



The year in review

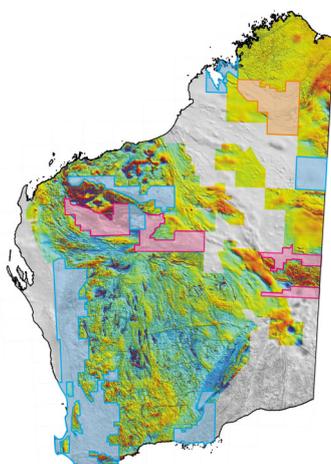
by Tim Griffin, Executive Director



The strength of the resources industry during 2005–06 is shown by the dramatic increase in capital expenditure on mineral and petroleum extraction projects in Australia, up 76% on the previous year to \$18.1 billion. Western Australia accounted for 56% of this expenditure, and the State's total of \$10.2 billion in new capital expenditure on mining was up 84% on 2004–05. Commodity prices continued to rise on the back of strong demand, particularly for zinc (prices up over 70% on 2004–05), copper (up 55%), iron ore (up 45%), oil (up over 30%), and gold (up over 20%).

However, these higher prices did not translate into an increase in mineral exploration activity in Western Australia, where there was actually a 3% drop in expenditure, although there was a modest increase in mineral exploration expenditure for Australia as a whole. Petroleum exploration expenditure in Western Australia did show an increase of 3% to \$594 million, compared with the country's increase of 15% to \$1262 million. In 2005–06 Western Australia had about 47% of the national petroleum exploration budget, down slightly from the previous year. More needs to be done to attract increased exploration to the State if the future of the resources industry is to be sustained.

Pre-competitive geoscience funding



The \$3 million per annum additional funding provided to GSWA by the State Government in 2004 for acquisition of new pre-competitive geoscience information has again provided a 'shot in the arm' for greenfields exploration in 2005–06. This funding allowed 528 000 line-km of airborne magnetic and radiometric surveys to be carried out, in collaboration with Geoscience Australia, covering some 145 000 km² in the Paterson, Gascoyne, and east Yilgarn regions. With company data purchased adjacent to the new surveys, some 250 000 km² of new magnetic/radiometric data was made available to explorers during the year, initially as preliminary enhanced compressed wavelet (ECW) images downloadable from the GSWA website and later as final point-located and gridded data from the Geophysical Archive Data Delivery System (GADDS) on Geoscience Australia's website. The interest generated by these surveys is evidenced by increased tenement applications over the areas covered immediately following the release of images and data.

Also made possible with the additional funding and in collaboration with Geoscience Australia was a detailed regional gravity survey of the Paterson area surrounding the Telfer (gold), Nifty (copper),

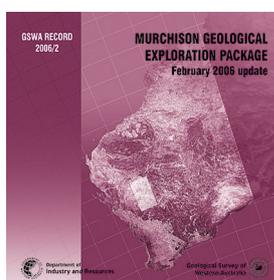
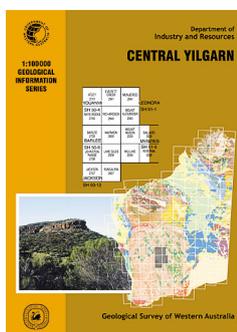
and Kintyre (uranium) deposits, and a seismic traverse across the Tanami Complex. The helicopter-assisted but ground-based Paterson gravity survey covered 20 000 km² with 4544 readings at a nominal 2.5 km spacing. The Martu Aboriginal people were consulted prior to the survey and at their request several culturally sensitive areas were excised from the area to be covered. Industry's enthusiasm for such detailed regional gravity surveys has encouraged planning for further surveys in coming years.

The 102 km-long Tanami seismic line passed close to the Coyote gold deposit and provides important information about the nature and attitude of major crustal structures that may be important in localizing gold mineralization in this exciting greenfields gold province.

GSWA publications

During 2005–06 GSWA published:

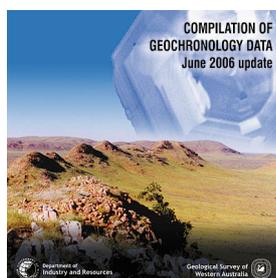
- 26 geoscience maps including 6 geological maps at 1:100 000 scale
- 24 Records, Reports, and other publications
- 18 digital information products.



The emphasis continues to be on digital products in response to requests from industry through the industry bodies APPEA, AMEC, and the Chamber of Minerals and Energy, and the Geological Survey Liaison Committee. GSWA's policy of releasing, prior to new mapping being undertaken, all available data on DVD as **Geological Exploration Packages** has proved very popular, and the year saw updated releases for the Northeastern Goldfields and the Murchison regions. New geological maps at 1:100 000 scale were released with large amounts of supporting information in GIS format as part of the **Geological Information Series** for the west Musgrave, central Yilgarn, and southern Pilbara areas. This series of seamless geoscience maps comprising geology, geophysics, satellite imagery, and associated sample and observational data has rapidly become the standard format for presentation of these multi-layer datasets, usable in common GIS software packages or with GSWA's GeoVIEWER.WA software that is provided with the information package. Conventional paper plotted maps for these areas are available on-line or from the Information Centre at Mineral House, Perth.

Geochronology

Geochronology continues to be an important activity for GSWA and an expanded capacity for SHRIMP and other dating techniques in 2005–06 enabled more rocks critical to the mapping program to be dated. Geochronology coverage of the State is summarized in the **Compilation of Geochronology June 2006 update**, which has data for 654 GSWA samples as well as 1162 samples from Geoscience Australia's Ozchron database. The GeoVIEWER.WA software developed by GSWA to view data in GIS format allows queries on many aspects including rock type, stratigraphic unit, or age range, with results plotted on screen with State 1:500 000- or 1:2 500 000-scale geology. Improved graphs help in visualizing results and interpretation of these complex data.



New mapping process

A new approach to GSWA's mapping processes was introduced during the year to take advantage of new technologies, speed up field mapping programs, and shorten the time it takes to deliver the final digital and paper maps. The new process involves desktop production of an interpreted bedrock geology map using all available information such as aeromagnetics, radiometrics, existing 1:250 000-scale geology, and company exploration data prior to any new fieldwork. At the same time, regolith-terrain maps

are produced from satellite images, orthophotography, and digital elevation models. The field geologist can then target new mapping and concentrate on the regolith and bedrock geological features identified as most likely to provide new insight into the geology and mineralization potential. Field data is collected digitally and is readily transferred to corporate databases for incorporation into the final digital geological map. This can be released with all associated data such as structural measurements, field photos, petrographic descriptions, and any geochemical or geochronological information, in a multi-layered GIS format. The first products using the new process will be released in 2006–07.

Web delivery of products and reports

GSWA's implementation of DigitalPaper XE now includes the ability to view online, print, or download without charge almost all GSWA products released since 1895, including maps, Reports and Bulletins. The same facility enables viewing and downloading of open-file company mineral exploration (WAMEX) reports and at the end of 2006 almost 30 000 reports were available for viewing by this facility, including the first reports released under the sunset clause provisions of the Mining Act.

The data download centre on the GSWA website now has 1:100 000 and 1:250 000 geological maps as vector files for downloading as ArcMap or MapInfo formats. Free training sessions for users of our online systems were implemented in 2006

Access to Aboriginal lands

Geological mapping on Aboriginal reserve lands or Native Title determined areas is extending modern 1:100 000-scale mapping into greenfields areas of Western Australia in the west Musgrave region at Blackstone–Wingellina (Papulankutja–Irrunytju), Cosmo Newbery in the northeastern Goldfields, and Tjurabalan lands in the Tanami. GSWA has agreements with traditional owners and the Ngaanyatjarra Council regarding access to Ngaanyatjarra lands and employs local people to help in the mapping fieldwork. An agreement is also being discussed with the Kimberley Land Council and the Tjurabalan people regarding ongoing access to sensitive areas of the Tanami.

Petroleum systems studies

The Petroleum Systems group finalized studies of the Officer Basin during 2005–06 and turned its attention to the underexplored Canning Basin. Planned work includes reappraisal of existing seismic records and exploration drillholes to provide industry with pre-interpretive workstation-ready data packages as well as field-based studies focusing on the sedimentology through the Ordovician and Permian–Carboniferous sequences. Regional petroleum geochemical studies are also underway to refine the prospectivity of the basin. This comes at a time when there is renewed interest from both international and local petroleum explorers in the hydrocarbon potential of the Canning Basin.

The petroleum exploration information database (WAPIMS) continued to improve access to exploration data with a total of 342 Gb of data now available online. The transcription of valuable historic seismic data to modern media continued to ensure availability, with 60% of the archive now completed. Discrete data packages are now being produced for release starting in the second quarter of 2007, and these packages will be updated on an annual basis.

Geological field excursions

In 2005–06, GSWA staff participated in field excursions to the Proterozoic Albany–Fraser Orogen, the Archean Kurnalpi Terrane, and the Devonian reefs of the Kimberley. Field guides were published by GSWA for the Albany–Fraser Orogen and Kurnalpi Terrane excursions.



The Albany–Fraser excursion was organized by the Tectonics Special Research Centre and the Geological Society of Australia as part of the Supercontinents and Earth Evolution Symposium that marked the end of the Tectonics Special Research Centre.

The Kurnalpi Terrane excursion was held in conjunction with the Australian Institute of Geoscientists' 'Outcrop to Orebody' symposium held in Kalgoorlie in May 2006. The excursion visited key outcrops on the recently mapped MINERIE 1:100 000 sheet, including felsic volcanics of the Welcome Well Formation and ultramafic rocks of the Murrin Murrin Formation, as well as the Sunrise gold deposit.

The Devonian reefs field trip showed oil industry geoscientists the well-preserved aspects of the fossil reef system that has been the subject of detailed research by GSWA over many years. This research is summarized in GSWA Bulletin 145, which will be completed in 2007.

Promotional events

As part of its role in promoting the prospectivity of Western Australia and attracting exploration investment in the State, GSWA has targeted the major international mineral-exploration promotional events of the Prospectors and Developers Association of Canada (PDAC), China Mining, and a meeting with the Japan Oil Gas and Metals National Corporation (JOGMEC), as well as the NAPE petroleum exposition in Houston, USA. In addition, GSWA had promotional booths at major mineral and petroleum exploration conferences within Australia, including the RIU Explorers Conference in Fremantle, Mining 2005 in Brisbane, Diggers and Dealers in Kalgoorlie, the AIG Symposium in Kalgoorlie, the AMEC Conference in Perth, and the APPEA Conference on the Gold Coast.

The future

Strong demand and prices for many of the mineral and petroleum products important to Western Australia's resources industry look set to continue for at least the next few years. However, the resources that are currently being exploited or will be coming into production in the next year or so were largely discovered many years ago. It is critical to the sustainability of these industries that new deposits are discovered soon, as the lead time in bringing major new mines, oil- or gasfields, and associated downstream-processing facilities into production can be ten years or more. Although exploration expenditure in Western Australia increased slightly in the September 2006 quarter, it actually declined over the 2005–06 year despite the record value of production and royalties in the State during that time. Western Australia's share of Australian and world exploration expenditure continues to fall, and this trend must be reversed if the industry is to be sustained at or near current levels into the future.

The Geological Survey of Western Australia is charged with attracting mineral and petroleum exploration investment to the State. To make Western Australia the preferred destination for explorers, be they local, interstate or multi-national organizations, we need to improve the perception of prospectivity, land access, and government support for the industry within the State. We also need to compete favourably with other jurisdictions in these areas, and in this regard increased coverage of quality geological, geophysical, and geochemical data is seen as a major incentive for explorers. This can only be achieved with substantial additional funding for GSWA, and this is being sought within Government. A formal review of the Geological Survey will be undertaken by external consultants in 2007, with appropriate funding levels being included in the terms of reference.

With mineral and petroleum production at a record \$43.2 billion and royalties totalling \$2.09 billion in 2005–06, this would appear to be an opportune time to seriously address this issue.