



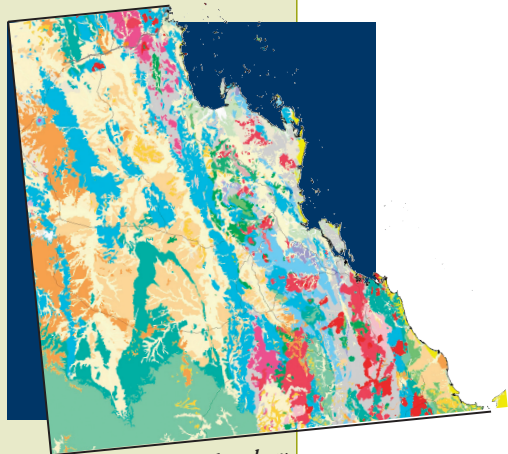
Australian Government

Geoscience Australia

# Australian *Mineral* EXPLORATION

FEBRUARY 2006

A REVIEW OF EXPLORATION FOR THE YEAR **2005**



1:1 million digital geology  
of Eastern Australia

## OVERVIEW

- Australian mineral exploration spending in 2004-05<sup>1</sup> rose by 31% to \$1028.3 million<sup>2</sup> of which 39.3% was spent on the search for new deposits<sup>3</sup>.
- Total global non-ferrous mineral exploration budgets rose 38% to an estimated US\$5.1 billion in 2005.
- Western Australia received 59% of Australian mineral exploration spending in 2004-05 as spending rose in all States except Victoria.
- Gold remained the main target but its share of spending was eroded by increased spending on nickel, copper, iron ore, coal and uranium.
- Exploration resulted in significant increases in resources at known deposits and a substantial number of drill intersections of economic interest.

## Exploration REVIEW

Australian mineral exploration expenditure rose by 31% to \$1028.3 million in 2004-05 (year ending 30 June 2005) according to the Australian Bureau of Statistics (ABS). This was the highest annual current dollar expenditure since 1997-98. Building on the 7.4% growth reported in 2003-04, the constant 2004-05 dollar spending rose by 28% (Figure 1) to reach 73% of the 1996-97 peak.

ABS survey data on spending on exploration for new deposits<sup>3</sup> showed that, nationally, 39.3% of exploration spending was in that category. Western Australia, at 46.8%, had the highest proportion of exploration for new deposits while Victoria had the lowest at 19.0%. This share of exploration for new deposits is slightly higher than the Metals Economics Group (MEG) world survey of non-ferrous minerals exploration budgets for 2005 which found that 37.0% of exploration budgets in Australia were for grassroots exploration.

Spending increased in all jurisdictions except Victoria where it fell slightly. Western Australia led by attracting \$606 million, an increase of 30% on 2003-04. It was followed by Queensland where spending rose by 32.9% to \$166.4 million and New South Wales where it rose by 45.7% to \$73.6 million. South Australian spending rose by 60.4% to \$66.9 million and the increase in the Northern Territory was 30.8% to \$55.6 million. Spending in Tasmania rose by 10.7% to \$8.5 million but Victorian exploration fell by 3.7% to \$51.5 million.

In 2004-05 ABS reported that exploration drilling totalled 6.78 million metres, an increase of 1.1 million metres (19%) from 2003-04. Of the total, 2.78 million metres (41% of all exploration drilling) was on the search for new deposits a substantially smaller share than the 47% recorded in 2003-04.

<sup>1</sup>Australian financial year from 1 July 2004 to 30 June 2005.

<sup>2</sup>All monetary references in this paper are to Australian dollars unless otherwise stated.

<sup>3</sup>Exploration spending on the search for new deposits covers exploration for previously unknown mineralisation or exploration on known mineralisation which is not yet classified as a resource.

An extended version of this review is available at [www.ga.gov.au/minerals/research/pubspres.jsp](http://www.ga.gov.au/minerals/research/pubspres.jsp)

The MEG survey of world non-ferrous mineral exploration budgets for 2005 reported an increase of 34% to an estimated total budget of US\$5.1 billion based on survey respondent's budgets totalling US\$4.89 billion. Of the respondent's budgets, US\$614.7 million was directed to exploration in Australia the highest since 1998. However, Australia's share of global non-ferrous mineral exploration budgets fell to 12.7%, the lowest yet recorded.

According to the MEG survey, 58.6% of the 2005 exploration budgets for Australian-based companies was for exploration in Australia. The survey included 308 companies with non-ferrous exploration budgets of more than US\$100 000 that were exploring in Australia, an increase of 21 over 2004. Of the total, 37 were overseas based companies, one more than in 2004. Budgets for Australian non-ferrous mineral exploration were directed to gold (US\$331.4 million), base metals (US\$214.1 million) and diamonds (US\$22.5 million).

Some \$177 million was raised for exploration in Australia from 48 initial public offerings on the Australian Stock Exchange in 2005.

## GOVERNMENT PROGRAMS

The Australian, State and Northern Territory Governments continued to release new geoscientific information to support mineral exploration. Highlights for 2005 included:

### Geoscience Australia

- Geoscience Australia released the 1st edition seamless digital 1:1 million geology datasets for NSW and Queensland and 2nd edition for Tasmania and Victoria.
- Geoscience Australia, in partnership with Western Australia, Northern Territory, Newmont Exploration and Tanami Gold NL, acquired 700 km of deep crustal seismic reflection data in the Tanami gold province, to better redefine the crustal structure and upper crustal geometries of the region.

### New South Wales

- The \$30 million, seven year, Exploration NSW Initiative, has covered 80% of NSW with high resolution geophysics at 400 m line spacing or better. Its focus is now on the "frontier terranes" the Thomson Fold Belt in the northwest and extensions of the gold-rich Bendigo and Stawell Zones into NSW.
- 3D modelling of the highly prospective Lachlan Fold Belt is being done with the Cooperative Research Centre for Predictive Mineral Discovery.

### Northern Territory

- Release of 3700 new gravity stations over the northern Tanami Region, acquired on 2 km centres.
- Release of major reports on the gold mineral systems of the Tanami Region and tin-tantalum pegmatite mineralisation of the Northern Territory.

### Queensland

- Smart Exploration is a 4 year geoscience initiative to stimulate exploration with an additional \$20 million to accelerate geoscience data acquisition in the priority areas of Mount Isa, Drummond Basin and Mount Rawdon regions, and the Bowen and Surat Basins.
- Smart Exploration programs include airborne geophysics, gravity, deep seismic reflection, hyperspectral and magneto-telluric surveys, structural studies, geological mapping and 3D modelling, and digital data capture from historical exploration reports.

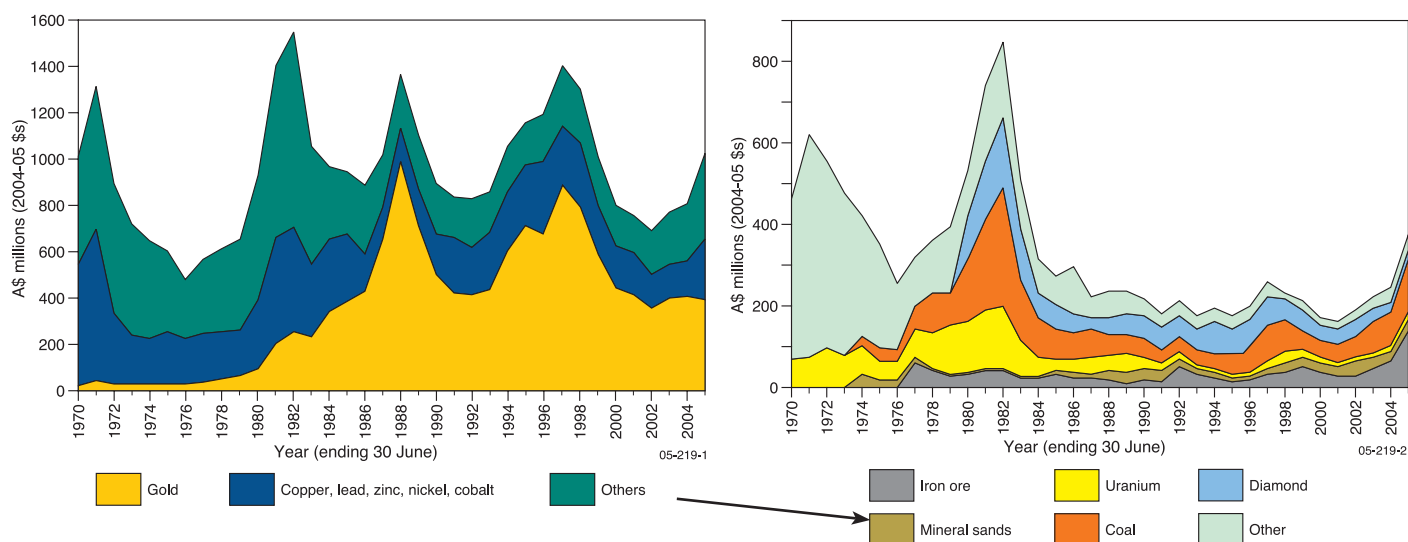
### South Australia

- Under the Plan for Accelerating Exploration (PACE) collaborative drilling program 106 successful proposals were awarded government grants totalling more than \$6.1 million for exploration in the State. The discovery at Carrapateena and other positive drilling results were achieved.
- Acquisition of ground gravity data over the central Gawler Craton and the northern Curnamona region has increased exploration licence coverage by approximately 22%.

### Tasmania

- Building on work conducted under the Western Tasmanian Regional Minerals Program and

**Figure 1:** Australian mineral exploration expenditure in constant 2004-05 dollars. Based on Australian Bureau of Statistics data deflated by Consumer Price Index.



the development of the 3D geological model and prospectivity analysis of Tasmania, the digital geology of 94 1:25,000 sheets covering the State's main mineral belt, the Mount Read Volcanics was updated and released in 2005.

- Geoscience Australia and Mineral Resources Tasmania jointly completed a project on the mineralisation potential of the Palaeozoic granites of Tasmania, including a comprehensive rock geochemical database.

## Victoria

- 17th VIMP data release in June included the "Victoria - Geoscientific Data Package", Open File mineral exploration licence reports and a range of products to assist explorers.
- A number of new data layers were added to the GeoVic online web mapping application including geological structure measurements, 3D seismic surveys and mineral graticules.

## Western Australia

- Using Western Australian Government initiative funding of \$3 million per annum, airborne geophysical programs were conducted in cooperation with Geoscience Australia in the southern Yilgarn, Albany-Fraser Orogen, Paterson area north of the Telfer mine, Gascoyne, and in the Tanami area.
- About 7000 statutory mineral exploration reports were digitally scanned in 2005 using Western Australian government initiative funding of \$1.2 million over three years. These and the other 14 000 reports to be scanned during this program will be released to open file after recent amendments to the WA Mining Act.

# EXPLORATION

Exploration resulted in significant increases in resources at some known deposits and generated numerous drill intersections of economic interest. Gold and base metals remained the major targets but a surge of activity was recorded in iron ore and uranium exploration. Among the more notable discoveries were copper-gold mineralisation at Carrapateena in the Gawler Craton and the mineral sands discoveries in the Eucla Basin.

## Gold

ABS reported gold exploration spending for 2004-05 was \$391.7 million, a reduction of \$5.4 million over 2003-04. Increases in New South Wales, Queensland and the Northern Territory did not offset reductions in other jurisdictions. Western Australia was the focus of gold exploration with \$259.6 million. Intersections of particular interest were those at Carrapateena, South Australia and Trident, Pithara and Karlawinda Bore in Western Australia.

## New South Wales

- Newcrest Mining Ltd announced an initial reserve estimate for the **Cadia East** project of 6.0 Mozs Au and 0.63 Mt Cu within an indicated and inferred resource of 18.2 Mozs Au and 2.9 Mt Cu.
- Alkane Exploration Ltd reported an encouraging intersection from drilling into the Hangingwall zone at the **Wyoming One** deposit. A zone of 12 m @ 3.45g/t Au included 4 m @ 5.37g/t Au. In drilling on adjacent structures significant intersections were 5 m @ 7.65g/t Au, 14 m @ 15.48g/t Au and 66 m @ 13.8g/t Au. Later drilling returned 66.00 m @ 19.49g/t Au.
- Moly Mines Ltd reported drilling at the **Dargues Reef** project near Braidwood returned 74.0 m @ 2.6g/t Au and 50.0 m @ 2.8g/t Au and within these are high-grade zones including 25 m @ 6.1g/t Au and 5.5 m @ 7.9g/t Au. The company announced an inferred resource of 3.72 Mt @ 3.0g/t Au (0.36 Mozs).

## Northern Territory

- At the **Cosmo Deeps** deposit, 150 km south of Darwin, Northern Gold NL (now GBS Gold Australia Pty Ltd) explored beneath the east and west flanks of the old Cosmo open pit. Drilling yielded 4.1 m @ 10.1g/t Au from 622 m downhole and 4.7 m @ 7.1g/t Au from 358 m downhole in the Eastern Lodes. In the Western Lodes results included 7.5 m @ 2.0g/t Au from 176 m downhole and 3.9 m @ 6.3g/t Au from 199 m downhole. Cosmo Deeps has an indicated plus inferred resource of 9.7 Mt @ 4.0g/t Au.

## Queensland

- At the Cracow project, Sedimentary Holdings Ltd announced the discovery of the **Kilkenny** zone 400 m west of the Crown Shoot. An intersection of 23.9 m @ 7.4g/t Au including 5.9 m @ 21g/t Au was reported. Subsequent drilling yielded 21 m @ 9.6g/t and 1 m @ 103g/t Au including visible gold.
- Ongoing drilling at **Woolgar**, 100 km north of Richmond, by Strategic Minerals Corporation NL yielded high-grade intersections from an anomaly linking the Grand Central and Camp Vein structures. Drilling returned 1 m @ 263g/t Au from 29 m, 6 m @ 10.24g/t Au from 41 m and 6 m @ 16.75g/t Au from 74 m.
- Straits Resources Ltd discovered mineralisation beneath the old **Yandan** mine. An intersection of 176 m @ 2.4g/t Au included a zone of 27.5 m @ 8.1g/t Au. A second intersection was 194 m @ 2.1g/t Au including 30.5 m at 8.6g/t Au. Another hole ended with 2.5 m @ 248g/t Au.

## South Australia

- Oxiana Ltd announced the addition of 1 Mozs of gold at the **Prominent Hill** deposit, 650 km northwest of Adelaide. Indicated and inferred resources in the Copper-Gold Breccia is 101 Mt @ 1.5% Cu and 0.55g/t Au and the Eastern Gold Zone has 21 Mt @ 1.2g/t Au. The metal content of resources is 1.5 Mt Cu and 2.6 Mozs Au.

## Tasmania

- Drilling of the **Pinafore Reef** in the Lefroy Goldfield, 40 km north of Launceston, by Lefroy Resources Ltd returned high-grade intersections below old workings and 200 m along strike from previous high-grade intersections. Results included 1 m @ 23.88g/t Au from 54 m, 10 m @ 2.41g/t Au from 60 m including 1 m @ 13.62g/t Au. Lefroy announced an inferred resource of 304 000 t @ 22.9g/t Au (0.225 Mozs).
- At the **Mount Charter** prospect in northwest Tasmania, Bass Metals Ltd reported 58 m @ 1.84g/t Au and 35g/t Ag from surface and 80 m @ 1.6g/t Au and 61g/t Ag.

## Victoria

- Bendigo Mining Ltd announced the discovery of a new reef on the Sheepshead Line at **Bendigo**. The Alexandria Reef is at least 900 m long, 3-10 m wide and about 50 m high. The company announced a 250 m extension of the Greater Garrad Reef, which contains 40% of Bendigo's gold reserves.
- Ballarat Goldfields NL reported a intersection from its **Ballarat East** prospect at Ballarat. An intersection of





30 m (true width) @ 24g/t Au which is interpreted as a continuation of an ore shoot previously intersected to the north. Production has commenced.

- Goldstar Resources NL reported visible gold in intersections from the first three holes drilled at its **Eureka** prospect at Walhalla. In the first modern exploration of the target, intersections reported include 1.85 m @ 16.48g/t Au, 2.00 m @ 64.61g/t Au and 1.9 m @ 4.37g/t Au.
- A diamond drill intersection of 7.9 m @ 10.0g/t Au, including 3.5 m @ 21.6g/t Au, at approximately 1270 m RL, was reported by Leviathan Resources Ltd from the **Magdala North** mineralisation at Stawell. The Magdala orebody had previously been thought to narrow at depth but this intersection suggests that it thickens and extends to the north.

## Western Australia

- A discovery of concealed gold mineralisation was reported by WMC Resources Ltd at its **Karlawinda Bore** prospect 65 km southeast of Newman. Intersections in two holes were 1 m @ 14.2g/t Au, 7 m @ 4.6g/t Au including 1 m @ 21.8g/t Au and 6 m @ 4.5g/t Au including 1 m @ 18.3g/t Au.
- Avoca Resources Ltd reported high-grade intersections from its **Trident** deposit at Higginsville including 7 m @ 72g/t Au in a new lode. Infill drilling at Trident yielded 60 m @ 7.6g/t Au and 1 m @ 162g/t Au. Indicated and inferred resources of 0.485 Mozs have been delineated.
- At the **Coyote** deposit, in the Western Australian side of the Tanami, Tanami Gold NL reported the discovery of Scooby Lode which returned 'bonanza' grade intersections including 0.2 m @ 847g/t Au from 178.1 m and 0.3 m at 143g/t Au from 173 m. Coyote has a resource of 2.7 Mt @ 5.2g/t Au (0.45 Mozs). Production is targeted for mid-2006.
- A1 Minerals Ltd advanced exploration of the Brightstar project 30 km southeast of Laverton. Drilling at **Brightstar Alpha** returned 7 m @ 16.95g/t Au, 19 m @ 3.3g/t Au and 11 m @ 2.93g/t Au. A1 acquired the Mikado gold mine 15 km southwest of Brightstar Alpha and has renamed it Brightstar Beta. In-pit drilling at Brightstar Beta returned 14 m @ 18.5g/t Au, 3 m @ 58.1g/t Au and 2 m @ 38.1g/t Au. A1 announced a total resource for the Brightstar project of 0.4 Mozs Au.
- Anglo Australia Resources NL reported the new Endymion palaeochannel mineralisation at its **Mandilla** project 70 km south of Kalgoorlie. Endymion returned 3 m @ 226.22g/t Au, 3 m @ 71.82g/t Au and 1 m @ 128.78g/t Au, all at 16 to 19 m below surface. Anglo Australian announced a probable reserve of 70 000 t @ 7.52g/t Au within an indicated resource of 53 000 t @ 10.22g/t Au for Mandilla.
- Exploration at the **Sickle** deposit, 10 km southeast of Laverton, by Crescent Gold Ltd returned 2 m @ 14.2g/t Au from 77 m, 12 m @ 4.4g/t Au from 58 m and 8 m @ 3.3g/t

Au from 51 m. Crescent reported indicated plus inferred resources of 9.7 Mt @ 1.7g/t Au (0.53 Mozs).

- Agincourt Resources Ltd reported intersecting wide gold mineralisation at its new **Woodley North** Lode near Wiluna. Intersections included 42.6 m @ 6.0g/t Au and 27.7 m @ 9.9g/t Au and are reportedly some of the thickest intersections recorded since the discovery of the 1 Moz Bulletin lode in 1992.
- Independence Group NL reported that drilling at **Tropicana**, east of Laverton, by AngloGold Ashanti Ltd returned intersections including 38 m @ 3.0g/t Au, 26 m @ 2.29g/t Au and 26 m @ 2.2g/t Au. The company suggests that this is in a potential new gold province on the southeast margin of the Yilgarn Craton.
- Shallow, high-grade intersections were reported by Independence Group NL from the **Pithara** prospect at its Dalwallinu project 250 km northeast of Perth. This discovery is under shallow cover and gave 7 m @ 21.8g/t Au, 9 m @ 6.3g/t Au and 6 m @ 4.9g/t Au.
- At the **Mt Berghaus** project in the Pilbara region, De Grey Mining Ltd continued to report encouraging intersections including 3 m @ 25.74g/t Au, 7 m @ 6.92g/t Au and 5 m @ 10.34g/t Au. Strike length of the mineralisation exceeds 5.5 km.
- Northern Star Resources Ltd reported shallow high-grade intersections from its **Range** prospect 130 km north of Halls Creek. Results include 5 m @ 15.08g/t Au and 34.94g/t Ag.
- In the Pilbara region, Northwest Resources Ltd announced high-grade intersections from its Nullagine project about 18 km east of Nullagine. At **Round Hill**, results included 6 m @ 40.12g/t Au, 14 m @ 8.92g/t Au and 4 m @ 6.22g/t Au.

## Copper-Gold

### New South Wales

- Drilling by Golden Cross Resources Ltd at **Copper Hill** near Molong returned 164 m, (from surface) @ 0.90g/t Au and 0.62% Cu. This included 124 m @ 1.11g/t Au and 0.68% Cu. Other results included 129.8 m @ 1.8g/t Au and 0.79% Cu from 48 m which ended in mineralisation.

### Queensland

- At its Cloncurry project 8 km east of the Ernest Henry mine northeast of Cloncurry, Exco Resources NL reported new mineralisation at the **E1 East** prospect. Intersections included 72 m @ 1.25% Cu and 0.4g/t Au, 42 m @ 1.75% Cu and 0.59g/t Au and 108 m @ 0.68% Cu and 0.2g/t Au.



**Figure 2:** Selected mineral exploration projects, 2005.

## South Australia

- RMG Services intersected Olympic Dam/Prominent Hill style iron oxide copper-gold mineralisation drilled at its **Carrapateena** Prospect, 100 km southeast of Olympic Dam. It intersected hematite alteration of variable intensity, sulphide development and brecciation between 469 m and 654.2m. The intersection from 476 m to 654.2 m yielded 1.83% Cu and 0.64g/t Au. RMG's drilling was 50% funded under the South Australian Government's PACE plan.

## Western Australia

- Dominion Mining Ltd reported new mineralisation from the **Wongan Hills** prospect 130 km northeast of Perth. Results included 3 m @ 0.7% Cu and 1.35g/t Au and 36 m @ 0.57% Cu, including 6 m @ 1.9% Cu and 2.4g/t Au, 9 m @ 0.69% Cu including 2 m @ 2.08% Cu and 1.6g/t Au.
- At the **Yagahong** prospect in the Gabanintha project, 45 km southeast of Meekatharra, Reward Minerals Ltd reported high-grade copper-gold. Included were 7 m @ 11.3g/t Au and 1.32% Cu and 4 m @ 9.66g/t Au and 2.30% Cu. Reward announced an indicated resource of 511 470 t @ 4.35g/t Au for 71 559 ozs.

## Copper, Zinc, Lead

ABS reported copper exploration spending for 2004-05 was \$71.3 million, an increase of 89% over 2003-04. Spending in South Australia rose by 139% to \$32.7 million as it became the principal target for copper exploration. In Queensland, \$24.8 million was spent resulting in South Australia and Queensland accounting for 81% of all copper exploration. In contrast zinc, lead, silver exploration rose by only \$1.5 million to \$31.2 million. Queensland is the major target for zinc, lead, silver exploration.

## New South Wales

- Perilya Ltd reported high-grade zinc mineralisation from five prospects 10 km west of its Broken Hill operations. They suggest that these results, including the following **Henry George** intersections, indicate potential for additional ore for Broken Hill. Henry George intersections were 2 m @ 17.8% Zn, 1.3% Pb and 65g/t Ag and 5 m @ 6.4% Zn, 0.1% Pb and 13g/t Ag.
- Triako Resources Ltd reported that drilling at the **Hera** prospect near Nymagee, returned 5.7 m @ 3.0g/t Au, 3.9% Pb+Zn and 13g/t Ag from 546 m including 2.22 m @ 6.0g/t Au, 0.1% Cu, 7.8% Zn and 25g/t Ag. A new, mainly inferred, resource

estimate of 1.94 Mt @ 6.7g/t Au, 0.2% Cu, 2.8% Zn, 2.5% Pb and 14g/t Ag was released.

## Northern Territory

- Reward Minerals Ltd reported results from drilling at its **Jervois** project including 6 m @ 5.2% Cu from 65 m at the Bellbird prospect and 14 m @ 9.9% Pb, 2.8% Zn and 89g/t Ag from 32m at Green Parrot.
- Intersections of 20 m @ 2.07% Cu, 0.30% Co and 0.37% Ni and 12 m @ 2.17% Cu, 0.03% Co and 0.09% Ni were reported by Compass Resources NL, from its **Browns East** Oxide prospect 80 km south of Darwin. They comment that it is likely that the oxidised copper cobalt nickel mineralisation is the weathered near surface expression of the Browns East deposit (resource of 30.5 Mt @ 1.29% Cu, 1.28% Pb, 0.13% Co and 0.13% Ni).

## Queensland

- Drilling by Kagara Zinc Ltd at its **Mungana** deposit near Chillagoe gave 13.94 m @ 3.38% Cu, 16.83% Zn, 0.06% Pb, 1.10g/t Au and 119g/t Ag and 1.25 m @ 3.40% Cu, 13.40% Zn, 20.60% Pb, 2.08g/t Au and 280g/t Ag. It has extended the gold mineralisation surrounding the base metal resource with intersections of 50.70 m @ 2.72g/t Au, 0.6% Zn, 0.2% Pb, 0.2% Cu and 17g/t Ag and 50.25 m @ 2.88g/t Au, 0.5% Zn, 0.1% Pb, 0.5% Cu and 11g/t Ag.
- At the **Muldiva** prospect 30 km southeast of Chillagoe, Kagara Zinc Ltd reported intersections including 6 m @ 16.2% Zn, 4.0% Pb, 802g/t Ag and 1.6g/t Au, 3 m @ 8.9% Zn, 2.4% Pb and 222g/t Ag and 3 m @ 18.3% Zn, 1.1% Pb and 146g/t Ag.
- Kagara Zinc Ltd reported copper intersections at **Balcooma**, 60 km east of Kidston, including 52 m @ 4.5% Cu, 21g/t Ag and 0.37g/t Au, 44 m @ 4.5% Cu, 20g/t Ag and 0.49g/t Au and 61 m @ 3.1% Cu, 12g/t Ag and 0.32g/t Au. Kagara believe that this drilling will add to the primary copper orebody resource of 1.978 Mt @ 3.3% Cu.
- Copper Strike Ltd reported intersections from its **Einasleigh** prospect 300 km northwest of Townsville, including 15 m @ 11.76% Cu, 11 m @ 3.10% Cu and 2 m @ 9.83% Cu. It has an inferred resource of 0.94 Mt @ 3.3% Cu, 0.18g/t Au and 15g/t Ag.

## South Australia

- BHP Billiton Ltd released updated reserve and resource estimates for the **Olympic Dam** deposit. Proven and probable reserves total 756 Mt @ 1.5% Cu, 0.5 kg/t U<sub>3</sub>O<sub>8</sub>, 0.5g/t Au and 3.1g/t Ag within a total measured, indicated and inferred

resource of 3970 Mt @ 1.1% Cu, 0.4 kg/t U<sub>3</sub>O<sub>8</sub>, 0.4 g/t Au and 2.3g/t Ag.

- At the **Angas** project, 65 km southeast of Adelaide, Terramin Australia Ltd reported intersections including 3.96 m @ 0.77% Cu, 7.49% Pb, 27.68% Zn, 102g/t Ag and 1.11g/t Au and 6.84 m @ 0.3% Cu, 12.01% Pb, 28.15% Zn, 140g/t Ag and 0.61g/t Au. Terramin reported an inferred resource of 1.8 Mt @ 11% Zn, 4% Pb and 47g/t Ag for the Rankine Shoot.

## Tasmania

- Tasgold Ltd reported encouraging intersections from drilling at the **Wart Hill** prospect, 125 km south of Rosebery. Diamond drilling returned 2.4 m @ 162g/t Ag, 9.81% Zn, 5.11% Pb, 0.12% Cu and 0.4g/t Au, from a second hole 7 m @ 55.6g/t Ag, 6.16% Zn, 3.33% Pb, 0.22% Cu and 1.81g/t Au from 197 m.
- Drilling by Bass Metals Ltd at **Que River** aimed at extending the resources in the S-Lens returned an encouraging intersection of 8.4 m @ 1.3% Cu, 35g/t Ag and 2.0% Zn which included 2.8 m @ 3.9% Cu, 3.0% Zn, 93.1g/t Ag and 0.35g/t Au.

## Western Australia

- Continuing exploration by Fox Resources Limited at **West Whundo** near the Radio Hill mine in the Pilbara region, built on high-grade intersections reported in 2004. Results included 14 m @ 5.65% Cu, 0.05% Zn and 3.0g/t Ag, 14 m @ 2.45% Cu, 0.03% Zn and 2.5g/t Ag and 3 m @ 4.76% Cu, 0.03% Zn and 1.5g/t Ag. Fox announced a measured+indicated resource for West Whundo of 0.894 Mt @ 2.0% Cu, 1.4% Zn and 3.3g/t Ag and an indicated resource of 32 000 t @ 5.3% Cu, 8.0% Zn and 45g/t Ag.
- Abra Mining Ltd reported high-grade intersections at the **Abra** deposit, 200 km north of Meekatharra. Intersections included 188 m @ 5.82% Pb, 0.24% Cu and 0.60% Zn from 352 m which included 74 m @ 1.41% Zn, 5.52% Pb and 0.07% Cu. Other intersections included 6 m @ 11.22% Pb, 0.59% Cu and 0.76g/t Au from 562 m.
- At the **Orchard Well** prospect, 60 km south of Port Hedland, De Grey Mining Ltd reported mineralisation beneath gossaneous material. Drilling gave 13 m @ 3.11% Zn, 1.36% Pb, 0.19% Cu, 1.19g/t Au and 58g/t Ag.
- Jabiru Metals Ltd announced the discovery of the **Daimler** mineralisation at Teutonic Bore. A drill intersection of 30 m yielded 2.0% Cu, 0.3% Zn and 14.5g/t Ag from 90 m. Later results included 42 m @ 0.32% Cu, 3.09% Zn and 8.9g/t Ag from 159 m.



## Nickel

Nickel exploration in 2004-05 rose by 88% to \$158.6 million with all but \$9.9 million spent in Western Australia. Most activity in Western Australia focussed on the search for sulphide mineralisation in the Yilgarn Craton. Significant intersections from the Avebury area, Tasmania, continued to highlight its prospectivity.

### Tasmania

- At Avebury, Allegiance Mining NL reported encouraging drilling at the **Viking** deposit. Intersections returned included 31 m @ 1.5% Ni, 5 m @ 1.8% Ni and 42 m @ 0.8% Ni. At West Viking, intersections of 6.5 m @ 2.3% Ni and 2.0 m @ 1.3% Ni confirmed the area's potential. At Central Avebury 25 m @ 1.5% Ni was recorded. Allegiance announced a resource of 11.59 Mt @ 1.02% Ni at Avebury.

### Western Australia

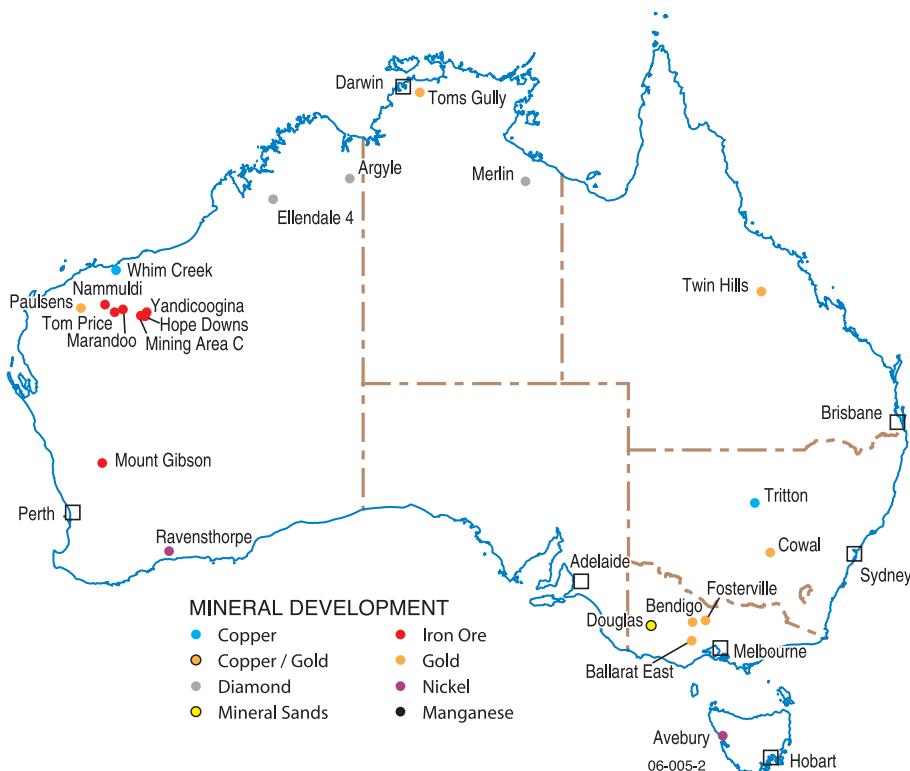
- At the **Flying Fox** T5 deposit, Western Areas NL reported 16.1 m @ 9.7% Ni. T5 has a probable reserve of 606 000 t @ 5.3% Ni and an inferred resource of 115 800 t @ 6.5% Ni. At T5 South the company reported an indicated resource of 141 600 t @ 9.0% Ni. Including these the indicated resource at Flying Fox is 64 600 t Ni and inferred resource is 9 200 t Ni. Western Areas reported zones of 10.45 m and 12.35 m of massive sulphides at T5 (assays awaited)
- Jubilee Mines NL reported inferred resources at its **Prospero** deposit, 4.5 km south of the Cosmos nickel mine, of 1.06 Mt @ 5.72% Ni. Drilling reported subsequently yielded intersections including 19.6 m @ 10.3% Ni, 15.7 m @ 8.7% Ni and 7.10 m @ 5.2% Ni.
- Jubilee Mines NL reported the discovery of nickel sulphides at its **Sinclair** prospect in the Bannockburn Nickel Project near Leonora. Drilling intersected basal, contact related massive and disseminated nickel sulphides over a strike length of 100 m. Intersections included 2.5 m @ 2.58% Ni, 1.45 m @ 2.25% Ni and 2.23 m @ 0.61% Ni.
- At the **Bodkin** prospect near Wiluna drilling returned 6 m @ 0.5% Ni, 5.1 m @ 0.49% Ni and 2 m @ 2.15% Ni. Subsequently Agincourt Resources Ltd intersected 0.3 m @ 6.6% Ni in massive nickel sulphide. This is the first massive nickel sulphide reported from the northern segment of the Perseverance-Wiluna greenstone belt.
- Consolidated Minerals Ltd announced intersections at its **Reliance** project near Kambalda, including 4.3 m @ 16.31% Ni and 1.5 m @ 10.77% Ni.
- Independence Group NL reported the discovery of the **McLeay** deposit at the Long Complex at Kambalda and announced resources of 13 000 t Ni. Ongoing exploration at McLeay returned intersections of 17 m @ 10.7% Ni, 6 m @ 8.3% Ni and 6 m at 6.1% Ni.

- Drilling at **Duplex South**, 35 km southeast of Kalgoorlie, by Australian Mines Ltd returned shallow intersections, including 10 m @ 7.08% Ni, 2 m @ 7.29% Ni and 6 m @ 3.41% Ni.
- Fox Resources Ltd announced further high-grade intersections at the **Ruth Well** prospect 30 km south of Karratha in the Pilbara region. Intersections included 11 m @ 4.3% Ni, 1.5% Cu and 0.13% Co including 3 m @ 13.1% Ni, 1.0% Cu and 0.35% Co.
- Barra Resources Ltd reported 1 m @ 2.93% Ni and 0.19% Cu in primary massive sulphides, the first indication economic grade mineralisation at the **Riverina** project, about 150 km north northwest of Kalgoorlie. Subsequent intersections included 0.37 m @ 10.88% Ni, 31.0 m @ 1.17% Ni and 1.14 m @ 2.28% Ni.
- Thundellara Exploration Ltd reported that LionOre Australia Ltd intersected massive nickel sulphides at the **Keller Creek** prospect in the East Kimberley region. This intersection was 6.77 m @ 1.98% Ni, 0.53% Cu and 0.16% Co.

## Iron Ore

Spending on exploration for iron ore reported by ABS more than doubled in 2004-05 to \$138 million of which \$136.9 million was spent in Western Australia.

- Fortescue Metals Group Ltd released probable reserve for the Cloud Break and **Christmas Creek** deposits in the Pilbara region, WA. Cloud Break has a high-grade reserve of 182 Mt @ 60.4% Fe, 3.0% SiO<sub>2</sub>, 1.9% Al<sub>2</sub>O<sub>3</sub>, 0.051% P and 7.9% LOI. At Christmas Creek the probable high-grade reserve is 177 Mt @ 60.5% Fe, 3.4% SiO<sub>2</sub>, 2.0% Al<sub>2</sub>O<sub>3</sub>, 0.051% P and 6.9% LOI. Both deposits also have low grade reserves.
- Atlas Gold Ltd reported iron ore intersections from its **Pardoo** project, 75 km east of Port Hedland, WA, including 52 m @ 60.6% Fe and 44 m @ 59.26% Fe.
- Golden West Resources Ltd reported encouraging drill intersections at its **Wiluna West** prospect, 40 km west of Wiluna, WA. First results were 29 m @ 68.25% Fe, 0.63 % SiO<sub>2</sub>, 0.45% Al<sub>2</sub>O<sub>3</sub> and 0.12% P and 17 m @ 68.67% Fe, 0.72% SiO<sub>2</sub>, 0.46% Al<sub>2</sub>O<sub>3</sub> and 0.006% P.



**Figure 3:** Selected mineral development projects, 2005.



- Drilling at Gindalbie Metals Ltd's **Blue Hills** project 100 km south of Yalgoo, WA, returned 18 m @ 61.71% Fe, 3.34% SiO<sub>2</sub>, 2.34% Al<sub>2</sub>O<sub>3</sub>, 0.116% P and 5.08% LOI and 6 m @ 65.25% Fe, 1.78% SiO<sub>2</sub>, 1.02% Al<sub>2</sub>O<sub>3</sub>, 0.098% P and 3.52% LOI.
- At the **Argyle** iron ore project, 120 km south of Wyndham, Resource Mining Corporation reported high-grade hematite intersections including 6 m @ 66% Fe, 2.33% SiO<sub>2</sub>, 0.98% Al<sub>2</sub>O<sub>3</sub> and 0.09% P.

## Mineral Sands

Mineral sands exploration recovered from the slump of 2003-04 to rise by \$3.8 million to a total of \$27.6 million. Western Australia dominated spending with \$14.8 million. Significant activity occurred on the Tiwi Islands, Northern Territory and in the Eucla Basin in South Australia.

- Bemax Resources Ltd announced the discovery of the **Campaspe** deposit in the Murray Basin, NSW, and reported an inferred resource of 106 Mt @ 4.26% heavy minerals (HM) composed of 12% rutile, 18% zircon and 62% ilmenite.
- Matilda Minerals Ltd was granted mining leases by the Northern Territory Government over the zircon rich Andranangoo and Lethbridge Bay mineral sands deposits on the **Tiwi Islands**, 60 km north of Darwin. The ore reserve is 4.9 Mt @ 4.5% HM.
- Adelaide Resources Ltd the discovered HM zones in drill traverses at the **Tripitaka** Prospect, northwest of Ceduna, SA. Indicative mineralogy from one is 63% zircon, 17% leucoxene and 7% ilmenite with intersections including 18 m @ 3.8% HM and 15 m @ 2.9% HM.
- Dominion Mining Ltd intersected mineral sands at **Barton West** (Notrab) northwest of Ceduna, SA, in the Eucla Basin. Intersections included 16 m @ 2.64% HM and 13 m @ 2.23% HM.

## Diamond

ABS reported that exploration spending on diamond in 2004-05 fell by \$2.1 million to \$23.7 million. Most was in Western Australia (\$15.9 million) with small amounts in the Northern Territory (\$5.2 million) and South Australia (\$1.8 million).

- Blina Diamonds NL reported that limited trial mining and large scale bulk sampling of alluvial gravels in palaeo-channels at its **Ellendale 9 North** project in the Kimberley region, WA, yielded over 20 carats per hundred tonnes (cpht). The average diamond size was 0.37 c but 8 stones in excess of 5 c were recovered, including a 9.92 c yellow gem, the largest found so far from alluvial material in the Ellendale area.
- Kimberley Diamond Company NL continued evaluation near Ellendale 4 and 9 in its **Ellendale** mining lease. The latest lamproite is the 44th pipe discovered in the lease. Resources, at 30 June for Ellendale 4, 4s and 9 were 68 Mt @ 7.4 cpht.
- Gravity Diamonds Ltd discovered a new diamondiferous kimberlite pipe, ABN 021, at its **Abner Range** project, NT, following up a Falcon® airborne gravity gradiometer survey with ground gravity drilling. Gravity later recovered a 0.147 c stone and 16 other diamonds greater than 0.4 mm diameter from drill hole samples.

## Rare Earths

- Arafura Resources NL reported that drilling at the **Nolan's Bore** prospect, 130 km north of Alice Springs, returned intersections including 40 m @ 3.5% REO, 22% P<sub>2</sub>O<sub>5</sub> and 0.61lb/t U<sub>3</sub>O<sub>8</sub> from 46 m and 12 m @ 4.7% REO, 22% P<sub>2</sub>O<sub>5</sub> and 0.54lb/t U<sub>3</sub>O<sub>8</sub> from 90 m.

## Uranium

Uranium exploration almost doubled in 2004-05 to \$20.7 million in line with anticipated growth in demand. Most activity was focussed on the Northern Territory.

- Exploration by Summit Resources Ltd at its **Valhalla** and **Skal** prospects north of Mount Isa, Qld, returned high-grade uranium-vanadium intersections. At Valhalla, a 106 m mineralised breccia included 10 m @ 6.07lb/t U<sub>3</sub>O<sub>8</sub> and 4.5lb/t V<sub>2</sub>O<sub>5</sub>. At Skal the Company reported a 30 m mineralised breccia gave 5 m @ 1.54lb/t U<sub>3</sub>O<sub>8</sub>, 2.26lb/t V<sub>2</sub>O<sub>5</sub> and 0.73% Cu and 6 m @ 2.59lb/t U<sub>3</sub>O<sub>8</sub> and 3.02lb/t V<sub>2</sub>O<sub>5</sub>.
- Marathon Resources Ltd announced a resource estimate for the **Mount Gee** deposit in the North Flinders Ranges, SA. The inferred uranium resource totals 33 200 t U<sub>3</sub>O<sub>8</sub>
- Inferred resources of 12.65 Mt @ 0.053% U<sub>3</sub>O<sub>8</sub> were reported by Pepinnini Minerals Ltd from the **Crocker Well** and **Mount Victoria** deposits, 120 km west of Broken Hill.

## PROJECT DEVELOPMENT

The following examples illustrate the range of mineral projects that were in progress in 2005.

## Copper, Lead, Zinc, Silver

- Tritton Resources Ltd commissioned the **Tritton** Copper Mine, NSW. Development was within budget and on schedule.
- The **Whim Creek** copper mine, 110 km south of Port Hedland, WA, operated by Straits Resources Ltd, commenced production. It expects full production in 2006.

## Diamond

- In December Rio Tinto Ltd announced the decision to develop a US\$760 million block cave underground operation at its **Argyle** diamond mine in the Kimberley region of WA. An additional US\$150 million will be spent on a related open pit cutback to enable production to continue between the cessation of open pit mining in 2008 and the ramp up of the underground mine. Average annual production over the life of the underground mine from 2007 to 2018 is expected be about 60% of Argyle's historical annual average of 34 Mc and of similar quality.
- Kimberley Diamond Company NL is spending \$48 million on a new 4.4 Mtpa plant at **Ellendale 4** that will increase Ellendale production to 7.2 Mt and 700,000 c pa commencing in April 2006.
- North Australian Diamonds Ltd (formerly Striker Resources NL) reported that it had recovered over 12 000 c, with an average value of US \$104/c including 3 diamonds exceeding 10 c, from reprocessing of x-ray sorthouse tailings at its **Merlin** mine, NT.

## Gold

- Barrick Gold Corporation continued construction of the **Cowal** Project near West Wyalong, NSW, with production expected to commence in early 2006. Annual production will be 0.23 Mozs.
- Renison Consolidated Mines NL commenced mining at the **Toms Gully** mine, 90 km southeast of Darwin, NT. Gold production is expected in March 2006.
- BMA Gold Ltd continued with development of its **Twin Hills** gold mine in central Queensland with the first ore produced in December.



- Bendigo Mining Ltd commenced construction of plant for the **Bendigo** project with commissioning due in the June quarter 2006. Initial production will be 0.12 Mozs rising to over 0.5 Mozs annually 2011.
- At **Ballarat East**, Vic, Ballarat Goldfields NL poured its first gold December 2005.
- Nustar Mining Corporation Ltd poured the first gold at its **Paulsens** mine in the Ashburton region, WA. It is expected to produce 80 000 ozs per year.

## Iron Ore

- BHP Billiton Ltd commenced expansion at **Mining Area C**, WA, which, by 2007, will increase the Company's capacity in the Pilbara to 129 Mtpa.

- Rio Tinto Ltd completed an expansion of the **Yandicoogina** operation from 24 to 36 Mtpa in August and work to increase capacity to 52 Mtpa started.
- Rio Tinto Ltd announced that it would spend US\$290 million to expand its existing iron ore mines in the Pilbara region with expanded capacity at the **Tom Price** and **Marandoo** mines and new capacity at **Nammuldi** by 2006. It will add about 15 Mtpa to capacity.
- A 50:50 joint venture was formed between Hancock Prospecting Pty Ltd and Rio Tinto Ltd to develop the **Hope Downs** iron ore deposits, 75 km northwest of Newman.
- Mount Gibson Iron Ltd agreed with Shougang Holding (Hong Kong) Ltd to develop the **Mount Gibson** magnetite deposit 350 km north northeast of Perth.

## Mineral Sands

- At Iluka Resources Ltd's **Douglas** project, Vic, construction of the wet concentrator plant was completed and full-scale production is scheduled for mid-2006.

## Nickel

- Allegiance Mining NL received all regulatory approvals for the **Avebury** nickel project. The company announced that the feasibility study was positive for a 5700 tpa nickel mine.
- BHP Billiton reported that construction at the **Ravensthorpe** lateritic nickel-cobalt mine, WA, is proceeding on schedule. The first shipment of product is scheduled for mid-2007.

# AUSTRALIAN GOVERNMENT CONTACTS

## AUSTRALIAN GOVERNMENT

### Geoscience Australia

GPO Box 378  
Canberra, ACT, 2601, Australia

Tel: +61 (0)2 6249 9087

Fax: +61 (0)2 6249 9983

Email: [mike.huleatt@ga.gov.au](mailto:mike.huleatt@ga.gov.au)  
[www.ga.gov.au](http://www.ga.gov.au)

### Department of Industry, Tourism and Resources

GPO Box 9839  
Canberra, ACT, 2601, Australia

Tel: +61 (0)2 6213 6000

Fax: +61 (0)2 6213 7000

Email: [Michael.Sheldrick@industry.gov.au](mailto:Michael.Sheldrick@industry.gov.au)  
[www.industry.gov.au](http://www.industry.gov.au)

## NEW SOUTH WALES

### Department of Primary Industries - Mineral Resources

PO Box 344  
Hunter Regional Mail Centre  
NSW 2320 Australia

Tel: +61 (0)2 49316696

Fax: +61 (0)2 49316794

Email: [lindsay.gilligan@minerals.nsw.gov.au](mailto:lindsay.gilligan@minerals.nsw.gov.au)  
[www.minerals.nsw.gov.au](http://www.minerals.nsw.gov.au)

## NORTHERN TERRITORY

### Northern Territory Geological Survey

Department of Primary Industry,  
Fisheries and Mines  
PO Box 3000

Darwin, NT 0801, Australia

Tel: +61 (0)8 8999 5313

Fax: +61 (0)8 8999 6824

[www.minerals.nt.gov.au/ntgs](http://www.minerals.nt.gov.au/ntgs)

## QUEENSLAND

### Geological Survey of Queensland

Department of Natural Resources  
and Mines

Block A 80 Meiers Road

Indooroopilly, QLD 4068, Australia

Tel: +61 (0)7 3362 9365

Fax: +61 (0)7 3362 9368

Email: [david.mason@nrm.qld.gov.au](mailto:david.mason@nrm.qld.gov.au)  
[www.nrm.qld.gov.au](http://www.nrm.qld.gov.au)

## SOUTH AUSTRALIA

### Primary Industries and Resources South Australia

Mineral and Energy Division  
GPO Box 1671

Adelaide, SA 5001, Australia

Tel: +61 (0)8 8463 4153

Fax: +61 (0)8 8463 4155

Email: [heithersay.paul@saugov.sa.gov.au](mailto:heithersay.paul@saugov.sa.gov.au)  
[www.pir.sa.gov.au](http://www.pir.sa.gov.au)

## TASMANIA

### Mineral Resources Tasmania

PO Box 56,  
Rosny Park, Tas, Australia 7018

Tel: +61 (0)3 6233 8377

Fax: +61 (0)3 6233 8338

Email: [info@mrt.tas.gov.au](mailto:info@mrt.tas.gov.au)

[www.mrt.tas.gov.au](http://www.mrt.tas.gov.au)

GeoCat: 63972 ISBN: 1 920871 68 3

An extended version of this review is  
available at [www.ga.gov.au/minerals/  
research/pubspres.jsp](http://www.ga.gov.au/minerals/research/pubspres.jsp)

## VICTORIA

### Department of Primary Industries

Minerals and Petroleum Victoria  
GPO Box 4440

Melbourne, Vic 3001, Australia

Tel: +61 (0)3 9412 5035

Fax: +61 (0)3 9412 5155

Email: [customer.service@dpi.vic.gov.au](mailto:customer.service@dpi.vic.gov.au)  
[www.dpi.vic.gov.au](http://www.dpi.vic.gov.au)

## WESTERN AUSTRALIA

### Geological Survey of Western Australia

Department of Industry and Resources  
100 Plain Street

East Perth, WA 6044, Australia

Tel: +61 (0)8 9222 3160

Fax: +61 (0)8 9222 3633

Email: [tim.griffin@doir.wa.gov.au](mailto:tim.griffin@doir.wa.gov.au)

[www.doir.wa.gov.au](http://www.doir.wa.gov.au)

*Disclaimer: Geoscience Australia has tried to make the information in this Review as accurate as possible. However, it does not guarantee that the information is totally accurate or complete. Therefore, you should not rely solely on this information when making commercial or other decisions. Information contained in this review was compiled from public domain sources.*

*The authors acknowledge the information, comments and suggestions on the manuscript provided by colleagues in Geoscience Australia, the Department of Industry, Tourism and Resources and the above State and Northern Territory agencies.*





