sand.

In terms of the influence of carbonate in regolith, all of the Au datasets indicated only a weak and inconsistent relationship between Au and Ca, and between Au and loss on ignition (LOI) data. The exception is a series of colluvium and sandplain samples with anomalous Au concentrations of >13.8 µg/kg collected over metagranitic and metamafic rocks of the Northern Foreland close to the Cundeelee Fault, which have a well-established carbonate signature.

Associations of chalcophile, ferro-alloy, and base metal elements show that anomalous samples are almost entirely related to transported regolith over the Albany–Fraser Orogen. However, in the Northern Foreland close to the Cundeelee Fault, northwest of Fraser Range homestead, and the Biranup Zone near Ponton Creek, north of Zanthus, the chemistry of transported regolith seems to be closely related to local bedrock and possibly bedrock-hosted mineralization. Regolith samples along Ponton Creek also have a strong signature of rare earth elements. Here, regolith samples are predominantly silicate-rich and carbonate-poor colluvium,

and spatially related to outcrops of strongly foliated, garnetiferous granitic gneiss.

Regolith samples from the northern part of the study area do not indicate any anomalous element concentrations. This is probably due to thicker cover, in particular over the Gunbarrel Basin, and a higher proportion of recent, barren eolian material that is commonly found across the basin and the northeastern Albany–Fraser Orogen.

Download **Record 2014/3 Regolith geochemistry and mineral prospectivity — the southeast Yilgarn Craton and east Albany–Fraser Orogen** from <www.dmp.wa.gov.au/gswapublications>.

For more information, contact Andreas Scheib (andreas.scheib@dmp.wa.gov.au).

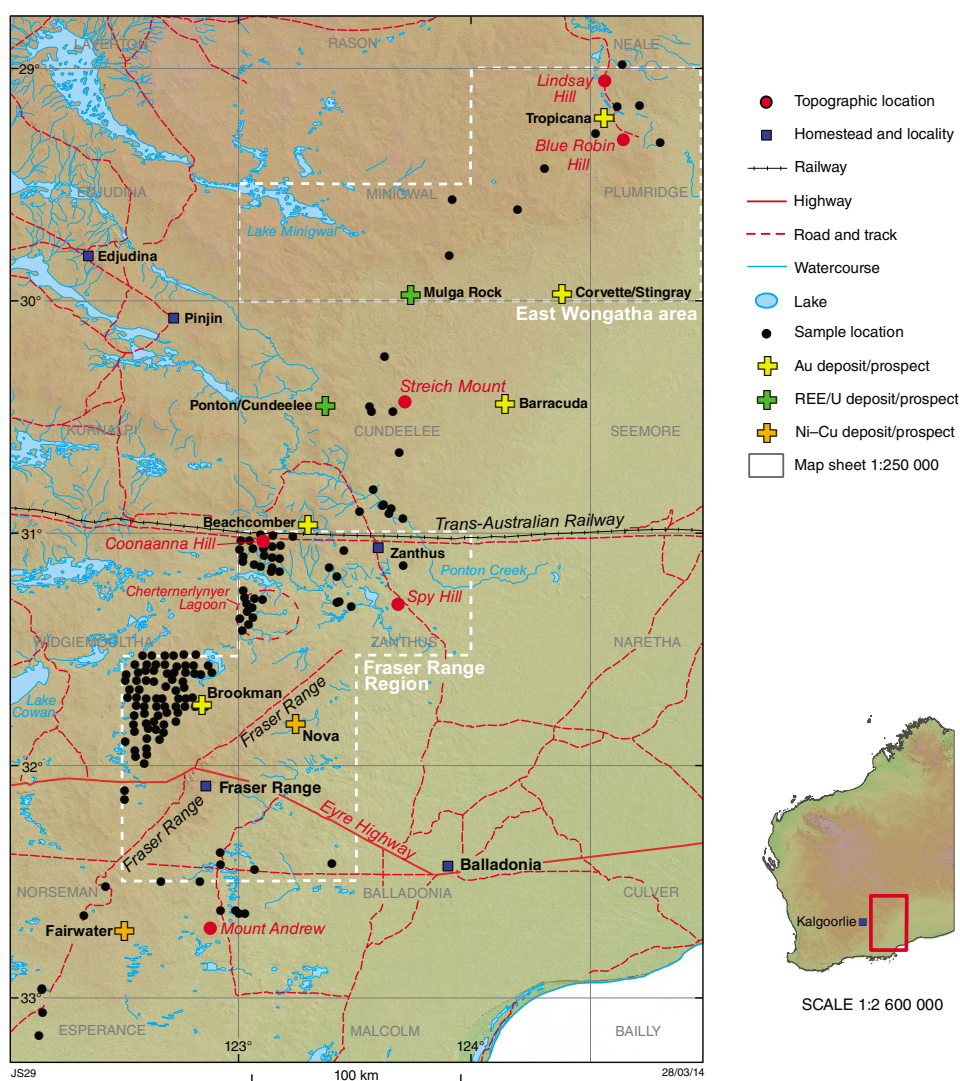


Figure 1. Map of the study area showing GSWA sample site locations, transport routes, topographic localities, homesteads and a selection of mineral deposits and prospects in the area

Canning Basin seismic survey gains interest



The Geological Survey of Western Australia (GSWA) has just completed a 700 km-long, deep crustal reflection seismic survey across the Canning Basin, which will provide clues as to the nature of the basin's boundaries with the Pilbara and Kimberley Cratons, and its structure and basement. Data acquisition is funded by the Western Australian State Government's Royalties for Regions Exploration Incentive Scheme (EIS) and is a collaborative research project with Geoscience Australia (GA), which is funding the processing of the data.

The survey commenced on 2 May with a period of thorough testing to determine the best acquisition parameters that would achieve a good signal-to-noise ratio while staying within budget. The chosen acquisition parameters differ from those used in other deep crustal surveys, such as the Yilgarn–Officer–Musgrave (YOM) and Albany–Fraser Orogen (AFO) surveys, because of the need to adequately image the younger, shallower basin as well as the deep basement. Once the Vibroseis trucks conducted the 'sweeps' for 28 s (i.e. generated the seismic signal at the appropriate frequency range), the geophones 'listened' for an extra 20 s, allowing for reflections from a depth of ~60 km to be measured.

Not only will the survey provide an uninterrupted image of the basin's architecture, it will also be a springboard for interesting future research. A good image of the deeper crust, integrated with basement ages obtained from petroleum wells along the seismic line, will allow for a greater understanding of the Paterson and King Leopold Orogens and Centralian Superbasin, which is thought to underlie the basin, but about which little is known in this region. The velocity structure of the lower crust and upper mantle, combined with an understanding of the basin's boundaries and geometry, will give a greater insight into intracratonic rifting processes, such as the influence of pre-existing lithospheric weaknesses on basin architecture.

Some interesting obstacles unlikely to be found in other parts of Western Australia have been encountered during the survey, such as river crossings with crocodiles! Similar to other GSWA/GA deep crustal surveys, an endeavour was made to keep the survey along existing tracks and roads to minimize heritage and environmental impacts.

The survey was the subject of an ABC news story on television and radio. It has generated much interest from petroleum and mineral exploration companies, who see it as an opportunity to relate the local geology within their tenements or permits to the regional picture of the basin. Traditional owners and pastoral station lessees showed an interest in the survey, and came out to see the survey in progress.

For more information, please contact Charmaine Thomas (charmaine.thomas@dmp.wa.gov.au).

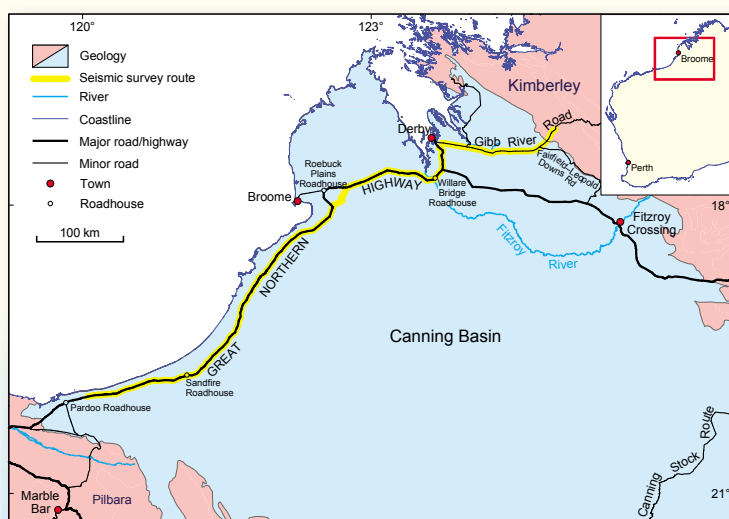


Figure 1. Map of seismic survey route



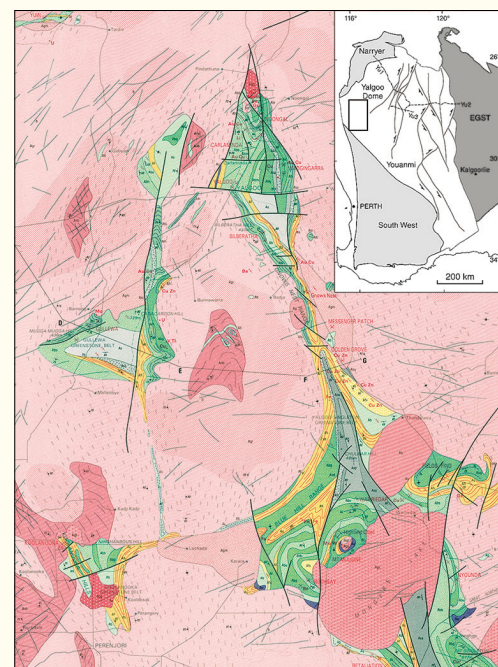
Figure 2. Vibroseis trucks working along the Great Northern Highway verge near Port Hedland

Magmatic and structural evolution of the Yalgoo Dome

The Yalgoo Dome is located in the northwestern portion of the Youanmi Terrane of the Yilgarn Craton (Fig. 1). In 2012 the Geological Survey of Western Australia (GSWA) started a new mapping project in the Yalgoo area, in collaboration with the China Geological Survey. The interpreted bedrock geology of the area (Fig. 1) shows that the Yalgoo Dome is N–S elongated, with an aspect ratio of about 2:1. Preliminary geochronology results indicate that the core of the dome includes c. 2950 Ma migmatites intruded into banded iron-formations and amphibolites.

Figure 1. (below) Interpreted geological map of the Yalgoo Dome area. Inset in the upper right corner shows the location of the Yalgoo Dome in the context of the terrane-scale shear zone network in the central part of the Yilgarn Craton.

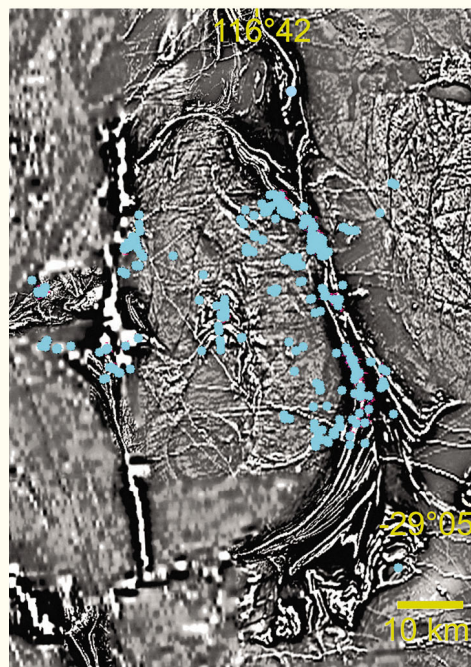
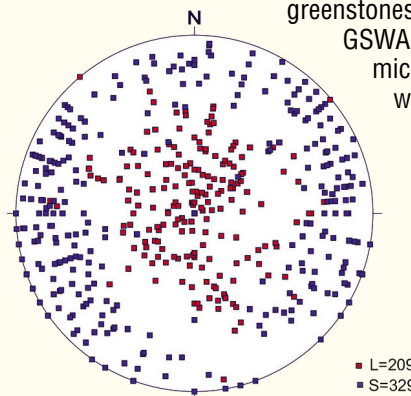
Figure 2. (right) Aeromagnetic map showing the outline of the Yalgoo Dome. Blue dots indicate location of structural data. Equal area projection plot shows bulk orientation of linear features (in red, stretching, mineral and magmatic lineation, fold axes) and poles to foliation (in blue, gneissic and magmatic foliation in granitoids; metamorphic foliation in greenstones).



This high-grade complex is separated from the enveloping greenstones by granitic rocks that were emplaced mostly around 2750 Ma. On the eastern side of the dome, the Warriedar Greenstone Belt includes economically important volcanic massive sulfides (VMS), and gold and iron deposits. Both the eastern and the western greenstone belts include a c. 2950 Ma, dominantly volcanic succession of bimodal composition, unconformably overlain by a siliciclastic sequence of unknown age.

The origin of most (if not all) gneiss domes is the subject of a long-lasting debate. Gneiss domes have been interpreted as the result of diapirism, fold interference, duplex-related antiforms, extension-controlled upwelling of partially molten crust or a combination of lower crustal contraction and upper crustal extension. The origin of the Yalgoo Dome is similarly cryptic.

The current mapping project in the area aims to unravel the stratigraphic, tectono-metamorphic evolution and the relationships with mineralization events in the Yalgoo Dome area. Our multidisciplinary work hinges around meso- and microstructural analysis, supported by geochemistry, geochronology and petrology on both the granite–migmatite system exposed in the core and in the surrounding greenstones. In the granite–migmatite domain, GSWA is conducting detailed meso- and microstructural analysis in collaboration with Macquarie and Monash Universities. Honours, Master's and PhD students are currently focusing their work on the tectono-metamorphic evolution of the migmatites and on the occurrence of L tectonites along some portions of the sheared granite–greenstones boundary. In the greenstones, our work aims to constrain the stratigraphic and structural evolution recorded by the volcano-sedimentary sequences, in relation to the magmatic evolution of the granite–migmatite core. In the Yalgoo Dome area we find no evidence of the transpressional kinematics that characterize most of the Yilgarn Craton. Preliminary meso- and microstructural data collected in the 2012 and 2013 field seasons indicate that both the older high-grade core and the surrounding granites mainly recorded synmagmatic deformation, while solid-state fabrics mainly occur along granite–greenstones boundaries. These contacts are marked by about 3 km-thick, amphibolite-facies shear zones with normal



kinematics, where greenstones were displaced downward with respect to the granite–migmatite core. Bulk structural data show that main planar fabrics dip away from the core (pole to foliation, Fig. 2), whereas bulk linear fabrics are commonly steeply plunging (lineation, Fig. 2). Such apparently simple first-order geometry recalls the classical dome-and-keel geometry typical of pre-2800 Ma granite–greenstone terranes. Preliminary meso- and microstructural data are thus in agreement with the interpretation of multistage diapiric activity within the Yalgoo Dome, associated with progressive tilting of the greenstone units towards their present-day sub-vertical architecture.

Download **Record 2014/4 Structural evolution of the Yalgoo Dome, Yilgarn Craton, Western Australia** from <www.dmp.wa.gov.au/gswapublications>.

For more information, contact Ivan Zibra (ivan.zibra@dmp.wa.gov.au).



Geological setting of mineral deposits in the Southern Cross district



CLIFFS



St Barbara
LIMITED



An excursion guide was prepared for a field trip to the Southern Cross district during the Structural Geology and Resources conference (Australian Institute of Geoscientists, Kalgoorlie 2012), a historical mining area with significant economic gold, nickel and iron deposits. The field trip included visits to operating gold, nickel and iron mines at Koolyanobbing, Marvel Loch and in the Forrestania area to investigate their structural and stratigraphic context.

Following a brief introduction into Yilgarn geology, the guide provides an overview of the geology of the Central and southern Southern Cross Domain. One focus is on the integration of new geochronology data into the stratigraphic context. Key aspects include that (i) the metasedimentary package, which forms a the younger part of the stratigraphy in both the Marda Diemals greenstone belt and the Southern Cross – Forrestania greenstone belts, shows maximum depositional ages of c. 2700 Ma; (ii) at least part of the underlying older, mafic/ultramafic greenstone sequence is younger than the previous assumed 2900 Ma.

The guide summarizes the structural evolution of the area, integrating previous work with results of recent field mapping of the SOUTHERN CROSS 1:100 000 map sheet, and provides an overview of the granite magmatism in the area. An important aspect within this context is that the prominent Ghooli Dome, a composite granite gneiss dome, recorded a long, protracted history of felsic magmatism, with intrusion ages ranging from c. 2775 to 2630 Ma. The first part of the excursion guide is concluded by chapters on the style (by Wally Witt) and timing of gold mineralization in the Southern Cross greenstone belt.

The second part of the guide illustrates the excursion localities, including chapters on the Flying Fox and Spotted Quoll nickel deposits in the Forrestania greenstone belt, the Koolyanobbing banded iron-formation hosted iron ore deposits, the Marvel Loch and Nevoria gold mines in the Southern Cross greenstone belt, and outcrop localities within the vicinity of Southern Cross, which provide an overview of typical greenstone lithologies and the structural style of the Southern Cross greenstone belt. All deposits have in common that their formation is closely linked with the structural framework at regional and deposit scale. Furthermore, the nickel and gold deposits are predominantly hosted by amphibolite facies rocks, which set them apart from most other regions in the Yilgarn Craton. All descriptions integrate the recent understanding of the deposit geology with the regional structural framework. Support from St Barbara Ltd, Western Areas NL, and Cliffs Natural Resources is gratefully acknowledged.

Download **Record 2013/11 Geological setting of mineral deposits in the Southern Cross district — a field guide** from www.dmp.wa.gov.au/gswapublications.

For more information, contact Stephen Wyche (stephen.wyche@dmp.wa.gov.au).

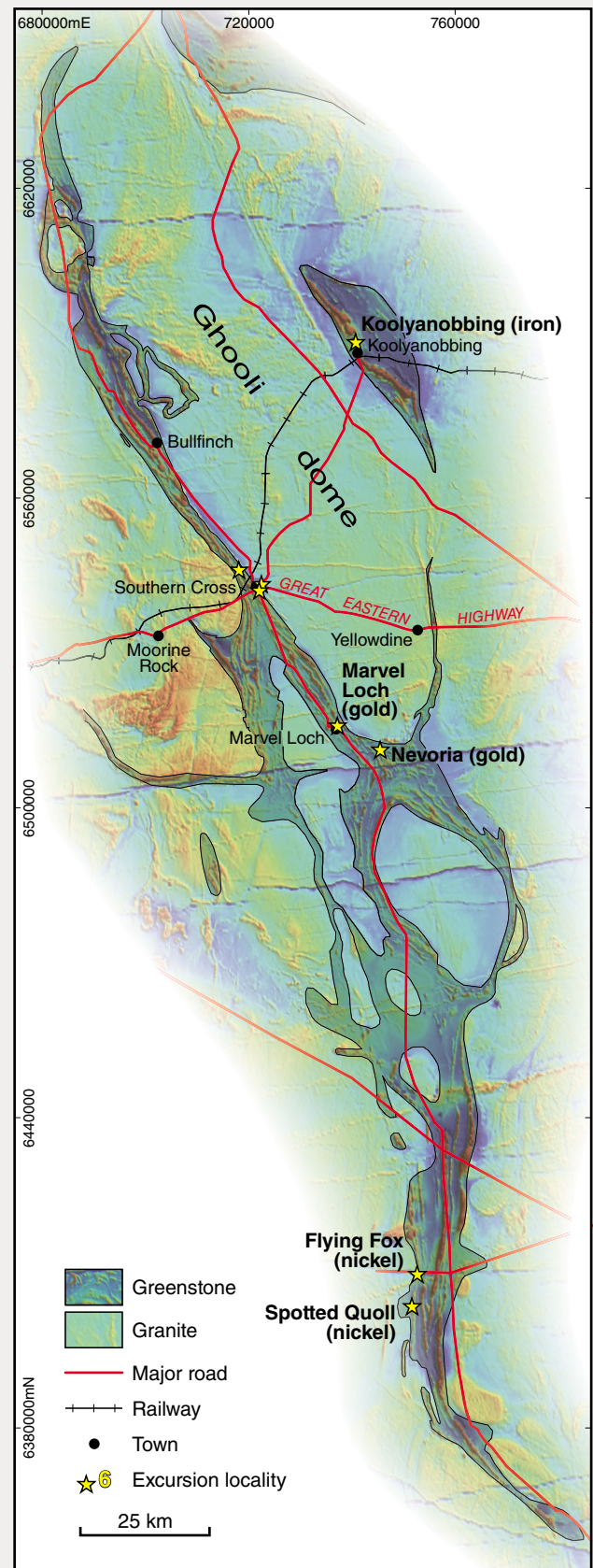


Figure 1. Excursion localities on a simplified geological map and RTP aeromagnetic image

New series covering the evolution of Western Australia

The Geological Survey of Western Australia (GSWA) is progressively publishing a new compilation on the geological evolution of Western Australia under the series banner of 'Western Australia unearthed'.

The four books in the series are aimed at trainee and professional geologists, and particularly newcomers to Western Australia, to enable them to quickly get a feel for the geology and economic potential of the diverse terrains that make up the State. Each book provides our current ideas on the geological evolution of Western Australia, and provides a recommended reading list. Magnificent photos and colour diagrams add to the geological narrative.



The series consists of:

- Building the core of the continent (Archean) — due for release in 2014/15
- The birth of supercontinents and the Proterozoic assembly of Western Australia — available
- The rise and fall of Gondwana — due for release in 2014/15
- Australia goes it alone — the emerging island continent 100 Ma to present — available

The birth of supercontinents and the Proterozoic assembly of Western Australia

by Simon P Johnson

The book covers two billion years of Earth history putting particular emphasis on the cratons, orogenic belts and basins of Western Australia. With clear diagrams, luscious photos, and a detailed time-space plot, this book encapsulates the whole of the Proterozoic in fewer than 80 pages.

Australia goes it alone — the emerging island continent 100 Ma to present

by AE Cockbain

NEW

This volume covers recent geological events that have shaped and are still shaping Western Australia. The first part covers the advance and retreat of the sea across Australia-to-be, and the dynamic forces responsible for the clastic and carbonate cycles of sedimentation. The second part looks at the landscape and how it has evolved over millions of years, particularly the regolith which is so important to mineral production. Clear diagrams and maps, stunning photos and panoramas, and a selection of maps of regolith mineralization make this book a must read (63 pages).

\$33 (inc. GST) each (buy five or more copies at \$22 each)

Purchase the printed books by calling +618 9222 3459 or go to <www.dmp.wa.gov.au/ebookshop>.

EARTH SCIENCE WESTERN AUSTRALIA

Just released

A Geological Field Guide to the Capes Region of Southwest WA

by John A Bunting

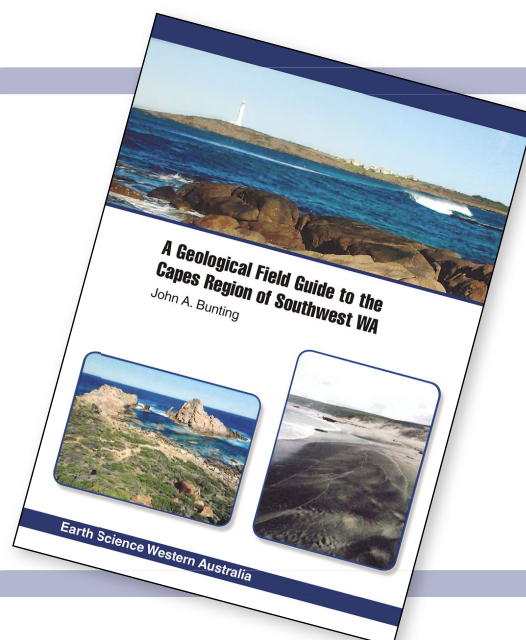
Explore the geology of the Capes region of southwest Western Australia with the help of this handy field guide.

Available from Mineral House

(Selling agent for ESWA)

Nell Stoyanoff — Tel: +618 9222 3168

\$38
incl. GST



GSWA regional geophysics surveys: 7 July 2014 update

Data downloads

Final data releases from the Geophysical Archive Data Delivery System are at <www.ga.gov.au/gadds>.

Preliminary and final grids and images from the GSWA website are available from <www.dmp.wa.gov.au/geophysics>.

Subscribe to the GSWA eNewsletter for alerts of preliminary and final data release dates.

Survey outline shapefiles are available online at <www.dmp.wa.gov.au/geophysics>.

Airborne mag/spec surveys

- Goldfields 100 m program (completed)
- Yalgoo–Singleton 100 m (proposed)

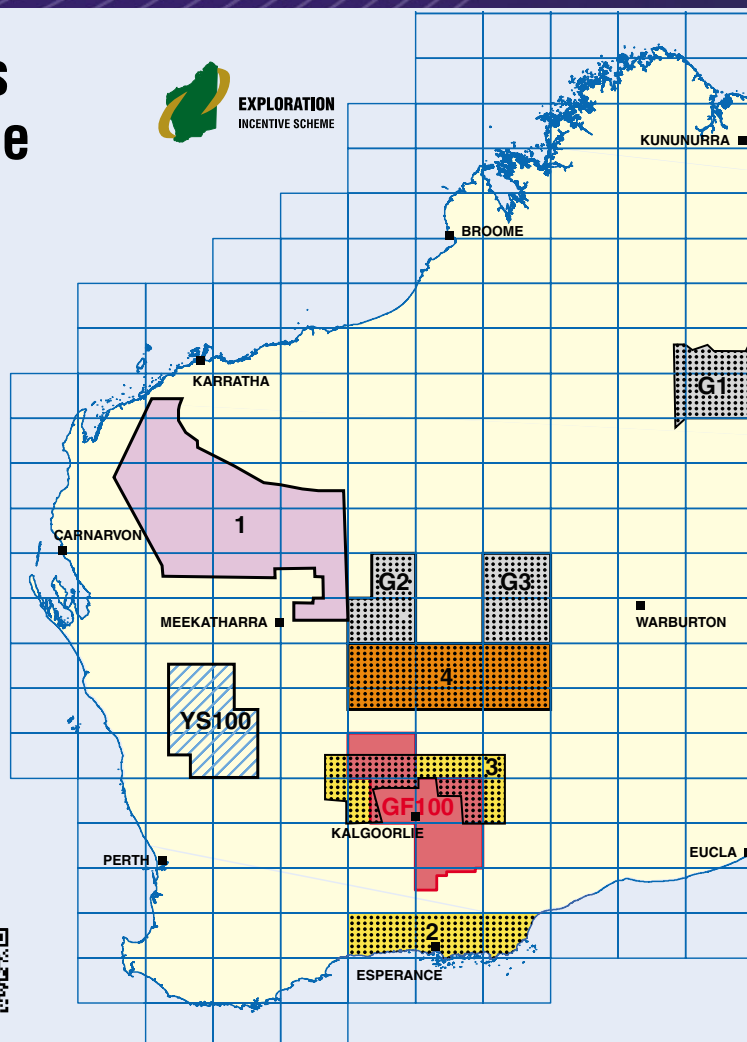
Airborne EM surveys

- Capricorn 2013 AEM (completed)

Ground gravity surveys

- Recently completed
- In progress
- Under consideration

For more information, contact David Howard (david.howard@dmp.wa.gov.au).



Airborne magnetic and radiometric surveys

ID	Area/Name	Configuration	Line-km	Contractor	Acquisition Start	Acquisition End	Current Status	Release Status ¹ & Date
GF100	Eastern Goldfields 100 m program	100 m E-W	720 000	Various	2012	2014	Released	Jun 13 – Jun 14
YS100	Yalgoo–Singleton 100 m program	100 m E-W	Area under consideration for surveys in 2014–16					

Airborne EM surveys

ID	Area/Name	Configuration	Line-km	Contractor	Acquisition Start	Acquisition End	Current Status	Release Status ¹ & Date
1	Capricorn 2013 (TEMPEST)	5000 m; N/S(E/W in part)	30 000	CGG	Oct-13	Jan-14	Released	19-Jun-14

Ground gravity surveys

ID	Area/Name	Configuration	Stations	Contractor	Acquisition Start	Acquisition End	Current Status	Release Status ¹ & Date
2	Esperance 2013	2.5 km grid, 1 km roads	7 891	Atlas	Jul-13	Sep-13	Released	24-Oct-13
3	Goldfields 2013	2.5 km grid	8 115	Atlas	Nov-13	Dec-13	Released	20-Feb-14
4	Sir Samuel – Throssel 2014	2.5 km grid	11 600	IMT	Jun-14	Sep-14*	Survey 19%	Dec-14*
Gx	Potential areas under consideration for ground gravity surveys in 2014 and 2015							

Notes

* Asterisk indicates an estimated date (month/year) based on latest information available. Subscribe to the newsletter for release alerts.

1. Release Status

Colour legend



Final data released



Prelim release or Final release date set



In progress



Under consideration

Information current at: 5 July 2014

■ REPORTS

Report 131 The Yuinmery volcanogenic massive sulphide prospects: mineralization, metasomatism and geology
by Hassan, LY

Report 133 Tectonic links between Proterozoic sedimentary cycles, basin formation and magmatism in the Albany–Fraser Orogen, Western Australia
by Spaggiari, CV, Kirkland, CL, Smithies, RH, and Wingate, MTD

Report 134 Mafic–ultramafic intrusions of the Giles Event, Western Australia: petrogenesis and prospectivity for magmatic ore deposits
by Maier, WD, Howard, HM, Smithies, RH, Yang, S, Barnes, SJ, O'Brien, H, Huhma, H, and Gardoll, S

Report 135 A magnetotelluric traverse across the eastern part of the Capricorn Orogen
by Dentith, MC, Johnson, SP, Evans, S, Aitken, ARA, Joly, A, Thiel, S, and Tyler, IM

Report 136 A magnetotelluric survey across the Kimberley Craton, northern Western Australia
by Spratt, J, Dentith, MC, Evans, S, Aitken, ARA, Lindsay, M, Hollis, JA, Tyler, IM, Joly, A, and Shragge, J

Report 137 Basin formation by orogenic collapse: zircon U–Pb and Lu–Hf isotope evidence from the Kimberley and Speewah Groups, northern Australia
by Hollis, JA, Kemp, AIS, Tyler, IM, Kirkland, CL, Wingate, MTD, Phillips, C, Sheppard, S, Belousova, E, and Gréau, Y

Reports are available as free PDFs from our website.

■ REPORT DATA PACKAGES

Report 117 Mineral systems analysis of the west Musgrave Province: regional structure and prospectivity modelling
by Joly, A, Aitken, ARA, Dentith, MC, Porwal, A, Smithies, RH, and Tyler, IM

This product is available on USB and contains the following:

- GSWA Report 117 as a PDF
- Appendix tables A1–A6
- Predictor and prospectivity maps (GeoTIFF)
- Selected ESRI ArcGIS data

Report 123 3D architecture, structural evolution, and mineral prospectivity of the Gascoyne Province
by Aitken, AR, Joly, A, Dentith, MC, Johnson, SP, Thorne, AM, and Tyler, IM

This product is available on USB and contains the following:

- GSWA Report 123 as a PDF
- Appendix 2 tables with input parameters for predictor maps (PDF)
- Appendix 2 predictor maps used for mineral prospectivity analysis — provided as spatially located raster (GeoTIFF) files
- ESRI ArcGIS files including:
 - crustal-scale faults
 - geochemistry points
 - basic topographic data
- Prospectivity maps — provided as spatially located raster (GeoTIFF) files

Report 138 CO₂ storage assessment of the on-shore western Eucla Basin
by FROGTECH Pty Ltd

This product is available on USB and contains the following:

- GSWA Report 138 as a PDF
- Appendices
- GIS dataset

■ RECORDS

2013/1 GSWA work program for 2013–14 and beyond

2013/6 Youanmi and southern Carnarvon seismic and magnetotelluric (MT) workshop

2013/11 Geological Setting of mineral deposits in the Southern Cross district — a field guide
by Doublier, MP

2014/3 Regolith geochemistry and mineral prospectivity — the southeast Yilgarn Craton and east Albany–Fraser Orogen
by Scheib, AJ

2014/4 Structural evolution of the Yalgoo Dome, Yilgarn Craton, Western Australia
by Caudery, JN

2014/5 A potential long-term source of sand near Boorabbin for the Eastern Goldfields region (includes one plate)
by Normore, LS

2014/6 Albany–Fraser Orogen seismic and magnetotelluric (MT) workshop 2014: extended abstracts (preliminary) (includes four plates)
by Spaggiari, C and Tyler, IM

2014/7 2D seismic interpretation of the Harvey area, southern Perth Basin, Western Australia
by Zhan, Y

2014/8 Linking grain-scale to crustal-scale structures along the Youanmi seismic traverse — a field guide
by Zibra, I, Pawley, M, and Wyche, S

■ NON-SERIES BOOKS

WA unearthed series: Australia goes it alone — the emerging island continent, 100 Ma to present
by Cockbain, AE

Cost: \$33 (or \$22 each for orders of five or more), PDF copy is free from website

■ 1:100 000 GEOLOGICAL SERIES MAPS

BALWINA, WA sheet 4558
by Eacott, GR, de Souza Kovacs, N, and Hollis, JA

SLATEY CREEK, WA sheet 4659
by Eacott, GR, de Souza Kovacs, N, and Hollis, JA

WATTS, WA sheet 4658
by Eacott, GR, de Souza Kovacs, N, and Hollis, JA

LYNDON, WA sheet 1950
by Johnson, SP

REEDY, WA sheet 2543
by Zibra, I, Van Kranendonk, MJ, and Chen, SF

YOUANMI, WA sheet 2640
by Ivanic, TJ

WARBURTON RANGE, WA sheet 4245
by Howard, H, Quentin de Gromard, R, and Smithies, RH

■ 1:250 000 GEOLOGICAL SERIES MAPS

CHARNLEY, WA sheet SE 51-4
by Phillips, C and de Souza Kovacs, N

■ NON-SERIES MAPS

Iron ore deposits of the Yilgarn Craton 2014

■ RESOURCE POTENTIAL FOR LAND USE PLANNING MAPS

Aboriginal land, conservation areas, mineral and petroleum titles, and geology, Western Australia — 2014
Ridge, KJ

Basic raw material resources, KARRATHA 1:200 000

Basic raw material resources, KARRATHA 1:50 000

Basic raw material resources, PORT HEDLAND 1:200 000

Basic raw material resources, PORT HEDLAND 1:50 000

Maps and data files are also available on USB.

■ GEOLOGICAL INFORMATION PACKAGES

South Yilgarn, 2014: Geological Information Series

Pilbara GIS, 2014: Geological Information Series

Murchison GIS, 2014: Geological Information Series

West Tanami GIS, 2014: Geological Information Series

■ NON-SERIES DIGITAL PRODUCTS

Western Australia petroleum acreage release, April 2014
APPEA 2014

Exploration geochemistry of WA 2014 (TerraSearch)

■ NON-SERIES DATA PACKAGES

Compilation of geochronology information, 2014
Karratha, Port Hedland region, basic raw materials resources

All digital packages are available on USB at a cost of \$55.



Printed publications are available free as PDF files on our website at <<http://www.dmp.wa.gov.au/GSWApublications>>.

GIS files (ESRI and MAPINFO formats) for all maps published since 1991 are available as a free download from the Data and Software Centre.

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

Hardcopy publications including products on CD, DVD, and USB 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 <<http://www.dmp.wa.gov.au/ebookshop>>.

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