

Australia's mineral resources maintain world status

A recent assessment by Geoscience Australia concludes that Australia's mining sector continues to hold the potential to remain the most important export earning sector of the Australian economy for the foreseeable future. This trend is based on the latest annual assessment of Australia's minerals inventory—*Australia's Identified Mineral Resources 2009*. The report shows that Australia's Economic Demonstrated Resources for a number of mineral commodities increased during 2008. These increases mean that production was more than compensated for by the discovery of additional resources.

There have been very few world-class discoveries in Australia in the past two decades and the inventory has been sustained largely through delineation of additional resources in known mineral fields. At December 2008, Australia had the world's largest Economic Demonstrated Resources of brown coal, mineral sands (rutile and zircon), nickel, silver, uranium, zinc, and lead. The country also ranks among the top six worldwide for identified resources of antimony, bauxite, black coal, copper, gold, iron ore, ilmenite, industrial diamond, lithium, manganese ore, niobium, tantalum, vanadium and antimony.

While Australia's resource stocks are healthy overall, the country's position as a premier mineral producer is dependent on continuing investment in exploration to locate high quality resources and to upgrade known deposits to make them competitive on the world market.

The severe world financial crisis in late 2008 has highlighted the fact that a long resource life for a particular commodity does not guarantee that such resources will continue to be exploited in Australia. In an increasingly globalised and competitive commodity market, multinational mining companies continue to search for mineral deposits which will offer attractive returns on investment. Such returns are influenced by the quality of the resources (grade, tonnage and metallurgical characteristics) as well as environmental, social and political factors, land access and the location and scale of competing projects. Increasingly, multinational companies are ranking their individual mineral projects against investment returns from other projects worldwide and this has resulted in a number of recent mine closures in Australia. In the case of nickel, multinational companies have closed sulphide and lateritic nickel mines in Western Australia and Tasmania and consolidated their operations at larger, low cost mining operations, sometimes outside Australia.



A free download of *Australia's Identified Mineral Resources 2009* is available through the Geoscience Australia website and other fundamental data on the minerals sector can be accessed through the *Atlas of Australia's Mineral Resources, Mines and Processing Centres*.

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Related articles/websites

Australia's Identified Mineral Resources 2009

www.ga.gov.au/image_cache/GA16805.pdf

Atlas of Australia's Mineral Resources, Mines and Processing Centres

www.australianminesatlas.gov.au/

Uranium ore-forming systems of the Lake Frome region, South Australia: regional spatial controls and exploration criteria

Cenozoic basins of the Lake Frome region in northeastern South Australia contain most of Australia's known resources of sandstone-hosted uranium mineralisation. These include the currently operating Beverley uranium mine, and the Honeymoon, Four Mile, Oban, and Goulds Dam deposits. While the known resources are significant, the potential of the region for very large uranium deposits has not been well understood, in part due to limited knowledge of the regional and district-scale geological controls on uranium mineralisation.

A recently released report from Geoscience Australia presents new data and includes a review of geological knowledge of uranium mineral systems in the Lake Frome region. The report, *Uranium ore-forming systems of the Lake Frome region, South Australia*, is intended to provide a revised framework for exploration of major uranium deposits in the region. This new framework is aimed at providing a basis for refined exploration targeting of areas to reduce investment risk for the exploration industry. The report is a product of Geoscience Australia's Onshore Energy Security Program which is delivering pre-competitive data to boost investment in exploration for onshore energy resources including uranium.

The integration of results from this study supports a model of three potential episodes of basin-hosted uranium systems in the Lake Frome region. In this hypothesis, three regional uplift events since the late Mesozoic triggered increases in the gravitationally-driven flow of groundwater through previously deeply weathered uranium-bearing source rocks and into adjacent basins. As a consequence, uranium mineral systems potentially were active during the late Cretaceous to Paleogene, the late Eocene–Oligocene, and the Pliocene–Pleistocene. The model is consistent with known mineralisation hosted by Miocene and Eocene sediments and also predicts potential mineralisation within Mesozoic sediments. Evaluation of the permeability architecture indicates potential for larger uranium systems 'downstream' in the north of the region. The importance of regional fault architecture is highlighted as a control on paleo-fluid flow and on the sites of uranium deposition.

Using a re-formulation of the 'mineral systems' approach (see *AusGeo News* 95), the report describes the following essential parts of the ore-forming system:

- uranium and fluid sources, with descriptions of lithostratigraphy
- energy and timing in relation to the tectonic evolution
- regional 3D permeability architecture and fluid flow
- chemical gradients and controls on uranium deposition.

The report reviews the geology of uranium deposits in the region and also includes the first published description of the mineralogy of



the Four Mile East deposit. To test the viability of previously published genetic models, the report presents the results of numerical modelling of paleo-fluid flow and mineralising processes. The final chapter synthesises the results and presents alternative ore-forming scenarios along with implications for mineral exploration in the region.

For more information or to download a copy visit

www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=6969711-27

Related websites/articles

Uranium ore-forming systems of the Lake Frome region, South Australia (Geoscience Australia Record 2009/40)

www.ga.gov.au/image_cache/GA16103.pdf

AusGeo News 97: Exploring for sandstone-hosted uranium deposits in paleovalleys and paleochannels

www.ga.gov.au/ausgeonews/ausgeonews201003/uranium.jsp

AusGeo News 95: New views of Australia's uranium mineral systems

www.ga.gov.au/ausgeonews/ausgeonews200909/uranium.jsp

New geophysical datasets released

Datasets from five new geophysical surveys which include the Canning and Eucla basins and the Yilgarn Craton in Western Australia and Broken Hill in New South Wales have been released this year.

The data from these new airborne magnetic/radiometric, electromagnetic and gravity surveys provide basic geophysical data which can be interpreted to reveal the sub-surface geology of the survey area. The datasets will be a valuable tool in assessing the mineral potential of the respective survey areas and should stimulate mineral exploration.

The Crossland-Noonkanbah, Naretha and Eucla Coast airborne magnetic and radiometric surveys and South Yilgarn gravity survey were managed by Geoscience Australia on behalf of the Geological Survey of Western Australia. The airborne magnetic and radiometric surveys were conducted under the Western Australian Government's *Exploration Incentive Scheme*.

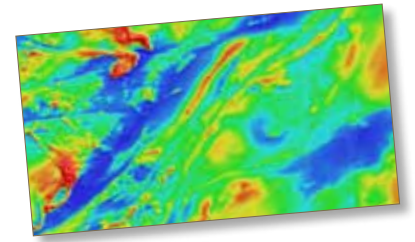
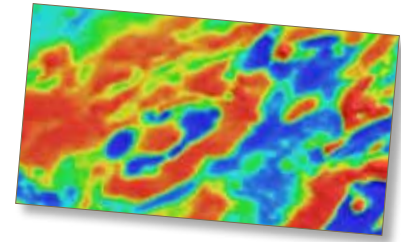


Table 1. Details of the airborne magnetic, radiometric and elevation surveys.

Survey	Date	1:250 000 map sheets	Line spacing/ terrain clearance/ orientation	Line km	Contractor
Crossland - Noonkanbah (East Canning 1) WA	June–December 2009	Lennard River (pt) Noonkanbah (pt) Crossland Dummer (pt)	400 m 60 m north–south	116 700	GPX Surveys Pty Ltd
Naretha (Eucla Basin 3) WA	June–December 2009	Zanthus (pt) Naretha (pt) Balladonia (pt) Culver (pt)	200 m 50 m east–west	123 100	Fugro Airborne Surveys Pty Ltd
Eucla Coast (Eucla Basin 6) WA	June–December 2009	Zanthus (pt) Naretha (pt) Balladonia (pt) Culver (pt)	200 m (onshore) 400 m (offshore) 50 m (onshore) 100 m (offshore) north–south	121 645	UTS Aeroquest Pty Ltd

Table 2. Details of the gravity surveys.

Survey	Date	1:250 000 map sheets	Station spacing/ orientation	Stations	Contractor
South Yilgarn WA	July–December 2009	Lake Johnston Balladonia(pt) Zanthus (pt) Naretha	2500 m east–west	6500	Fugro Ground Geophysics Pty Ltd
Broken Hill NSW	May–October 2009	Broken Hill (pt) Ana Branch (pt) Mildura (pt)	4000 m 1000 m east–west	6999	Atlas Geophysics Pty Ltd

The Broken Hill gravity survey was managed entirely by the Geological Survey of New South Wales and conducted under the New South Wales Government's *New Frontiers* Initiative.

The magnetic, radiometric and gravity data have been incorporated into the national geophysical databases. The point-located and gridded data for these surveys can be obtained free online using the GADDS download facility.

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Related websites

Geophysical Archive Data Delivery System (GADDS)

www.geoscience.gov.au/gadds

Geological Survey of Western Australia

www.dmp.wa.gov.au

Geological Survey of New South Wales

www.dpi.nsw.gov.au/minerals/geological

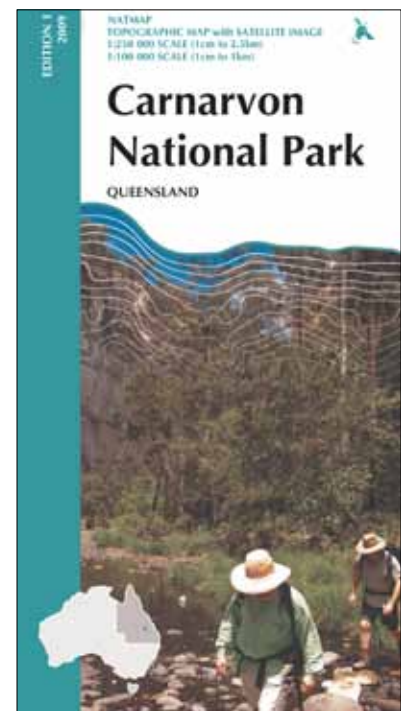
Carnarvon National Park map features in new map

Carnarvon National Park is located in Queensland's central highlands about 700 kilometres northwest of Brisbane. The park has an inviting and rich mosaic of open woodlands, forests and plains and is home to a huge variety of plant and animal species. Sculpted sandstone outcrops, spectacular views from the highest plateau in Queensland and significant Aboriginal rock art sites are all found in the park. It is not surprising, therefore, that Carnarvon National Park is a popular destination for tourists.

The park is the focus of a new multi-scale topographic map recently released by Geoscience Australia. Though the map was originally developed to meet the needs of local emergency and environmental managers, it has also proved a valuable resource for visitors to the area.

The map sheet includes coverage of the Carnarvon Gorge area (showing popular walking tracks) at 1:250 000 scale as well as coverage of the popular southern section of the park at 1:100 000 scale. The reverse side features a satellite image (1:250 000 scale) with overlays showing major roads and visitor facilities as well as three insets highlighting the Salvator Rosa, Ka Ka Mundi and Carnarvon Gorge sections of the park.

The Carnarvon National Park map is one of a number of maps recently released by Geoscience Australia that have been produced as a result of collaboration between the Australian Government and state and territory land management agencies. The map was compiled with assistance from the Queensland Government Department of Environment and Resource Management and the Queensland Fire and Rescue Service. The map is available from the Geoscience Australia Sales Centre and map retailers.



For more information or to order a copy visit

www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=68612

ACT Region map updated

A second edition of the ACT Region map was launched in November 2009 by the Australian Capital Territory (ACT) Minister for Police and Emergency Services, Simon Corbell. The new map covers the entire ACT and the immediate surrounding region at 1:100 000 scale. This latest edition provides emergency service workers with critical information to help safeguard the community as well as providing a guide to help local residents and visitors to the region to enjoy its natural beauty.

The map has used the latest in aerial photography acquisition techniques and mapping technologies to ensure that it includes information vital to emergency services activities, such as, prevention, preparedness, response and recovery. Many topographic and cultural features have been updated since the first edition and the map features orthophotography on the reverse side plus an informative narrative panel which provides details about the region's landscapes.

Geoscience Australia collaborated with the ACT Emergency Services Authority to produce the ACT Region map and Geographical Information System (GIS). The maps and datasets were delivered to emergency management workers to assist in planning and operational exercises for the 2009–10 bushfire season. The aerial photography used to identify features during revision and as a reference on the back of the printed map was provided free-of-charge by the New South Wales (NSW) Land & Property Management Authority.

The ACT Region map is part of a cooperative National Topographic Information Coordination Initiative (NTICI) program being undertaken by Geoscience Australia in partnership with state and territory emergency management and mapping agencies. The program operates on the efficient principle of collecting information once and using it many times across all levels of government, industry and the community.

The first detailed ACT Region topographic map was produced in 2004 by Geoscience Australia following the 2003 Canberra bushfires in collaboration with a range of key stakeholders using the best data available at the time. The new edition was developed again by Geoscience Australia in collaboration with various government agencies including the ACT Emergency Services Agency, ACT Planning and Land Authority, ACT Department of Territory and Municipal Services, NSW Department of Lands, NSW National Parks and Wildlife Service as well as emergency service volunteers from the ACT and surrounding NSW region.



For more information or to order a copy visit

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