

West Musgrave magnetics

OVERVIEW

- ◊ Global mineral exploration budgets fell by almost 14% in 2002 to US\$1.9 billion (US\$2.2 billion in 2001).
- ◊ Australia was displaced by Canada as the world's leading exploration destination, but Australia's share of world exploration budgets rose marginally to 17.6%.
- ◊ Mineral exploration in Australia in 2001-02 totalled \$640.6 million¹, down 6% on 2000-01, and the lowest since 1992-93.
- ◊ Western Australia was the leading state for exploration spending accounting for \$381 million (59%).
- ◊ Gold was the principal commodity sought with \$331 million spent accounting for 52% of all exploration.
- ◊ Exploration spending was up in coal, copper, diamonds, mineral sands (a record), but down in nickel and zinc on the previous year.
- ◊ Exploration spending in the September quarter 2002 was up significantly.

EXPLORATION REVIEW

Australian mineral exploration expenditure fell by 6% to \$640.6 million in 2001-02 according to the Australian Bureau of Statistics (ABS), the lowest annual current dollar expenditure since 1992-93. In constant 2001-02 dollars spending was 9.3% lower than in 2000-01 (Figure 1), down 51% on the peak in 1996-97 and the lowest since 1978-79.

Western Australia was the leading state in 2001-02 with \$381 million spent but this was down 10% on 2000-01. Other states recording falls were New South Wales (down 16% to \$48 million) and Tasmania which fell to a record low of \$4 million. Exploration expenditure rose in all other states and the Northern Territory. Queensland showed the greatest growth, rising by 12% to \$93 million. Spending in the Northern Territory was \$48 million, Victoria \$34 million and South Australia \$32 million.

Gold continued to dominate exploration spending (51.7%) but its share of the total was down slightly on 2000-01 to \$331 million. Gold exploration expenditure has fallen by 60% in real terms since 1996-97. Mineral sands exploration reached a record level (\$33.2 million) due in particular to high levels of activity in the Murray Basin. Other commodities showing significant changes in 2000-01 were copper (\$41.6 million, up 27%), coal (\$50.3 million, up 20%), silver, lead, zinc (\$37.6 million, down 37%) and nickel, cobalt (\$53.7 million, down 26%). Spending on diamond exploration was \$35.4 million (up 11%). Uranium rose to \$8.8 million (up 4.7%) and iron ore recovered to reach \$25.2 million (up 2%).

In 2001-02 exploration drilling was, in total, 4.83 million metres (ABS), a fall of 1 million metres (17%) from 2000-01. Of the total, 1.42 million metres (29%) were on production leases a fall of 12% from 2000-01.

¹ All monetary references in this paper are to Australian dollars unless otherwise stated.

ABS reported spending on exploration in the first half of calendar year 2002 was \$302.5 million, over 7% lower than in the first half of calendar year 2001. However, spending in the third quarter of 2002 recovered strongly to \$183.1 million, over 9% higher than the September quarter 2001. Over half the September quarter increase was due to gold but iron ore and coal exploration also increased significantly. If the improvement recorded in the September quarter continues into the December quarter spending in calendar year 2002 will exceed that for 2001.

Exploration budgets and capital raising

The Metals Economics Group's (MEG) world survey of exploration budgets for 2002 saw Australia displaced by Canada as the world's leading exploration destination (Figure 2).

MEG data shows that 72% of 2002 budgets for exploration in Australia was sourced from Australian-based companies, down slightly on previous years. Australian grassroots exploration budgets are dominated by the search for gold (55% of total budgets). The MEG survey includes 221 companies with exploration budgets of more than US\$100,000 that were exploring in Australia. Of the 221, only 5 had Australian exploration budgets of US\$10 million or more (30% of total), 9 had budgets of US\$5-10 million (22% of total), 22 had budgets of US\$2-5 million (21% of total), 28 had budgets of US\$1-2 million (12%), and the remaining 157 companies (71%) had budgets of less than US\$1 million (15% of total budgets).

A total of \$104 million was raised in 25 initial public offerings on the Australian Stock Exchange in 2002 for exploration in Australia. The largest was a raising of \$10 million in April but the average float size was \$4.2 million, too small to attract support from institutional investors. Three Australian mineral exploration companies floated on the Alternative Investment Market of the London Stock Exchange during 2002.

Joint Ventures

Strategic alliances and joint ventures between majors and juniors are playing an increasingly important role in exploration. Drivers for this are the desire of majors to diversify exploration portfolios and to tap into the exploration expertise of juniors, and difficulty in equity raising for exploration experienced by juniors. Examples include Tanami Gold NL joint ventures with Barrick Gold, Newmont, BHP Billiton and Teck Cominco in the Tanami-Arunta in the Northern Territory and Western Australia - one of Australia's high profile exploration regions. Another is the BHP Billiton joint venture with West Musgrave Mining that will allow both to explore within a large area of West Musgrave's leases in the West Musgrave area adjacent to WMC's nickel-copper discoveries. A significant alliance was formed between Gravity Capital Ltd and BHP Billiton for the former to use the Falcon™ airborne gravity gradiometer in exploration. A number of alliances and joint ventures have involved majors taking an equity interest in the junior, for example the BHP Billiton arrangement with recently floated nickel explorer, Mithril Resources.

Government programs

The Australian Government initiated two inquiries into the state of mineral exploration: the House of Representatives Standing Committee on Resources inquiry into resources exploration impediments and the Minerals Action Agenda. Both will report later in 2003.

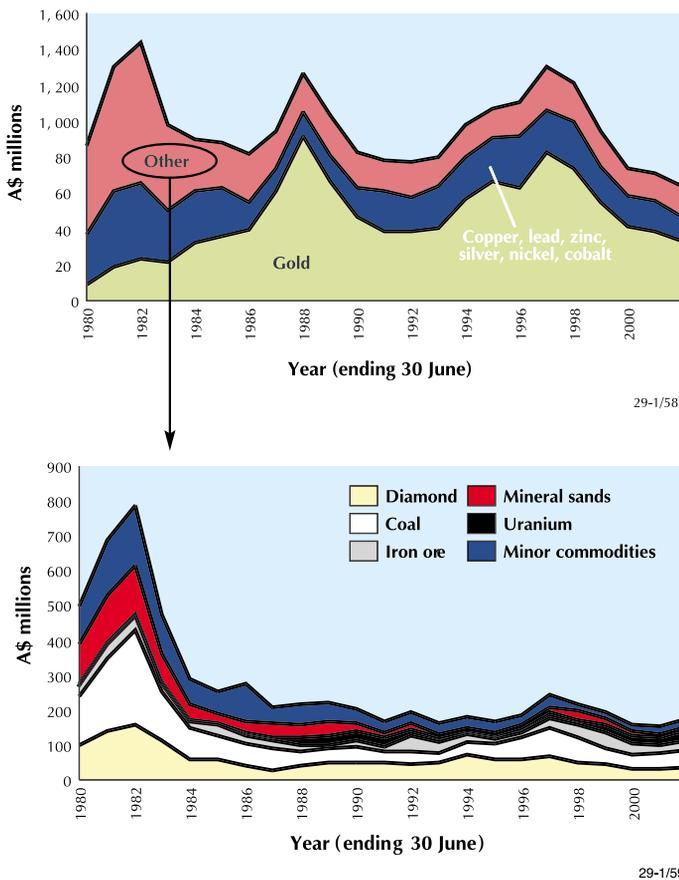


Figure 1: Australian mineral exploration expenditure in constant 2001-02 dollars. Based on Australian Bureau of Statistics data deflated by Consumer Price Index.

Governments continued to advance the online delivery of data and information:

- Geoscience Australia continued to provide free data online
- Queensland Digital Exploration reports system (QDEX) allows explorers to lodge, search and retrieve company exploration reports online
- Development of the TIGER system to provide online delivery of data and information including company exploration reports continued in Tasmania
- SARIG II provides online access to South Australia's latest geoscientific data.

Major government multidisciplinary geoscientific programs in 2002 included:

- Yilgarn, WA, Tanami-Arunta, NT, and Gawler Craton, SA, (Geoscience Australia and National Geoscience Agreement collaborators)
- Yilgarn and Pilbara Cratons and adjacent Proterozoic basins (WA)
- Western Arunta and southern Georgina Basin (NT)
- Regolith and geology maps of the Ballarat-Bendigo region (Vic)
- A complete tectonic map of the Gawler Craton (SA)

Major government geophysical programs in 2002 included:

- Deep crustal seismic reflection surveys in the Yilgarn, WA, and Batten Trough, NT, near the McArthur River Zn-Pb-Ag deposit (Geoscience Australia and National Geoscience Agreement collaborators and pmd CRC)
- Major hyperspectral survey over the Broken Hill region and Falcon™ gravity gradiometry at Broken Hill (NSW)
- Airborne magnetic and radiometric data from
 - West Tanami and west Musgrave regions (WA)
 - 175 000 line km over the Wiso and Georgina Basins (NT)
 - Western Tasmania (Tas)
 - South Australia portion of the Musgrave Block (SA)
- AEM surveys over
 - Honeysuckle Creek (Vic)
 - Areas in western Tasmania

Exploration outlook

Global and domestic mineral exploration levels continue to decline both in terms of overall expenditure and in the average and median exploration budgets reported in the MEG surveys. This year saw a reduced number of mergers and acquisition of companies compared with 2001. The rise in metal prices - especially gold - if sustained, should result in an increase in minerals exploration spending given the 12-18 month lag between increased gold prices and exploration levels. Nickel prices are expected to rise sharply in response to increasing demand due to supply constraints caused by a lack of new projects. Several global gold majors, notably Barrick Gold and Newmont Corporation, have indicated that exploration budgets are likely to rise in 2003 to redress under-investment in grassroots gold exploration in recent years. Overall, the outlook for exploration, although remaining difficult, is the best in the past five years.

Exploration highlights

In 2002, stand out intersections were reported from the **Prominent Hill** prospect in the Gawler Craton of South Australia (Figure 3) where Minotaur Resources Ltd reported 41 m at 6.06% Cu - the highest copper grade yet reported from the project. At the **Wyoming** prospect in the Lachlan Orogen in New South Wales, Alkane Exploration Ltd reported excellent intersections including 75 m at 10.43 g/t Au.

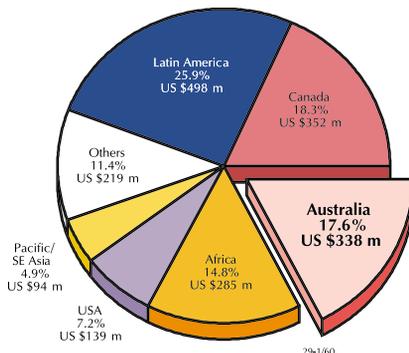
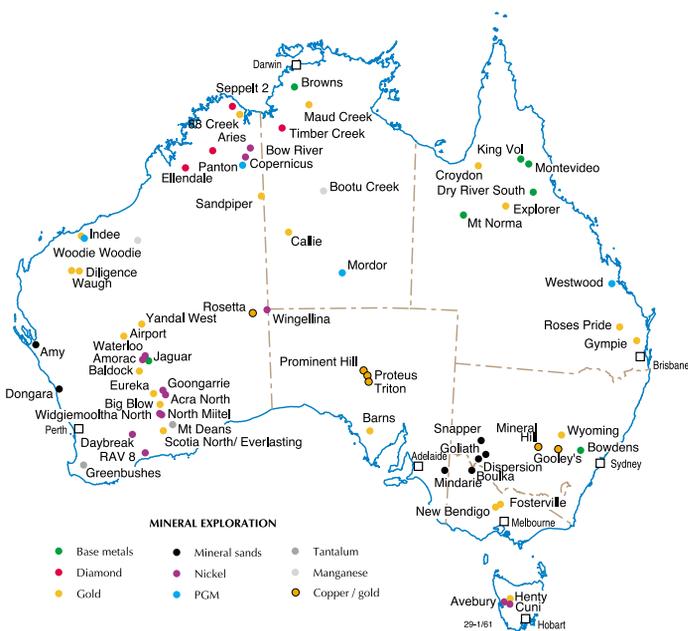


Figure 2: Distribution of world exploration budgets 2002.

Source: Corporate Exploration Strategies 2002, published by Metals Economics Group.

Figure 3: Selected mineral exploration projects, 2002.



Zinc, lead, silver, copper

- ◇ Diamond drilling by Inmet Mining Corporation (operator) at Pilbara Mines Ltd's **Jaguar** prospect Teutonic Bore project, 260 km north of Kalgoorlie, WA, returned encouraging results. Intersections reported include: 8 m (true thickness) at 5.0% Cu, 14.9% Zn, 0.6% Pb, 147 g/t Ag, 0.04 g/t Au; 6.9 m (true thickness) at 1.9% Cu, 16.6% Zn, 0.7% Pb, 93 g/t Ag and 0.02 g/t Au; 7.5 m (true thickness) 0.6% Cu, 23.3% Zn, 2.3% Pb, 149 g/t Ag and 0.02 g/t Au.
- ◇ Compass Resources NL completed two deep diamond holes at its **Browns** project, 65 km southeast of Darwin, NT. Both targeted deep extensions to the known orebody. Results included 68 m at 0.44% Cu, 11.28% Pb, 0.11% Co, 0.09% Ni and 25.5g/t Ag from 387 m and 38 m at 0.16% Cu, 2.52% Pb, 0.09% Co, 0.07% Ni and 12.0 g/t Ag from 360 m.
- ◇ Kagara Zinc Ltd announced new resource estimates for its **King Vol** and **Dry River South** deposits, 160 km west of Cairns, Qld. At King Vol a 30% increase in contained zinc took the global resource to 1.152 Mt at 18.5% Zn, 1.1% Cu, 0.9% Pb and 48 g/t Ag. At Dry River South, the global resource stands at 0.76 Mt at 11.9% Zn, 3.8% Pb, 1.04% Cu and 96 g/t Ag.
- ◇ At the **Montevideo** prospect near Chillagoe, Qld, Kagara Zinc Ltd reported high-grade zinc mineralisation from two drill holes. The first had 24 m at 7.3% Zn, 0.3% Pb, <0.1% Cu, 14 g/t Ag and 0.15 g/t Au including 5 m at 12.6% Zn, 0.7% Pb, <0.1% Cu, 17 g/t Ag and 0.02 g/t Au. The second hole intersected 4 m at 11.3% Zn, 0.4% Pb, 0.14% Cu and 25 g/t Ag.
- ◇ Silver Standard Resources Inc. reported a new lens of high-grade silver and base metals at its **Bowdens** silver project, near Mudgee, NSW. Intersections included 4850 g/t Ag, 20.5% Pb and 12.65% Zn over 1.25 m and 1140 g/t Ag, 20.5% Pb and 3.45% Zn over 1.2 m.
- ◇ Australian Mining Investments Ltd reported high-grade copper intersections from their **Mt Norma** project near Cloncurry, Qld. Several 1 m intersections were reported from four holes with grades ranging from 1.05% Cu to 15.77% Cu.

Copper-Gold

- ◇ At **Prominent Hill**, SA, Minotaur Resources Ltd reported that mineralisation had been intersected over a distance of 2.5 km with the highest copper grade yet reported from the project, 41 m at 6.06%

Cu, recorded late in the year. It was structurally above a previous gold intersection of 57 m at 7.7 g/t Au. Minotaur also reported two new regional haematite alteration systems at the Mount Woods project. The **Proteus** prospect, 6 km southeast of Prominent Hill gave anomalous gold, copper and barium which is believed to be indicative of Prominent Hill style mineralisation. At **Triton**, 1.5 km south of Proteus, the initial drillhole encountered anomalous copper, gold, uranium, cerium, lanthanum, iron, barium and silver.

- ◇ At the **Gooley's** prospect, 15 km south of Orange, NSW, Newcrest Mining Ltd reported an intersection of 732 m at 0.17 g/t Au and 0.13% Cu from a downhole depth of 226 m. It is adjacent to Newcrest's Cadia Au-Cu operation.
- ◇ Triako Resources Ltd announced high-grade Cu-Au extensions to its **Mineral Hill** deposit, 160 km west northwest of Parkes, NSW. Intersections include: 57.6 m at 1.2 g/t Au and 1.1% Cu, 0.45 m at 88.7 g/t Au and 14.3% Cu and 1.5 m at 5.7 g/t Au and 3.8% Cu.
- ◇ West Musgrave Mining Ltd reported sampling of the **Rosetta** Vein in its West Musgrave tenements, WA, yielded high-grade copper-gold assays. Four samples ranged from 0.87 g/t Au to 5.36 g/t Au and 5.26% to 7.17% Cu. The mineralised quartz vein extends over about 300 m.

Diamond

- ◇ Kimberley Diamond Co reported increased resources at its new **Ellendale** mine in the West Kimberley, WA, where it is mining enriched near-surface zones of Ellendale pipes 4 and 9. A study of stage 2A identified 21.9 Mt at 9.3 ct/100t at Ellendale 4, including 8.11 Mt at 12.6 ct/100t in the northwest and eastern parts of pipe 4. A parcel of nine diamonds was sold in December for US\$160 per carat.
- ◇ Striker Resources NL reported that a 183 t bulk sample from its **Seppelt 2** pipe in the North Kimberley, WA, yielded 412 commercial-sized diamonds, including 4 stones greater than 2 cts, equivalent to 225 ct/100t. Drilling is continuing to determine the size and shape the pipe with a view to trial mining of the Seppelt 1 and 2 pipes.
- ◇ Thundelarra Exploration Ltd, in joint venture with Gravity Capital and BHP Billiton, reported the discovery, using the Falcon™ airborne gravity gradiometer, of a further non-magnetic diamondiferous kimberlite pipe as a satellite to the **Aries** kimberlite in the Phillips Range in the central Kimberley, WA.
- ◇ Tawana Resources NL reported that bulk sampling of the TC-01 kimberlite at **Timber Creek**, NT, confirmed earlier grade estimates of over 100 cts/100t by De Beers but with a higher than expected proportion of gem quality diamonds.

Gold

- ◇ Alkane Exploration Ltd report more encouraging drill results from its **Wyoming** prospect, 12 km north of its Peak Hill mine, NSW. Results included 75 m at 10.43 g/t Au including 21 m at 22.71 g/t Au and 14 m at 8.32 g/t Au including 8 m at 13.70 g/t Au.
- ◇ Sipa Resources International report a recoverable resource of 134 000 oz of gold at the **Waugh** deposit, about 3 km east of the company's Mount Olympus gold mine 30 km south of Paraburadoo, WA. Exploration for similar deposits yielded, from the **Diligence** prospect, 1.5 km east of Waugh, 4 m at 20.7 g/t Au from 5 m and 2 m at 9.4 g/t Au from 7 m.
- ◇ In the Kimberley region, 200 km northeast of Kununurra, WA, Striker Resources NL identified coarse gold in soil samples over 4 km² at its **88 Creek** prospect which is part of the Oombulgurri gold project. Samples have yielded 16.7 g/t Au and 10.5 g/t Au. This discovery, the first in the area, stimulated interest in gold exploration in the region.
- ◇ At the **Airport** prospect, 95 km north of Sandstone, WA, Gateway Mining NL reported encouraging drill results including 6 m at 39.85 g/t Au including 1 m at 173.39 g/t Au, 3 m at 14.56 g/t Au and 1 m at 20.86 g/t Au. Gateway also reported encouraging results from five other prospects in the Gidgee project area.
- ◇ At Bendigo, Vic, Bendigo Mining NL announced that it had commenced exploration development and bulk sampling in three gold-bearing reefs in the **New Bendigo** project. The D3 East Leg and Upper S3 Reefs contain coarse-grained visible gold. Initial bulk sample results have met or exceeded company expectations with grades of 4 to 16g/t Au in the D3 East Leg Reef and 3 to 22g/t Au in the Upper S3Reef.
- ◇ At **Fosterville**, near Bendigo, Vic, Perseverance Corporation Ltd continued investigations into the sulphide resources. The Phoenix Shoot has been traced down plunge and along strike for 1.5 km and is reportedly consistent over that distance. Mineralisation is open at depth and a drill intersection of 5 m at 6.07 g/t has been reported.
- ◇ Gympie Gold Ltd announced, in August, a three year, \$25 million



exploration program at and around its existing mine at **Gympie**, Qld. In 2002-03 \$7 million will be spent including \$4 million on grassroots targets in the Gympie Goldfield.

- ◊ Deep drilling by Newmont Australia at **Callie** in the Tanami, NT, returned intersections including 1 m at 49.5 g/t Au, 2 m at 53.9 g/t Au, and 1 m at 93.8 g/t Au. The upper portions of previously completed drill holes targeting Kerril South/ Wilson Shoot at Callie returned results including 8 m at 29.3 g/t Au, 8 m at 4 g/t Au and 2 m at 75.2 g/t Au. These are 300 m above previously known Kerril South mineralisation.
- ◊ At the **Yandal West** joint venture, WA, (AuDAX Resources Ltd 49% and Newmont Mining Corp. 51%) Newmont reported encouraging intersections. Results included 8 m at 16.2 g/t Au including 1 m at 78.8 g/t Au and 1 m at 32.7 g/t Au, and 4 m at 16.8 g/t Au.
- ◊ Tanami Gold NL and Barrick Gold Corp. reported encouraging results from the **Sandpiper** deposit on the WA side of the Tanami. Including 21 m at 2.6 g/t Au including 8.6 m at 6.1 g/t Au from 366 m downhole. These results show the potential for Kookaburra-Sandpiper to have deep continuation of near-surface mineralisation.
- ◊ AurionGold Ltd (subsequently taken over by Placer Dome Inc) announced new resource and reserve estimates for the **Henty** Mine, 30 km north of Queenstown, Tas, that should enable the project to continue for at least another five years. Total reserves are 1.391 Mt grading 10.4 g/t Au (0.46 Moz) and resources are 1.928 Mt at 10.3 g/t Au (0.64 Moz).
- ◊ Near Norseman, WA, Kinross Gold Corp. reported narrow, gold-bearing quartz veins at the **Scotia North** and **Everlasting** prospects which had grades significantly higher than those reported at Mount Henry and Selene. These results are expected to enhance the economics of mining the Mount Henry area. Kinross estimate an indicated resource of 26.9 Mt at 1.34 g/t Au for their Norseman project.
- ◊ At the **Croydon** project, 150 km northwest of Georgetown, Qld, Union Capital Limited and Newcrest Mining Ltd announced high-grade mineralisation at depth. Drilling yielded mineralisation at up to 11.3 g/t to a depth of 330 m and shallower results of 10 m at 10.9 g/t Au and 5 m at 11.6 g/t Au.
- ◊ At **Big Blow**, south of Coolgardie, WA, the Coolgardie Joint Venture (Mining Project Investors Pty Ltd 25%, Pittson Mineral Ventures of Australia Pty Ltd 25%, and Herald Resources Ltd 50%) reported high-grade

mineralisation from a zone of intense silica-carbonate-sulphide alteration of a basalt. Intersections included 7 m at 12.69 g/t Au from 99 m, 23 m at 5.72 g/t Au from 104 m, including 9 m at 11.36 g/t Au from 115 m.

- ◊ High-grade mineralisation was discovered at the **Baldock** prospect, near Menzies, WA. Hamill Resources Ltd reported intersections including 4 m at 66.0 g/t Au, 3 m at 46.3 g/t Au, and 1.36 m at 74.78 g/t Au for an inferred resource of almost 67 000 oz. Encouraging intersections were also reported from the Dave North prospect (1 m at 27.69 g/t Au) and the Tim North prospect (5 m at 5.26 g/t Au).
- ◊ Strategic Mineral Corporation NL reported further high grade intersections from its **Explorer** prospect at the Woolgar project, 100 km north of Richmond, Qld. Results included 1 m from 56 m at 107 g/t Au, 5 m from 35 m at 7.35 g/t Au and 9 m from 29 m at 7.0 g/t Au. Explorer is believed to be an epithermal vein system with a high-grade core.
- ◊ Near Wudinna, SA, Adelaide Resources Ltd reported encouraging results from its **Barns** prospect. These included 21 m at 1.50 g/t Au from 120 m, 12 m at 3.38 g/t Au from 67 m and 2 m at 67.6 g/t Au from 158 m including 1 m at 128.6 g/t Au.
- ◊ Drilling by Greenstone Resources NL at the **Indee** prospect in the Pilbara region, 80 km southwest of Port Hedland, WA, has increased the potential of the prospect. Results included 6 m at 10.3 g/t Au, 2 m at 9.9 g/t Au and 24 m at 2.4 g/t Au.
- ◊ Drilling by the Cracow Joint Venture, reported by Sedimentary Holdings Ltd, yielded deep intersections between the Back Creek North and **Roses Pride** deposits at Cracow, Qld. Results include 6.4 m at 10 g/t Au and 1.1 m at 15 g/t Au from 516.7 m and 533.9 m respectively.
- ◊ Central Kalgoorlie Gold Mines Ltd discovered high-grade gold at its **Eureka** project, 50 km north of Kalgoorlie, WA. The mineralisation is about 170 m below the surface and 45 m beneath the bottom of an existing open pit. Intersections include 2 m at 23.2 g/t Au, and 3 m at 7.07 g/t Au. Subsequent drilling on the north end of the prospect yielded 4 m at 134 g/t Au including 2 m at 255 g/t Au.
- ◊ Drilling at Harmony Gold Mining's **Maud Creek** project, near Pine Creek, NT, evaluated the down plunge position of the main ore zone. One hole intersected 18.6 m at 6.4 g/t Au within a mineralized zone of 55.4 m at 3.3 g/t Au. Holes testing for deeper down-plunge mineralisation intersected only thin zones of low-grade material.

Manganese

- ◊ Consolidated Minerals Ltd increased resources at its **Woodie Woodie** manganese mine, WA, by 3 Mt. This includes a new resource of 1.15 Mt grading 46.5% Mn at Chris D deposit, and an increase of 438 kt at Double 8 deposit to 0.914 Mt at 38.1% Mn.
- ◊ At the **Bootu Creek** prospect, 130 km north of Tennant Creek, NT, Oriental Mineral Holdings reported mineralisation averaging 7 m thick in 68 of 82 holes drilled. An initial inferred resource of 8.5 Mt at 33% Mn was increased to 10.5 Mt with extra drilling.

Mineral sands

- ◊ Iluka Resources Limited discovered three new deposits, **Boulka** in the Ouyen area, Vic, **Snapper (Iluka)** 120 km north of Mildura in NSW, and **Dispersion** in NSW, about 70 km east of Mildura. The company's HM resources in the Murray Basin increased from 10.9 Mt to 14 Mt.
- ◊ BeMax Resources NL upgraded the resources at its **Snapper (BeMax)** deposit, NSW, 120 km north of Mildura, to a measured resource containing 99.5 Mt at an average 5.4% HM. The mineral suite is estimated at rutile (14%), zircon (7%), leucoxene (46%) and various ilmenites (14%). A pre-feasibility study is under way.
- ◊ BeMax Resources NL announced that the resources at its **Goliath** prospect near the NSW - Vic border total 65.5 Mt grading 3.0% HM.
- ◊ Magnetic Minerals Ltd increased resources at its **Dongara** project, 35 km north of the Eneabba mine, WA, to 133 Mt at 4.8% HM. Drilling confirmed that the Hebe strandline averages 35% combined zircon and rutile and the Hebe South strandline averages 40%.
- ◊ Southern Titanium NL expanded the scope of its feasibility study on the **Mindarie** project, 120 km east of Adelaide, SA, to incorporate the major new Derrick strandline near Loxton. Resources total 373 Mt grading 2.6% HM.
- ◊ Gunson Resources Ltd commenced bulk sampling of the **Amy Zone** deposit south of Shark Bay, WA, as part of its preliminary feasibility study. Inferred resources total 516 Mt grading 1.4% HM and contain on average 23% zircon, 6% rutile and 60% ilmenite-leucoxene.

Nickel

- ◊ Acclaim Exploration NL increased the oxide resource at **Wingellina**, near the WA-SA-NT border, to 227 Mt at 1% Ni. Drill intersections



include 61m at 1.6% Ni, 18 m at 1.5% Ni, and 108 m at 1.1% Ni. Widespread disseminated nickel sulphide (pentlandite associated with chalcopyrite and pyrrhotite) was intersected at depth.

- ◊ LionOre Mining International and Dalrymple Resources NL discovered a high-grade nickel sulphide deposit at **Waterloo**, 6 km from Thunderbox, WA. Significant drill intersections include 10.68 m at 4.83% Ni and 0.4% Cu, 19.05 m at 5.09% Ni, and 5.82 m at 7.68% Ni and 0.81% Cu. Significant PGMs are also present including 19.05 m at 2.12 g/t PGM, 10.68 m at 1.70 g/t PGM, and 13 m at 1.91 g/t PGM.
- ◊ The Wildara Joint Venture (Dalrymple Resources NL and LionOre Mining International Ltd) delineated a corridor of nickel mineralisation comprising massive and stringer nickel sulphides, over 250 m strike length and a depth range of 90-100 vertical metres from the surface at the **Amorac** deposit, 1 km south of the Waterloo deposit, WA. Significant intersections include 6 m at 3.03% Ni, 5 m at 3.4% Ni and 0.1% Cu, and 6.32 m at 3.54% Ni and 0.08% Cu (including 2.7 m at 6.6% Ni and 0.1% Cu). PGMs were recorded in most holes.
- ◊ Deep drilling by Tectonic Resources NL below the base of planned underground workings at its **RAV 8** mine, east of Ravensthorpe, WA, gave high-grade intersections including 4 m at 7.7% Ni, 2 m at 4.0% Ni and 1 m at 6.4% Ni. This is a down plunge extent of the North East Orebody and possibly the main RAV 8 deposit.
- ◊ Mincor Resources NL intersected high-grade mineralisation north of the **Miitel** orebody, including 1.37 m at 5.45% Ni, 15.9 m at 2.66% Ni, and 3.74 m at 5.99% Ni. Subsequently Mincor intersected 9.7 m at 3.84% Ni, some 150 m north of the previous extent of the **North Miitel** mineralisation, near Kambalda, WA, extending the known strike length of the mineralisation from 300 m to 450 m.
- ◊ Drilling by Allegiance Mining NL has resulted in a significant upgrade of the total resource of the **Avebury** deposit, near Zeehan, Tas, to 4.06 Mt at 1.5% Ni. The company announced that it will be constructing a decline into the ore with a view to fast tracking the project.
- ◊ Allegiance Mining NL also announced promising intersections at **Cuni**, east of Zeehan, Tas, with a best intersection containing 6.1% Ni, 2.0% Cu, 0.47 g/t Pt, 0.71 g/t Pd and 0.44 g/t Au over a true width of 1.3 metres. This is a different

style of mineralisation from that at the Avebury.

- ◊ Titan Resources NL announced significant nickel intersections at its **Widgiemooltha North** prospect, 80 km south of Kalgoorlie, WA, including 2 m at 8.9% Ni and 9 m at 2.54% Ni. They also identified mineralisation at the Carr Boyd prospect with intersections of 33.4 m at 1.82% Ni and 0.86% Cu, and 0.5 m at 2.49% Ni and 0.28% Cu.
- ◊ Heron Resources Ltd continued a prefeasibility study of its **Goongarrie** nickel project, 80 km north northwest of Kalgoorlie, WA. Drilling yielded intersections including 29 m at 1.41% Ni and 0.069% Co, 16 m at 1.52% Ni and 0.207% Co at the Goongarrie South prospect and 18 m at 1.33% Ni and 0.032% Co at Goongarrie Hill.
- ◊ Western Areas NL intersected high-grade massive nickel sulphide in two EM anomalies at its **Daybreak** deposit, at the Forrestania Nickel project, 150 km north of Ravensthorpe, WA. Intersections included 5.9 m at 3.6% Ni including 1 m intervals to 4.9% Ni, 1.7 m at 4.1% Ni and 3.6 m at 4.9% Ni, including 1.4 m at 5.5% Ni.
- ◊ Thundelarra Exploration Ltd intersected nickel-copper mineralisation at its **Copernicus** prospect, south of Kununurra, WA. Better intersections included 15 m at 1.9% Ni and 1.28% Cu, 8 m at 1.32% Ni and 0.68% Cu and 27 m at 1.35% Ni and 0.53% Cu.
- ◊ Exploration at its Kalpini lateritic nickel project, 65 km northeast of Kalgoorlie, WA, by Heron Resources Ltd yielded intersections including 13 m at 1.84% Ni and 0.14% Co, 15 m at 1.44% Ni and 0.1% Co at the **Acra North** prospect.
- ◊ Drilling by Valdera Resources Ltd at its **Bow River** nickel-copper prospect in Western Australia's East Kimberley region confirmed the presence of large low-grade mineralisation. Intersections reported were 12 m at 0.45% Cu and 0.12% Ni and 8 m at 0.52% Cu and 0.37% Ni.

Platinum Group Metals

- ◊ Platinum Australia Ltd announced a resource estimate for the Top Reef deposit of 4.5 Moz of Pt+Pd+Au at its **Panton Sill** project, 60 km north of Halls Creek, WA. Underground mining of a bulk sample provided high-grade Top Reef material for flotation pilot plant tests and to provide material for metallurgical testing. A feasibility study is underway.
- ◊ Initial drilling by De Grey Mining Ltd at its **Indee** prospect in the Pilbara region, WA, confirmed the prospectivity of the Mt Dove Intrusive

Complex. Significant results were 2 m at 3.4 g/t Pt+Pd+Au, 4 m at 2.98 g/t Pt+Pd+Au and 3 m at 1.43 g/t Pt+Pd+Au.

- ◊ At **Westwood** near Rockhampton, Qld, Glengarry Resources Ltd reported encouraging intersections including 35 m at 2200 ppm Cu, 0.204 g/t Pd and 0.1 g/t Au, 15 m at 1320 ppm Cu and 0.14% Pd and 6 m at 3200 ppm Cu, 1000 ppm Ni and 0.125g/t Pd.
- ◊ Tanami Gold NL drilling at the **Mordor** layered mafic-ultramafic igneous complex northeast of Alice Springs, NT, gave a best result of 2 m at 1.1 g/t Pt+Pd+Au in a broader 8 m zone grading 0.67g/t at a depth of 204m.

Tantalum

- ◊ Underground drilling by Sons of Gwalia at its **Greenbushes** mine at Greenbushes, WA, yielded 124 intersections greater than 4 m recording grades greater than 500 g/t Ta₂O₅. Significant intersections included 24.8 m at 1128 ppm Ta₂O₅ and 36.9 m at 995 ppm Ta₂O₅.
- ◊ Tantalum Australia NL announced a resource estimate (all categories) of 9.1 Mt grading 216 g/t Ta₂O₅, 60 g/t Nb₂O₅ and 173 g/t Sn for its **Mt Deans** tantalum deposit near Norseman, WA.

PROJECT DEVELOPMENTS

Copper

- ◊ Western Mining Corporation will undertake a \$35 million two year pre-feasibility study of the existing **Olympic Dam** (Figure 4) operation to investigate increasing copper production from 0.235 Mtpa to 0.6 Mtpa. This study will consider both underground and open cut mining techniques.
- ◊ Tritton Resources Ltd plans to fast track project development for underground mining at **Tritton**, 60 km northwest of Nyngan, NSW. Construction is scheduled to commence in May 2003. The published resource is 4.6 Mt at 3.14% Cu.

Diamond

- ◊ Kimberley Diamond Co commenced mining at its **Ellendale** deposit in the West Kimberley, WA. Initial mining focussed on the top 3 m of Ellendale 9. Expanded production at Ellendale 4 pipe, is scheduled for 2004 with the Pipe 4 resource of 21.9 Mt grading 9.3 cts/100t.

Gold

- ◊ Newcrest Mining Ltd's **Ridgeway** Au-Cu mine near Orange, NSW, was officially opened in April. The mine, which is part of the Cadia project,



will produce approximately 350 000 ounces of gold and 34 000 t of copper in the first year of a 12 year mine life. Resource extension drilling below the current reserve at Ridgeway has confirmed that the orebody remains open at depth with potential to add significantly to reserves. A conceptual study has been completed for the Cadia East deposit and a feasibility study for the open cut development of the Cadia Extended deposit is underway.

- ▷ Newcrest Mining Ltd approved the development of a new operation at **Telfer**, WA, based on a revised resource estimate of 26.2 Moz. Newcrest will finance the \$1.19 billion project via debt financing and a \$210 million share placement. The mine life will be 25 years and it is expected that over that time total gold recovered will be 18.4 Moz with 640 000 t of copper.
- ▷ Wildara Joint Venture participants (Dalrymple Resources NL and LionOre Mining International Ltd) developed a stand-alone gold mine and plant based on the **Thunderbox** deposit about 90 km north of Leonora, WA. The mine which will have an initial life of 5 years and produce about 220 000 oz/year, poured its first gold on 19 November.
- ▷ Dominion Mining Ltd poured the first gold from its new **Challenger** mine, SA, in October. The project was brought on stream on schedule and within the \$17.8 million budget. The initial open pit is expected to recover 105 000 oz over its 20 month.
- ▷ The Mungari East joint venture (Dioro Exploration NL 49% and Mines and Resources Australia Pty Ltd 51%) announced that they would develop the **Frog's Leg** gold

mine near Kalgoorlie, WA. Open pit production is expected to yield some 108 500 oz of gold and will be followed by eight years of underground production.

- ▷ A.G.D. Mining Ltd approved the development of a mine on their high-grade Au-Sb deposit at **Costerfield**, Vic. Capital cost for the mine, which is expected to have a life of six years, is reported to be \$5.2 million. Output will be gold bullion and antimony concentrates.
- ▷ Further reserve/resource definition drilling is being carried out by Barrick Gold of Australia Ltd at its **Cowal** gold project in NSW. The current published reserve figure is 51 Mt at 1.68 g/t Au.
- ▷ The Northern Territory government approved mining of the **Chariot** deposit. Pre-production drilling yielded deep high-grade intersections with the potential to increase reserves. Current resources are 0.23 Moz.

Magnesium

- ▷ Leighton Contractors signed a \$1 billion contract with Australian Magnesium Corp (AMC) for the development of the **Stanwell** magnesium plant near Rockhampton, Qld. Construction commenced in late 2002 and first production of magnesium metal is scheduled for the December quarter 2004.
- ▷ Latrobe Magnesium Limited (formerly Rambora Technologies Limited) completed its pre-feasibility study on the proposed 100 000 t/year **Latrobe** magnesium project, in Latrobe Valley, Vic. This project is based on acid leach of fly ash supplied by the Hazelwood power station.

- ▷ Magnesium International Ltd, formerly Pima Mining NL, released its bankable feasibility study which established that the total capital cost for its proposed 71 000 t magnesium smelter plant would be A\$733 million. The company decided to construct the plant at **Weeroona**, 8 km north of Port Pirie, SA, starting in 2003.

Mineral sands

- ▷ Southern Titanium NL signed an MOU with DCM DECOMetal International Trading GmbH for the sale of all planned zircon, rutile, leucosene, and ilmenite production from its **Mindarie** project, SA. Southern Titanium completed a definitive feasibility study on the project and production is expected by 2004.
- ▷ BeMax Resources NL completed its definitive feasibility study and received all approvals from the State Government for the development of the **Ginkgo** deposit, near Pooncarie, NSW. Subject to project financing and construction the first product delivery is planned for late 2004. The operation is expected to produce 450 000 t/year of heavy minerals concentrate over a 25-year mine life.
- ▷ Basin Minerals Ltd completed a definitive feasibility study and received mining approval for stage 1 of its **Douglas** project, near Horsham, Vic. Following the acquisition of the company by Iluka Resources Limited, start up and commissioning of the project will now occur in the second half of 2004 with the project fully operational in early 2005.
- ▷ Doral Mineral Sands Pty Ltd has commenced mining 120 000 t/year of titanium minerals and 10 000 t/year of zircon at **Dardanup**, 15 km east of Bunbury, WA. The project, is expected to have a nine-year mine life.

Nickel

- ▷ Lionore Australia (Nickel) Ltd has produced its first nickel-in-concentrate from its **Emily Ann** mine, 130 km west of Norseman, WA. At full production, the mine will have a throughput of 250 000 t/year producing 6 700 t of nickel-in-concentrates.
- ▷ LionOre Mining International was in the final stages of a feasibility study into the **Maggie Hays** nickel deposit, 130 km west of Norseman, WA.
- ▷ A feasibility study by Sally Malay Ltd indicated that the **Sally Malay** open pit / underground project, 240 km south of Kununurra, WA, would yield 344 500 t of bulk concentrate over a 5.5 year life. The company expects to be commissioning the plant in late 2003.

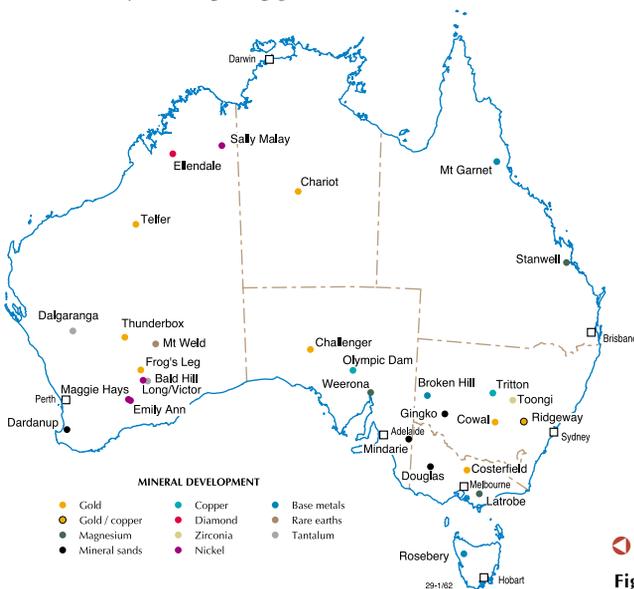


Figure 4: Selected mineral development projects, 2002.



- Independence Gold NL has purchased from WMC Resources the **Long / Victor** nickel mine complex and the associated assets, near Kambalda, WA. Mining of the Long mine commenced in October. The mined ore is toll-treated at WMC's Kalgoorlie concentrator.

Rare earths

- Lynas Corporation Ltd is evaluating various locations within Australia to build its Concentrate Cracking and Rare Earths Carbonate Plant to process the monazite concentrate from its **Mt Weld** project near Laverton, WA. The current resource estimate for the deposit is 3.5 Mt at 17% REO. Lynas has signed a letter of intent with Matsushita Electric International (MEI) for MEI to purchase rare earths for distribution to other Japanese companies.

Tantalum

- Haddington International Resources Limited commenced production from the **Bald Hill** deposit 60 km southeast of Kambalda, WA, where resources of 2 Mt at 375 ppm Ta₂O₅ have been identified. The plant has a design capacity of 200 000 t/year of ore which will yield about 145 000 lbs of tantalite.
- Tantalum Australian NL commenced open cut mining at **Dalgaranga**, 80 km northwest of Mt Magnet, WA.

Zinc

- Kagara Zinc Ltd is constructing and developing the **Mt Garnet** zinc project, about 100 km southwest of Cairns, Qld, with first zinc production due in early 2003. The project feasibility study indicated an initial nine year mine life treating 3.6 Mt of ore at an average head grade of 8.7% Zn.

- Pasminco Ltd has completed a decline at the **Rosebery** mine, Tas, which will permit single handling of ore for the first time in the mine's 68 year history as a significant producer. Total accessible resources at 31 March 2002 stood at 8.24 Mt at 16.1% Zn, 5.2% Pb, 0.41% Cu, 159 g/t Ag and 2.3 g/t Au.
- In May 2002 Perilya Ltd purchased the **Broken Hill** lead, zinc and silver mine from Pasminco Ltd. Perilya has developed a mine plan which will see the operations of the mine extended to at least 2011.

Zirconia

- Alkane Exploration Ltd completed its feasibility study on its **Toongi** zirconia project, near Dubbo, NSW. The study indicated that a 200 000 t/year plant producing 3 000 t of various zirconia products, 600 t of niobium plus tantalum as 80% concentrate, and 1 200 t of yttrium rare earth oxide as 70% concentrate would cost around \$90m.

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