GOVERNMENT OF WESTERN AUSTRALIA

MINISTER FOR STATE DEVELOPMENT;
TOURISM; SMALL BUSINESS

Our Ref: DO1340

The Hon. Geoff Prosser
Chairman
House of Representatives
Standing Committee on Industry and Resources
Parliament House
CANBERRA ACT 2600

Dear Mr Prosser

COMMONWEALTH INQUIRY INTO RESOURCES EXPLORATION IMPEDIMENTS

The Premier has asked me to respond to your invitation of 20 June 2002 to make a submission to the House of Representatives Inquiry into Resources Exploration Impediments. This submission identifies areas of concern relating to exploration impediments and asserts that this is a matter of State and national interest and provides a rationale for further consideration by your Inquiry.

The submission also discusses the strategic nature of Australia's mineral and petroleum reserves, the special nature of exploration and the impact that a lack of exploration will have on these strategic assets.

The submission also considers, in an historical context, the inter relationship that has existed between the private sector exploration and mining developers and the State and Commonwealth Governments in finding and developing new resources. This background is important as I believe there are many impediments that relate to the Commonwealth and the Commonwealth's jurisdiction.

One of the major impediments I see at the present is the lack of a national energy/national resources policy on which to assess the need for investment in strategic resources for the future of Australia's economic development.

The Commonwealth also has the constitutional powers and fiscal resources to provide the incentives and disincentives required to create a favourable investment environment for exploration activity.

The State is pursuing its own Inquiry into greenfields exploration which will highlight areas that can influence investment decisions in exploration and the results of that Inquiry will be conveyed to you later in the year.

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I therefore welcome the opportunity to provide this submission on behalf of the State of Western Australia. The State is keen to participate in any hearings that your Inquiry may hold in the future, either in Perth or elsewhere, on this critical issue to Australia's future economic development.

I look forward to the outcome of your Inquiry.

Yours sincerely

CLIVE BROWN MLA
MINISTER FOR STATE DEVELOPMENT

02 SEP 2002

Executive Summary

Sustainable development of Australia's resource industry is in the national interest:

- Mineral and petroleum production makes up 35% of Australia's goods and services exports;
- Capital investment in the resources sector accounts for 12% of annual private capital investment in Australia;
- Australia's balance of payments is critically dependent on a successful resources sector.

This submission therefore concludes that Australia's mineral and petroleum resources endowment is strategic to the growth of the Australian economy.

The submission highlights that Western Australia's resources sector is very significant in terms of the national economy:

- Western Australia currently accounts for over 48% of the nation's mining and petroleum production
- Western Australia accounts for over 60% of the nation's mineral exploration investment
- Western Australia accounts for 70% of the nation's petroleum exploration investment
- Western Australia accounts for 79% of the nation's oil and condensate production
- Western Australia accounts for 100% of the nation's LNG production

Within Western Australia the resources exploration and production industry is a major contributor to State, contributing 23% of the State's Gross State Product, directly employing 5% of the State's workforce and indirectly an additional 15% of the State's workforce.

Sustainable development of the resources sector in Western Australia is a priority for the Western Australian Government to ensure that future generations continue to enjoy the benefits of a healthy resources industry. These benefits would also be increased from downstream processing of resources.

The importance of exploration for the economic sustainability of the gold mining industry is covered as an example in the submission. With gold output being at a seven year low, it concludes that the low gold production is a direct outcome of lower exploration investment and demonstrates that the investment in gold exploration is below a sustainable level for the industry. The submission also finds that current exploration investment in other minerals could be below sustainable levels.

The submission concludes that exploration investment below sustainable levels will directly impact on the level of new discoveries and therefore the level of Australia's national strategic mineral and petroleum resources assets will be reduced.

The submission recommends the development of a national mineral and energy policy to include a national exploration policy as the first phase in the discovery and development of our national resources endowment for the future of Australia's economic development.

Regional Australia is seen as receiving major benefits from Australia's resources endowment. Infrastructure provision in regional areas is essential to developing the nation's mineral and petroleum resources.

The submission covers the close partnership that has existed between private sector exploration and mining developers and the State and Commonwealth governments. Western Australia has provided significant investment to ensure the development of Western Australia's resources endowment. The State is making a considerable effort to ensure the prospectivity of the State's resources is well known internationally and to ensure the mineral and petroleum industry can sustain its globally competitive position.

The public provision of geoscientific data is described as one of the key mechanisms of raising the prospectivity and investor perceptions in Australia. For Australia to remain globally competitive as a resources exploration investment destination, a national approach is required to funding geoscientific data and research. The Commonwealth's research priorities on other scientific areas is an impediment.

The submission covers the role of the Commonwealth, its constitutional powers, its fiscal resources to provide incentives and disincentives to ensure any impediments, its policy on foreign investment guidelines and its ability to review the anomalies that exist in the Grants Commission's methodology for funding the States.

The following is a summary list of the recommendations put forward in this submission:

Term of Reference 1: An assessment of Australia's resource endowment and the rates at which it is being drawn down

Recommendation 1.1: The Commonwealth acknowledges that Australia's mineral and petroleum resources endowment is a strategic national endowment to be viewed in the national interest.

Recommendation 1.2: The Commonwealth acknowledges that it is only through having strategic gas reserves that Australia is able to enter into long term LNG contracts with countries like China.

Recommendation 1.3: The Commonwealth acknowledges that Australia's strategic mineral and petroleum resources endowment needs specific national policy formulation to ensure the responsible and sustainable development of these resources.

Recommendation 1.4: The Commonwealth acknowledges that a national mineral and energy policy needs to commence with a national exploration policy as the first phase in the discovery and development of our national resources endowment.

Recommendation 1.5: The Commonwealth acknowledges that the gold industry (in particular) in Western Australia is at the cross-roads, with gold production already falling significantly and with exploration at current levels not being sufficient to sustain the resource base.

Term of Reference 2: The structure of the industry and role of small companies in resource exploration in Australia

Recommendation 2.1: As a matter of urgency, given the importance of greenfields exploration to the sustainability of the minerals industry, the Chief Government Geologist's Conference and ABS reach agreement on the definition of greenfields exploration.

Recommendation 2.2: The Commonwealth acknowledges that the declines are more than just cyclical and related to commodity price cycles—rather there are fundamental changes in the attitude of corporate entities and investors away from high risk and slow returns associated with the exploration sector.

Recommendation 2.3: The Commonwealth acknowledges that the Foreign Acquisitions and Takeovers Act 1975 implementation policy needs to be reviewed to include the mineral and petroleum resources industry as a key strategic industry along with the media, banks and real estate sectors of the economy.

Term of Reference 3: Impediments to accessing capital, particularly by small companies

Recommendation 3.1: In the case where the resources sector provides funds for exploration-related research within CSIRO, universities and CRC's, the Commonwealth Government should provide a 150% tax write-off of funds to companies with taxable income, or should match $ for $ funds committed by a company that does not have a taxable income.

Recommendation 3.2: The Commonwealth should assess alternative efficient tax/subsidy mechanisms for their potential to lift exploration expenditure in Australia.

In particular, it should assess the effects of introducing a "flow-through-share scheme". A key element of this assessment should examine the introduction of such a scheme for "greenfields" exploration in designated regions of Australia.

On determining the most effective policy instruments and approval following this assessment, they should be enacted as soon as possible.

Terms of Reference 4 & 7 relating to: Access to Land, including Native Title and Cultural Heritage Issues/ Relationships with Indigenous Communities

Recommendation 4.1: The Commonwealth increase funding of the NNTT in order to deal in a timely manner with the large number of mineral and petroleum titles required by WA to ensure sustainability of its resources industry.

Recommendation 4.2: The Commonwealth ensure that adequate resourcing is available to Native Title Representative Bodies, and to establish Native Title Bodies Corporate to allow them to be actively represented in the development of the State's resources.

Recommendation 4.3: The Commonwealth should-

a) use its best endeavours to enact revised heritages legislation that could be used to accredit compliant State legislation.

b) in co-operation with the States, agree where possible on Australia-wide heritage protocols that will address development proposals in a timely manner.

Recommendation 4.4: The Commonwealth review its policy on Indigenous Protected Areas with a view to ensuring that reasonable access for resource exploration and development is not impeded.

Recommendation 4.5: The Commonwealth ensure that the International Union for Conservation of Nature (IUCN) is the adopted conservation management option for IPA's.

Term of Reference 5: Environmental and other approval processes, including across jurisdictions

Recommendation 5.1: Following endorsement of the Keating Report by the WA Government, the Commonwealth embrace relevant actions and particularly:

a) in co-operation with the States, work towards streamlining of environmental approvals for both exploration and development projects

b) where Commonwealth permits are involved, the Western Australian Department of Mineral and Petroleum Resources and the Department of Industry, Tourism and Resources (DITR) should work to a known time schedule to assess, offer and award exploration permits, and the processes should be consistent between the State and Commonwealth offshore areas.

Recommendation 5.2: The Commonwealth support the principles and objectives of sustainability as outlined in the draft State Sustainability Strategy.

Term of Reference 6: Public Provision of Geoscientific Data

Recommendation 6.1: The Commonwealth increase funding for geoscience research in universities and CRCs.

Recommendation 6.2: The Commonwealth increase funding to Geoscience Australia in order to:

a) *undertake modern airborne and ground-based geophysical surveys and high-technology laboratory-based studies in greenfields and frontier areas in order to kick-start new exploration investment*

b) *build seamless geoscience and mineral deposit databases available free of charge to investors via the internet*

Term of Reference 8: Contributions to Regional Development

Recommendation 8.1: The Commonwealth acknowledges the enormous direct economic risk and cost shouldered by the people of Western Australia to encourage the private sector to invest in exploration, discovery and development of the State's mineral and petroleum resources endowment.

Recommendation 8.2: The Commonwealth acknowledges that the regional development of Western Australia is dependent on the prospectivity of mineral and petroleum resources and of ensuring a globally competitive mineral and petroleum industry.

Recommendation 8.3: The Commonwealth acknowledges that:

a) *Western Australia contributes substantially more in taxes and other revenues to the Commonwealth than it receives back in Commonwealth expenditures (including grants, services and personal benefits).*

b) *Not only do tax and royalty revenues from Western Australia directly contribute to the welfare of other States, but the economic activity and foreign exchange generated by the State's export sector contributes significantly towards sustaining jobs and income for the rest of Australia.*

c) *To sustain Western Australia's substantial contribution to the federation, the Commonwealth needs to provide a greater overall level of assistance to the State through revenue or expenditure measures.*

Recommendation 8.4: The Commonwealth acknowledges that the Grants Commission methodology needs review to ensure that disincentives to development are removed. In particular:

a) *The State's funding of regional infrastructure to support a globally competitive mineral and petroleum industry is fully reflected.*

b) *All costs faced by the private sector in developing mineral resources are taken into account in measuring States' capacity to raise royalties.*

c) *Costs of States' regional subsidies for power, water and transport are fully reflected.*

d) *The costs of developing and maintaining the State road network to support economic activity are fully reflected.*

e) *The costs of expanding social infrastructure to support economic growth are fully reflected.*

Recommendation 8.5: The Commonwealth should review the zone allowance rebate system so that it more effectively compensates for the disadvantages of living in areas remote from major cities.

Recommendation 8.6: The Commonwealth increase the funding available under the Regional Mineral Study Program to better resource implementation of findings regarding the need for better geoscience information, infrastructure, and investigation of land access arrangements.

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Access to Land, including Native Title and Cultural Heritage Issues/ Relationships with Indigenous Communities

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Introduction and Overview

A healthy resource sector is in the National interest

From the 1850s, development of Australia's resources has been a significant contributor to National wealth and the trend continues today. The mining and petroleum industries are major catalysts for regional and rural development, including growth in employment and public infrastructure. Regional centres such as Broken Hill, Mount Isa, Karratha and Kalgoorlie owe their existence to the mining industry.

At a national level, the mining and petroleum sector makes up a significant proportion of Australian exports (Figure A1) and therefore contributes positively to Australia's balance of payments. Resource exports typically make up about 35% of Australia's exports, and at that level contribute more than other rural-based industries.

Private capital investment (Figure A2) in Australia's resources sector makes up between 12 and 25% of total capital investment during the period 1995-96 to 2000-01. With its associated multipliers, capital investment in the resources sector nationwide is a powerful engine for economic growth. Infrastructure constructed by Governments to service the industry is not included in this total and represents a further boost to economic growth and public amenity.

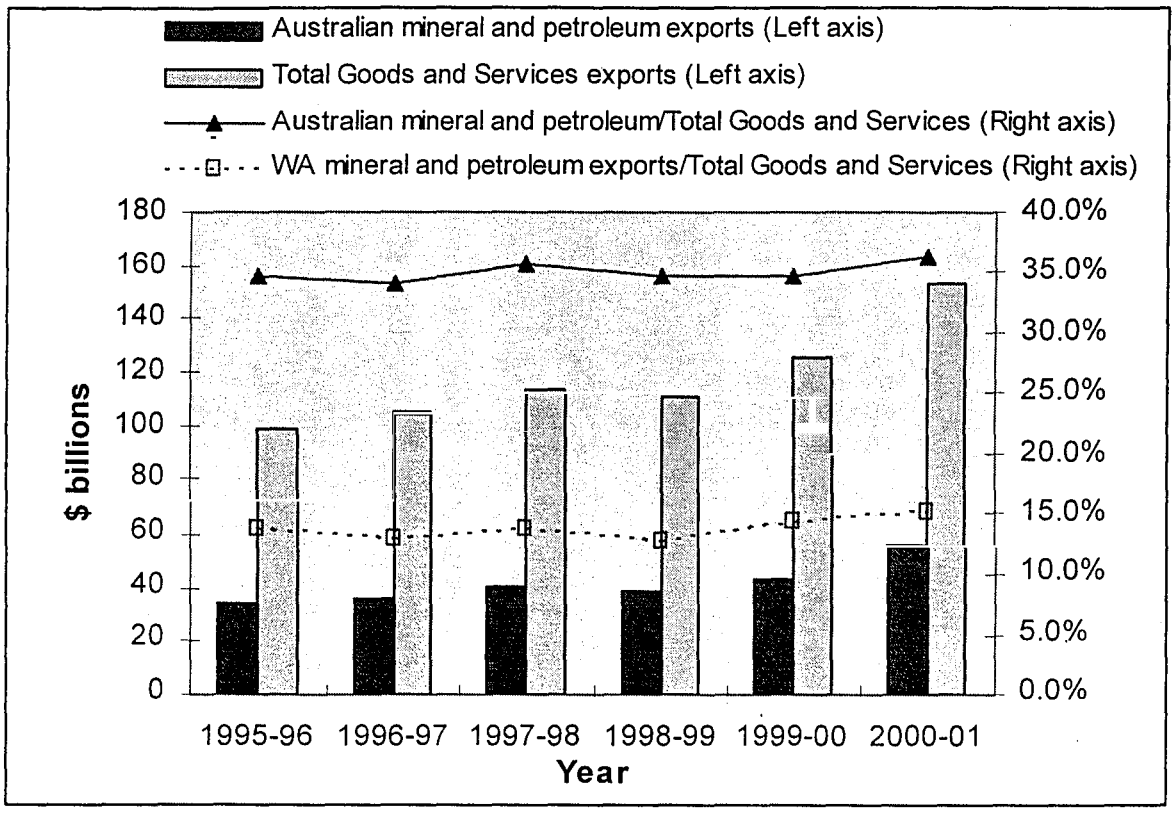


Figure A1: Exports of minerals and petroleum from Australia and WA as a percentage of total Goods and Services exports

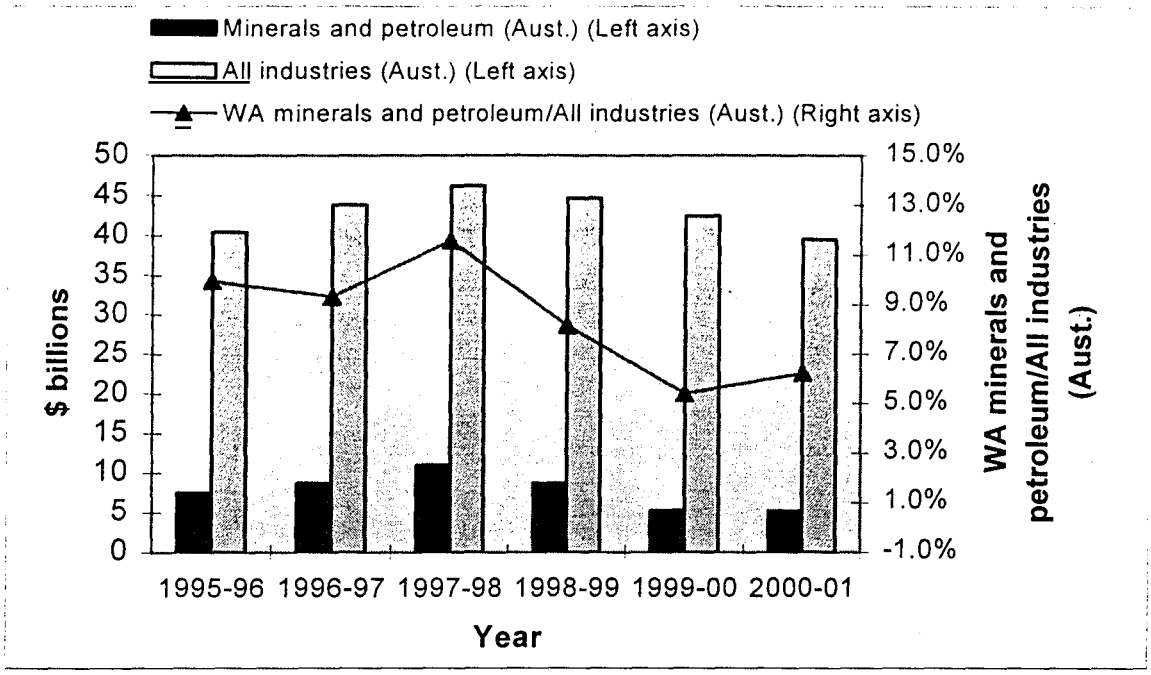


Figure A2: Private sector capital investment in the resources sector in Australia and WA

The total value of mineral and petroleum production and the WA contribution to this total (Figure A3) has shown a general upward trend since 1995-96. Part of the recent jump in 2000/01 was due to a weakening Australian dollar exchange rate against the $US. WA production value has been increasing steadily since 1995-96.

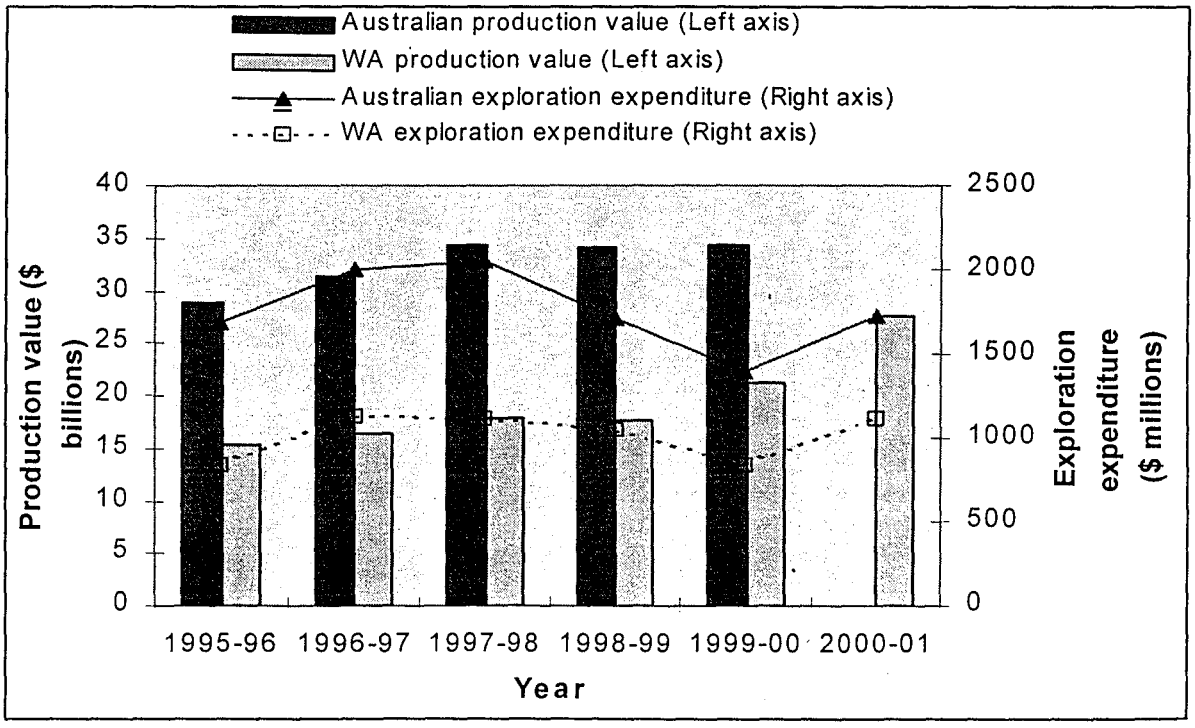


Figure A3: Value of Australian and WA mineral and petroleum production and exploration expenditure

In addition, mineral and petroleum exploration is a significant industry in its own right (Figure A3). The steady decline in exploration expenditure since 1996-97 appears to have

reversed in 2000-01. However, virtually all of the increase in 2000-01 was due to petroleum exploration — the mineral exploration sector remained subdued.

A healthy WA resources sector serves the National interest

Figures A1 –A3 also emphasise the contribution made by WA to the overall National importance of the resources sector. WA mineral and petroleum exports currently make up 15% of Australian exports of goods and services exports, and mineral exploration expenditure in WA is typically about 60% of the Australian total. This high proportion of exploration expenditure in WA flows through to the value of production in WA, which stands at approximately 50 – 60 % of the Australian total.

Representing between 5 and 11% of Australian private capital investment (Figure A2), WA's resource sector is important nationally. With some significant downstream resources projects being planned in WA over the next five years based on downstream processing of resources (mainly gas), this national proportion of resources investment should be maintained.

Perth is also the hub of the services sector for the mineral and petroleum industries. This sector is marked by its efficiency and innovation and particularly in development of new technology. A major part of the new technology is involved in developing advanced software solutions for the mineral exploration and mining sector. At between $1.8 and 2 billion per annum, Australian exports of information technology associated with the mining and exploration industry, much of which is based in Western Australia, exceed the total exports of the wine industry.

Exploration is critical for sustainable development of earth resources

The resources industry has been likened to a ten year pipeline in which investment by way of exploration at the beginning leads to feasibility studies of discoveries, and profits down the line from production, are then reinvested into more exploration in order to maintain the flow. The downstream processing of many resources often occur close to raw resource production sites, including mines and petroleum fields. Any delays in the provision of approvals and permits and later construction and commissioning, can seriously affect the return on investment from exploration. The community benefits by way of jobs, wages and the flow-on to business, taxation, royalties and infrastructure development etc.

The importance of exploration for the economic sustainability of the mining industry is underlined by a recent report that gold output in Australia during the March quarter 2002 has declined to seven year lows (*The West Australian* 27/5/02, page 26). The Melbourne-based mining consultant group, Surbiton Associates ascribed this continued trend of lower production to "the direct outcome of lower exploration expenditure".

WA is striving to ensure sustainable development of its resources sector

The WA Government is developing a sustainability strategy and since its formation in July 2001 has established a number of reviews and inquiries, in consultation with the community and business, to accelerate WA's pursuit of the goal of sustainable development.

These reviews and inquiries include:

Government Structures for Better Results (Author: Machinery of Government Taskforce) 2001
Review of the Native Title Claim Process in Western Australia (Authors: Paul Wand and Chris Athanasiou) 2001
Technical Taskforce on Mineral Tenements and Land Title Applications (Facilitator: Bardy McFarlane) 2001
Review of the Western Australian Project Development Approvals System (Author: Independent Review Committee, chaired by Michael Keating) 2002
Ministerial Inquiry to Identify Strategies to Increase Resources Exploration in Western Australia (Chair: John Bowler), due to report September 2002

These reviews and inquiries target economic, social, environmental and governance issues surrounding the resources sector. Published reports* are annexed in digital form to this submission

In 2000, a report by the independent "Task force to review the programs and funding of Geological Survey of Western Australia" (annexed in digital from to this submission).The report identified a strong positive link between Government provision of geoscience information and the level of exploration activity.

The Ministerial Inquiry to Identify Strategies to Increase Resources Exploration in Western Australia, announced in June 2002, was charged with investigating the reasons for the reduced level of greenfields exploration in WA and to recommend actions that might be taken at State and Federal levels to achieve the level of expenditure necessary for a sustainable future of this important sector of the WA economy.

Clearly there is a major overlap between the terms of reference of the Commonwealth Parliamentary inquiry and the State Ministerial inquiry. Thirty-six submissions have been received in response to the WA inquiry, many of which refer to issues in Commonwealth and State jurisdictions. As the report arising out of the State inquiry is not due for submission to the Minister for State Development until September 2002, it is too late for incorporating recommendations from it into this submission to the Commonwealth inquiry. However, it is hoped that the Commonwealth inquiry will give weight to the recommendations contained in the WA Ministerial inquiry when the report is released by the Minister for State Development.

WA's exploration sector in trouble

WA's mineral and petroleum industry is World class, attracting approximately 10% of World exploration spending and contributing significantly to world supply of some commodities (Table A1).

Commodity	*WA's proportion of World production (by quantity, end 2001)*
Alumina	20%
Diamond	38%
Gold	8%
Ilmenite	20%
Iron ore	14%
Nickel	14%
Rutile	24%
Tantalum	25%
Zircon	32%
LNG (world trade)	9%
Salt	4%

Australian Bureau of Statistics (ABS) figures reveal that resources exports from WA constitute about 70% of total State exports. The resources industry also provides about $1.6 billion in direct payments to the WA Government through royalties and payroll taxes, which is about 15% of Government income. WA Department of Mineral and Petroleum Resources statistics suggest that the resources sector accounts for about 17% of the State's direct and indirect employment.

However, recent statistical declines in exploration expenditure in greenfields areas and the reduction in area under mineral tenements in WA give rise to concern for the sustainability of the resources industry in WA.

Figure A4 shows a graph of mineral tenement statistics, data for which are available on the WA Department of Mineral and Petroleum Resources web site. The diagram shows that there has been a moderate decline in the number of mineral tenements granted in Western Australia and a marked decline, from about 40 to about 25 million hectares, in the area covered by mineral tenements in the State. This decline in area is a direct result of large greenfields mineral tenements being dropped in preference to usually smaller, "brownfields" tenements closer to known deposits (mainly Mining Leases).

ABS figures show (Figure A5) the decline in mineral exploration expenditure on non-production leases (an erroneous proxy for greenfields exploration) in Australia from about $850 million in 1996/97 to a little over $500 million in 2000/01. This decline in mineral exploration expenditure confirms the assertion that greenfields exploration is the first casualty when overall exploration activity drops. Given that WA dominates Australian mineral exploration expenditure statistics, these declines in "greenfields"-related exploration statistics are very significant at the State level.

The Australian Bureau of Statistics defines a production lease as 'an area on which development to extract coal, minerals, liquids or gaseous materials is underway or where extraction/mining of these substances is already occurring'

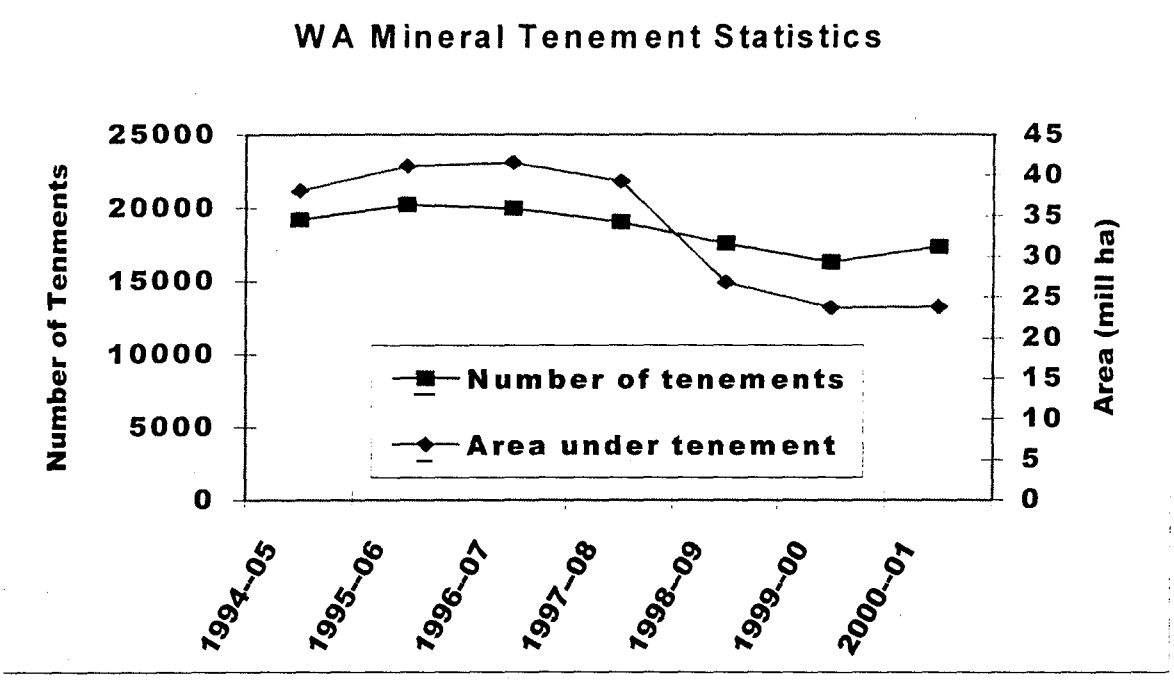


Figure A4. Decline in area under tenement in WA

However, one issue that needs to be examined closely is the meaning of ABS's "non-production leases" in relation to the term "greenfields exploration". Although used as a proxy for greenfields exploration expenditure, "non-production lease" expenditure may not be the same. There is no definition of "greenfields" and anecdotal evidence suggests that even the "non-production lease" terminology used by ABS has been variously interpreted by mining companies in their quarterly statistical reports to ABS.

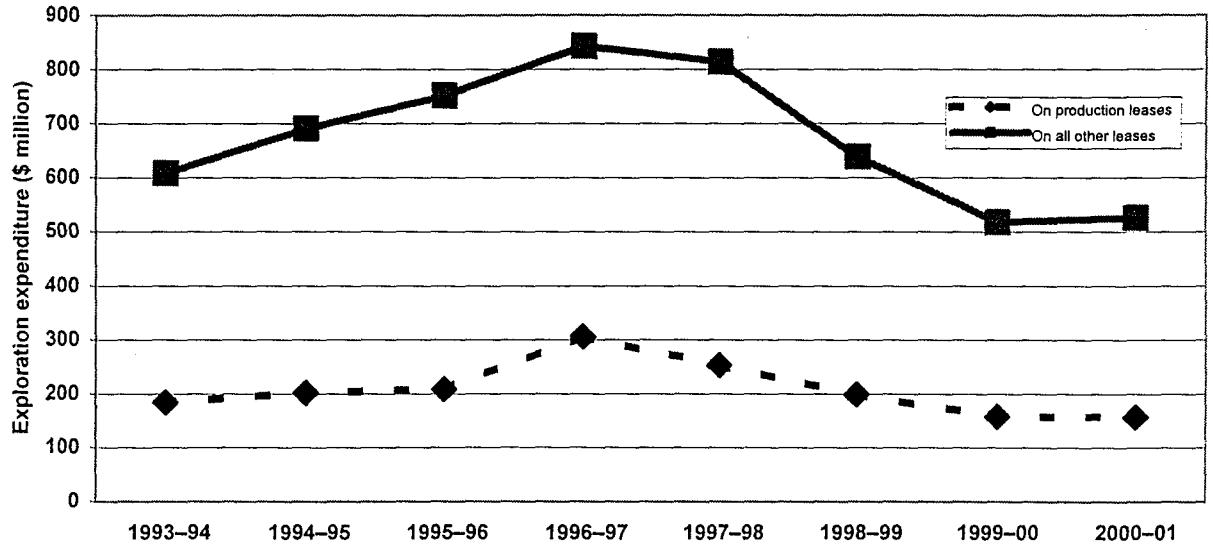


Figure A5. Decline in exploration expenditure in greenfields areas

Term of Reference 1

An assessment of Australia's resource endowment and the rates at which it is being drawn down

Mineral resources

The terminology of mineral resources and ore reserves used in this report follows that of the Australasian standard (known as the JORC code) produced by the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists, and Minerals Council of Australia. The first edition was in 1989 and the most recent edition was in 1999; and the code is widely used both nationally and internationally. Copies of the code are available at www.jorc.org.

The substantial resources of major mineral commodities produced in Western Australia are listed in Table 1.1, which also shows the situation in resource endowment for each year since 1996. The information is extracted from MPR's MINEDEX (mines and mineral deposits) database, and is based on resource estimates compiled by the mining industry.

Table 1.1 Estimates of mineral resources for major commodities in Western Australia

Commodity	*Units*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Measured and indicated resources							
Iron ore (high grade)	Mt	21 960	22 539	22 407	22 282	22 316	14 892
Gold	t	3 009	3 376	3 496	3 752	3 999	4 551
Bauxite ore	Mt	3 359	3 386	3 387	3 387	3 194	3 194
Mineral sands	Mt	128.9	163.4	208.7	208.7	215	216
Nickel	Mt	10.73	13.41	16.77	20.23	17.44	17.90
Diamonds (industrial + gem)	Mct	140	177	534	534	646	614
Inferred resources							
Iron ore (high grade)	Mt	10 466	10 382	10 525	10 587	12 796	16 288
Gold	t	1 295	1 549	1 750	1 807	1 930	1 834
Bauxite ore	Mt	1 326	1 314	1 314	1 314	1 314	1 314
Mineral sands	Mt	52	53	73	73	68	70
Nickel	Mt	6.96	10.58	10.15	11.68	15.94	14.96
Diamond (industrial + gem)	Mct	86	59	59	59	34	33

NOTE: Data sourced from the MINEDEX database. Information nominally as at 31 December for year shown, but data extracted from the MINEDEX database on 30 June in following year
For iron ore and bauxite, it is the quantity of resources that is shown. Only high-grade iron ore resources are included. High-grade iron ore is based on iron content only, but cut-off grade (55% or 60% Fe) depends on mineralization type
For heavy minerals, the total of all heavy minerals is shown
For all other commodities, it is the contained element/mineral in the resources that is shown
t Tonnes
Mt Million tonnes
Mct Million carats

Within this submission, forward-looking depletion rates are generally assumed to be the rate of mineral production for 2001 or, where that is atypical for some reason, a longer term (five year or ten year) average is used.

Caution needs to be exercised in using the composite data on resources and projecting future industry life ('mine life') based on current rates of production. Factors impacting negatively on such simple calculations include, but are not limited to, the following:

- Not all companies quote their resources exclusive of reserves, hence the State's position of reserves for any particular commodity is often understated (when the data are extracted from MINEDEX);
- The database includes resources where the date of the resource estimate is 20–30 years old, with the modern approach by companies often leading to such old (and often overly optimistic) resource estimates not being included in today's resource inventory;
- The database includes resources without cutoff grades, and some resources may have been determined at cutoff grades well below today's economic cutoff grades. Such resources may not be economic to mine in the foreseeable future;
- The bland assumption is made that all (or at least the majority) of the measured and indicated resources will at some time in the future be converted to reserves;
- Some deposits are very large but low-grade and difficult to treat. An example is large, low-grade disseminated nickel sulfide mineralization, (e.g. Yakabindie). Such deposits are only likely to be economic with a major change, for example, substantial price rise in the metal or by technological innovation (e.g., biological oxidation);
- Some deposits are very large but very remote, for example, the Wingellina lateritic nickel deposit in the Musgrave Complex. Such deposits contribute significantly to the resource base, but may not be economic without sharing infrastructure costs with other projects;
- Some resources relate to small, isolated deposits that might not be economic on a stand-alone basis for the foreseeable future.

Gold

The State's inventory of measured and indicated gold resources (including any converted to reserves) increased during 2001, and this maintains the long period of growth in gold resources throughout the 1990s (Figure 1.1).

Gold contained within measured and indicated resources increased by 552 t (13.8%) to 4551 t during 2001. The increase is primarily due to one resource upgrade – that by Newcrest for Telfer. Measured and indicated resources at Telfer are now estimated to contain a total of about 680 t of gold, with a further 126 t of contained gold within inferred resources. Other increases in the measured and indicated resources are from resource upgrades at some of the existing operating mines, and from conversion of some inferred resources to the measured and/or indicated category. This latter cause is often evident in some of the company floats during 2001 and early 2002, with old resource estimates being 'reworked' as part of the company float. If the resource increase for Telfer is excluded from the calculation, then there

is no net increase of gold contained within measured and indicated resources for Western Australia during 2001, and contained gold would have actually declined by about 10 t.

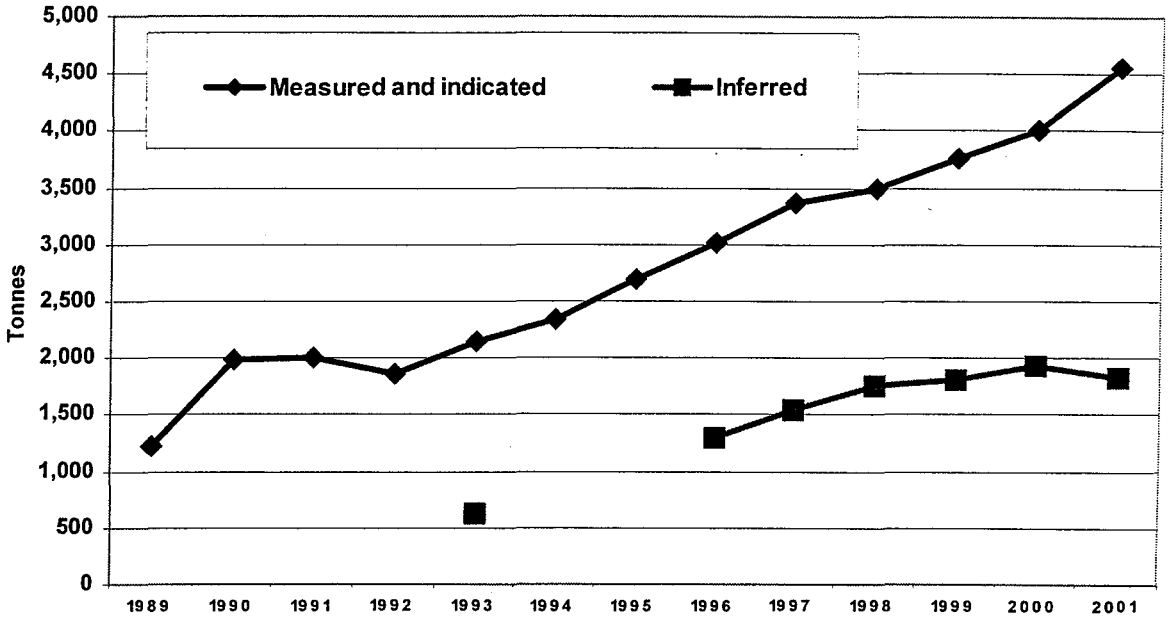


Figure 1.1 Western Australia's gold resources (measured and indicated versus inferred) 1989–2001

Gold contained within the inferred resource category decreased by 96 t (5.0%) to 1834 t during 2001. This is primarily due to resource upgrades at some of the existing operating mines and at Telfer, and from conversion of some inferred resources to the measured and/or indicated category, particularly those associated with company floats during 2001 and early 2002. The drop in inferred resources would have been substantial without the large boost from a revised resource estimate for Telfer. If the inferred resource increase for Telfer is excluded from the calculation, then contained gold would have actually declined by over 400 t.

The net increase in gold contained within measured and indicated resources (including any converted to reserves) corresponds to an average discovery cost for 2001 of $A12 per ounce (Table 1.2). If inferred resources are also included, then the average discovery cost rises to about $A13 per ounce as there was a net decrease in gold contained within inferred resources.

The average discovery costs for gold are the lowest since detailed records were available in 1993. However, the result is somewhat misleading, as the average discovery cost is unusually low because of the combination of circumstances — a huge one-off increase in resources at Telfer, combined with very low levels of gold exploration expenditure. If the resource increase for Telfer is excluded from the calculation, then (after allowing for production during 2001) there is no net increase of gold in Western Australia and hence the average discovery cost become meaningless (i.e., negative).

Table 1.2 Gold discovery costs per ounce of measured and indicated resources, Western Australia

Year	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Cost ($A) per ounce discovered	21	28	22	26	26	30	17	20	12

NOTE: (a) that this includes any resources converted to reserves, but does not include inferred resources. Discovery costs are in dollars of the day

Without another contribution from Telfer (or similar) then it is likely that the data for 2002 will exhibit declines in Western Australia's gold resources, that is, the impact from reduced exploration since 1997 will begin to show more clearly in the resource data. This is intuitively expected, but where the time delay is difficult to quantify. A corollary to this is that the emerging trend would also suggest that the apparent trend in recent years to brownfields exploration is, at best, only a short-term fix for companies and that the end of that being a successful strategy is already in sight.

During the last decade, Western Australia has produced between 182 tonnes and 238 tonnes of gold, with production peaking in 1997 (Figure 1.2). Since then, gold production has declined steadily, with only 191.7 tonnes produced during 2001. Annual gold production in Western Australia has declined by 46 tonnes (almost 20%) since 1997.

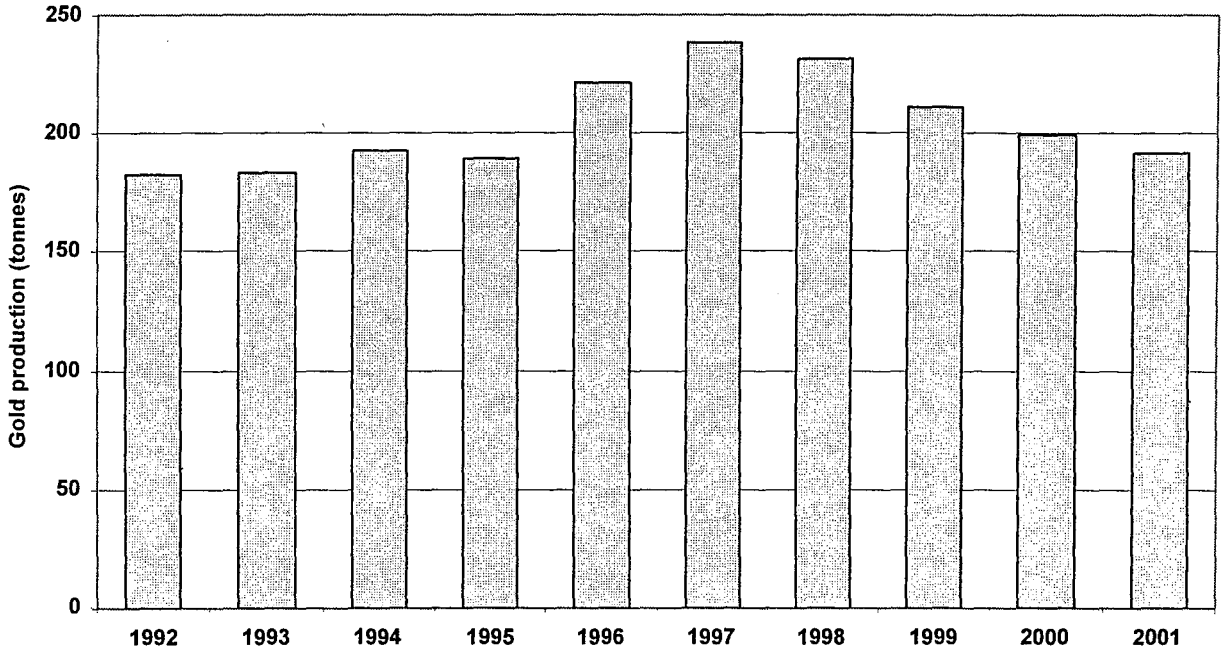


Figure 1.2 Gold production, Western Australia, 1992–2001

Existing resources by resource/reserve type and category are shown in Table 1.3. Reserves are only shown where these are clearly distinguishable from the resources, but this

tends to understate the reserves position. Where not distinguishable, the reserves are included with the resources. Where the reserves have been clearly distinguished from any remaining resources, an industry 'mine life' of only 1–2 years is suggested, but this is clearly not realistic.

Table 1.3 Western Australia's gold resources and reserves as at 30 June 2002

	Total ore tonnage (Mt)	*Average grade (g/t Au)*	*Contained gold (t)*
Reserves			
Proven	36.3	1.42	51.6
Probable	61.5	4.11	253.0
Resources			
Measured	749.9	1.79	1 341.9
Indicated	1 413.4	2.11	2 990.9
Inferred	898.2	2.09	1 879.8

Future mine life and gold production have been predicted for each mining project in Western Australia, and is based on 2001 project-specific ore production rate combined with project-specific measured–indicated resources and proven–probable reserves (all undifferentiated and as recorded in mid-2001). Inferred resources are omitted from the calculation. Results are shown in Figure 1.3.

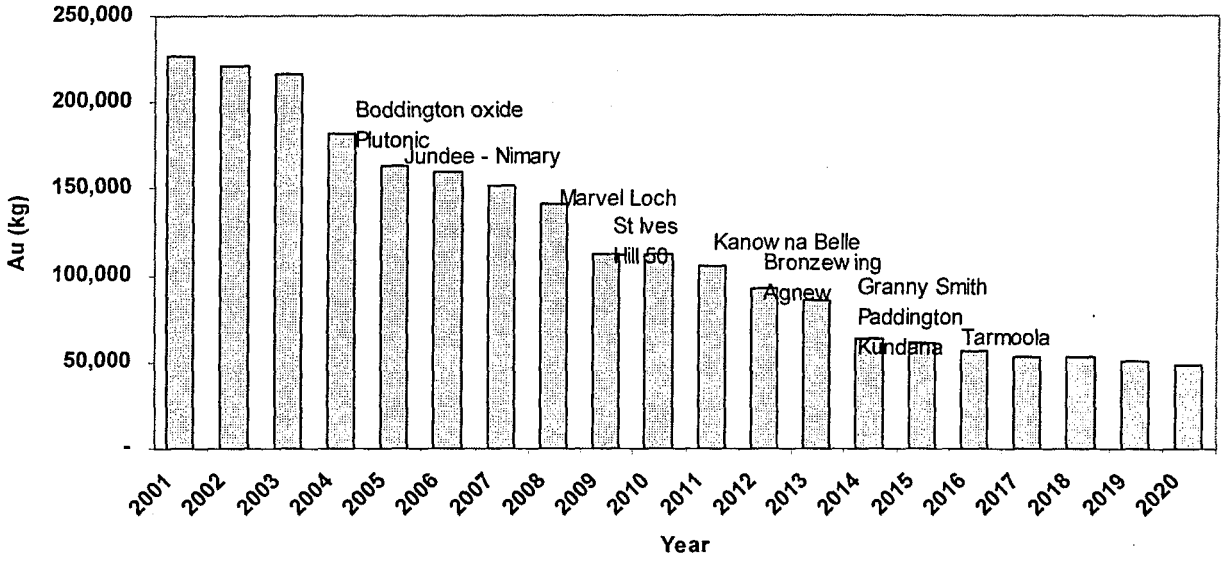


Figure 1.3 Forecast gold production, Western Australia

The results clearly show that gold production will fall away steadily over the next 20 years unless inferred resources are successfully upgraded, unless new projects such as Telfer Deeps and the Boddington–Wandoo Expansion are commissioned, and unless new discoveries are made. Without those events, the gold sector in Western Australia may shrink to only one quarter of its present size.

Recommendation: ***The Commonwealth acknowledge that the gold industry (in particular) in Western Australia is at the cross-roads, with gold production already falling significantly and with exploration at current levels not being sufficient to sustain the resource base.***

Nickel

The 1990s saw an unprecedented boom in nickel exploration that was extremely successful in converting exploration effort into resources in the ground (Figures 1.4–1.6). This was largely the result of prospect evaluation and resource estimation of lateritic nickel deposits that were already known from exploration work in the 1970s. Such deposits were amenable to short lead times between exploration expenditure and a net increase of nickel in mineral resources and reserves. The number of discoveries during this period was limited, but discoveries did occur, for example, Cosmos and Cosmos Deeps.

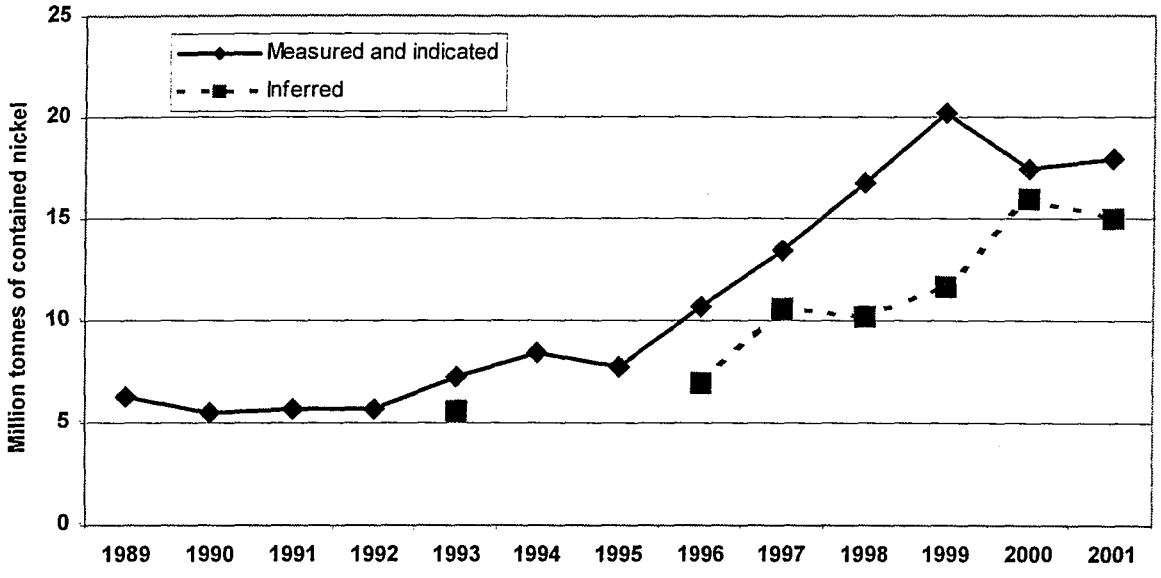


Figure 1.4 Western Australia's nickel resources (measured and indicated versus inferred) 1989–2001

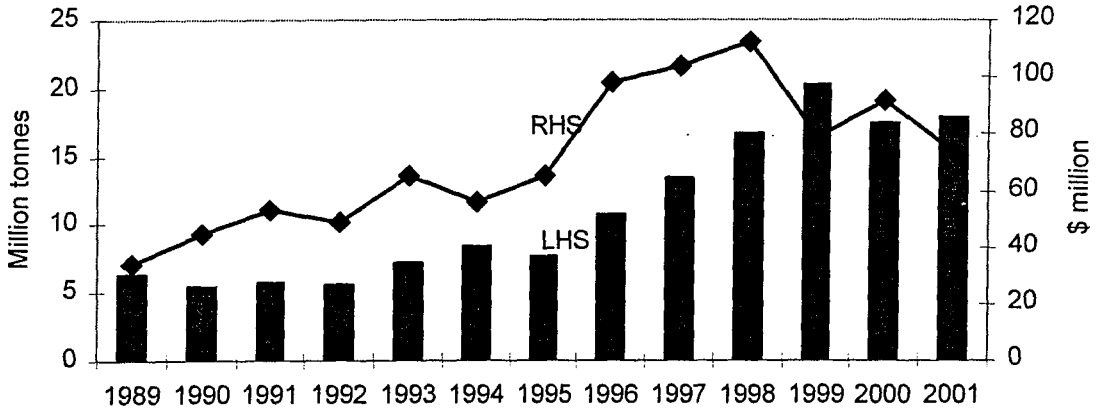


Figure 1.5 Western Australia's nickel resources (measured and indicated) and exploration expenditure for base metals (including Ni–Co)

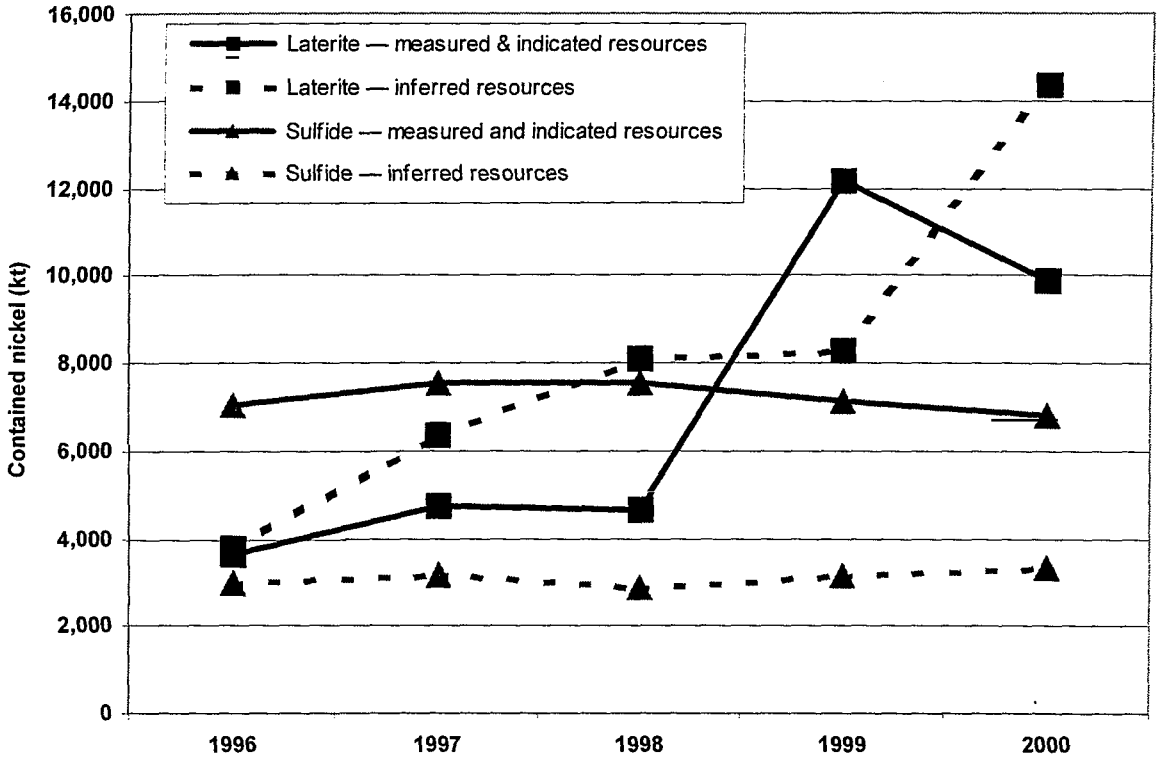


Figure 1.6 Total contained nickel in resources, Western Australia, by mineralization style and resource type

Resource estimates, by broad mineralization style and by resource category, for nickel projects in Western Australia are shown in Figures 1.7 and 1.8, with totals shown in Tables 1.4 and 1.5. In Figures 1.7 and 1.8 the measured and indicated resources, for the purposes of this paper, include any resources converted to proven or probable reserves, whereas Tables 1.4 and 1.5 distinguish reserves from resources.

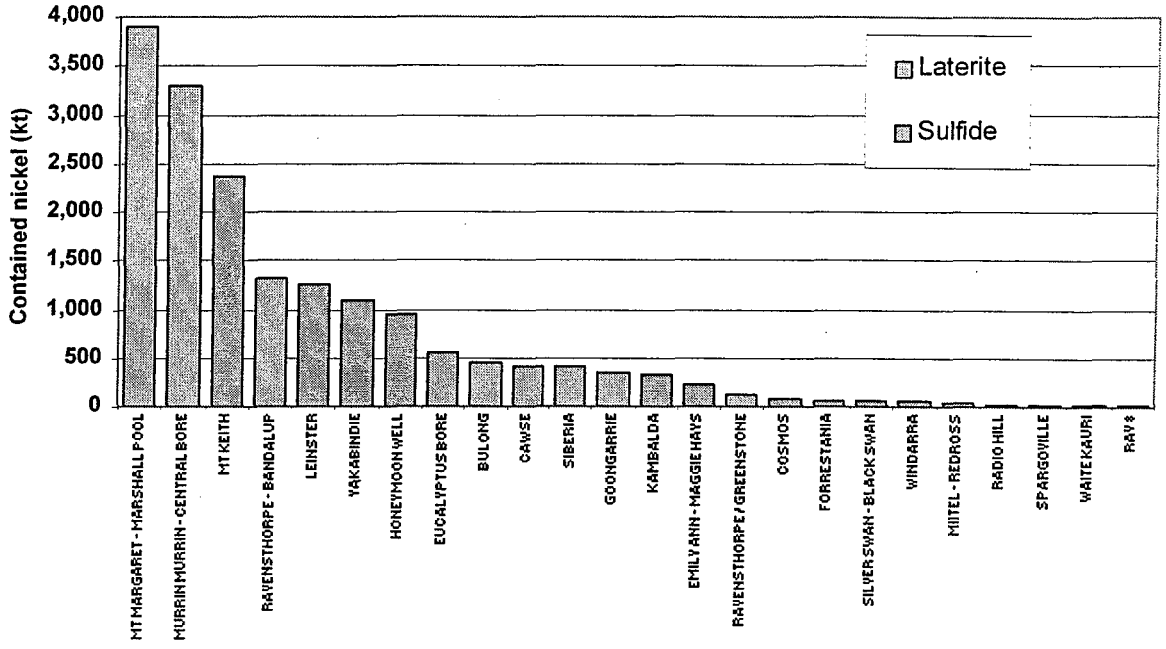


Figure 1.7 Ranking of nickel projects by contained nickel in measured and indicated resources (resources as at 30 June 2001, with 10 kt minimum)

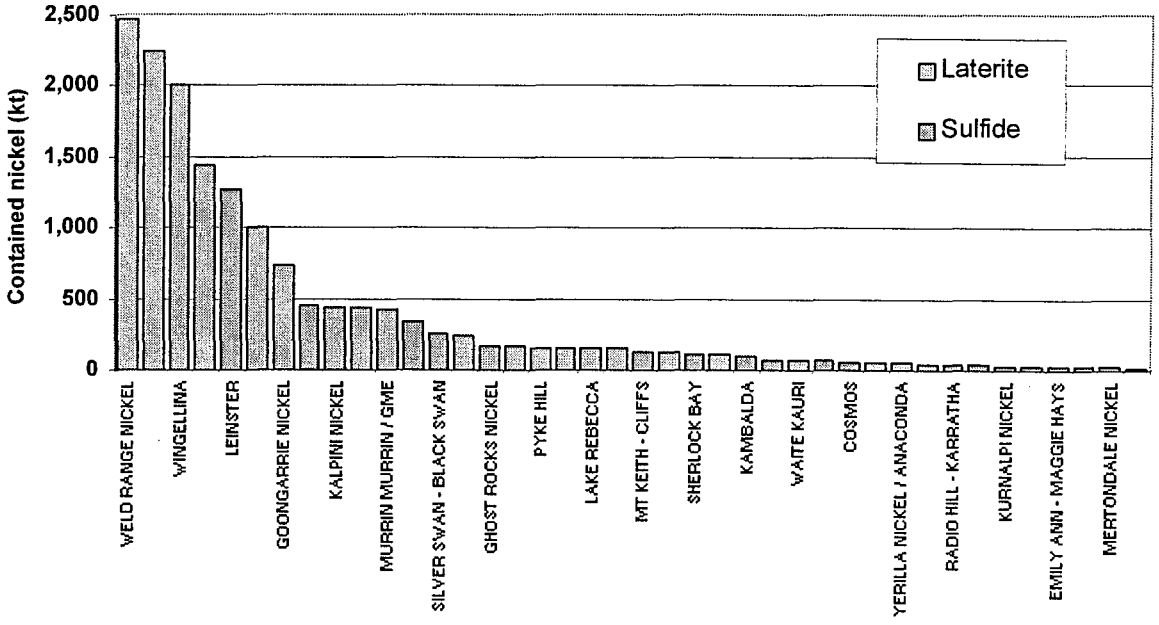


Figure 1.8 Ranking of nickel projects by contained nickel in inferred resources

Table 1.4 Western Australia's nickel laterite resources as at 30 June 2002

	Total ore tonnage (Mt)	*Average grade (%)*	*Contained nickel (kt)*
Reserves			
Proven	25.7	1.16	297.0
Probable	13.1	1.14	149.2
Resources			
Measured	322.7	0.83	2689.4
Indicated	1 160.4	0.76	8 876.1
Inferred	1 140.2	0.93	10 614.6

Table 1.5 Western Australia's nickel sulfide resources as at 30 June 2002

	Total ore tonnage (Mt)	*Average grade (%)*	*Contained nickel (kt)*
Reserves			
Proven	237.9	0.65	1 545.8
Probable	142.7	0.68	975.1
Resources			
Measured	110.9	0.70	917.3
Indicated	255.2	0.81	2 309.0
Inferred	670.1	0.63	4 208.3

The drop in nickel contained within measured and indicated resources that occurred during 2000 was a result of re-estimating mineral resources and reserves based on a higher cut-off grade, with this forced on the industry by lower market prices for nickel (Figures 1.4 and 1.6). Estimates of resources in lateritic deposits are often very sensitive to the cut-off grade used. This impact flowed through to an increase, however, in nickel contained within inferred resources. The increase of inferred resources during 2000 was also boosted by a new estimate of 2000 kt of contained nickel in the Wingellina lateritic nickel prospect, Musgrave Complex.

With more recent higher prices for nickel, the trend evident during 2000 has been partly reversed during 2001 (Figures 1.4 and 1.6). Re-estimation of mineral resources at some of the major mines and deposits has led to an increase of nickel contained within measured and indicated resources of 459 kt, but with a decrease of 977 kt of nickel contained within inferred resources.

Figure 1.6 clearly illustrates that nickel sulfide resources in Western Australia have remained essentially static for the period 1996–2000, whereas all of the increase has been in nickel laterite deposits.

During 2001, Western Australia produced 181.8 kt of nickel in various forms (within concentrate, matte and as refined nickel). Of this, 35.3 kt (20%) was sourced from nickel laterite deposits and 146.5 kt (80%) was from nickel sulfide deposits.

Much of the State's nickel resources are within projects not currently economic to work and/or within nickel laterite deposits, thus the industry's 'mine life' is difficult to evaluate. The unresolved issue is obviously the technical and financial viability of mining nickel laterite, with such deposits containing 58% of the State's nickel in measured–indicated resources and reserves and 71% of the nickel contained within inferred resources.

Nickel contained within current reserves at lateritic nickel projects totals 446 kt (Table 1.4), sufficient for an industry 'mine life' of about 12 years at current production rates for the laterite sector. The low average grades of the resources (measured, indicated and inferred) of nickel laterite, at only 0.76–0.93% Ni, is of concern as it is indicative that many of the deposits may not be economic without further technological advances or sustained higher prices for nickel. Alternatively, only small selected (high-grade) portions of the deposits may be able to be economically extracted.

The situation with nickel sulfide resources is similar. Although the total proven and probable reserves look impressive (Table 1.5), proven and probable reserves are dominated by those at WMC's opencut mines at Mount Keith. In an industry normally regarded as characterised by small, high-grade underground mines, 75% and 70% of Western Australia's proven and probable reserves (respectively) of nickel contained in nickel sulfide ore are at the Mount Keith opencut mines. These reserves have marginal grades of only 0.53–0.58% Ni, whereas reserves at underground nickel mines in Western Australia typically have grades of over 3% Ni.

Again, the main features in Western Australia's resources of nickel sulphide mineralization (once reserves are excluded) are that the average grade is low — only in the range of 0.63% Ni to 0.90% Ni, and the total of measured and indicated resources is smaller than the total reserves (Table 1.5).

Iron ore

Resource estimates for iron ore in Western Australia only include those classified as 'high grade' and the resource specifies the quantity of ore, rather than the contained iron (Table 1.1, Figure 1.9). For the purposes of this work, 'high grade' relates to the mineralization style and to the iron content. For iron ore occurring as supergene enriched zones within the Brockman Iron Formation, Marra Mamba Iron Formation or granite–greenstone terrains, a minimum average grade of 60% Fe is required for the deposit to be classed as high grade. For iron ore associated with pisolitic iron ore or channel iron deposits, occurring as scree and detrital deposits, or within sedimentary basins, a minimum average grade of 55% Fe is required for the deposit to be classed as high grade. This approximates industry standards. No additional criteria, for example, phosphorus content, are applied, and primary magnetite deposits in Archaean Banded Iron Formation (BIF) have historically not been included, but are contributing factors. Hence without much more detailed work, the 'high grade' resources here

are only approximations to Western Australia's iron ore resources that may be economic in the medium to long term.

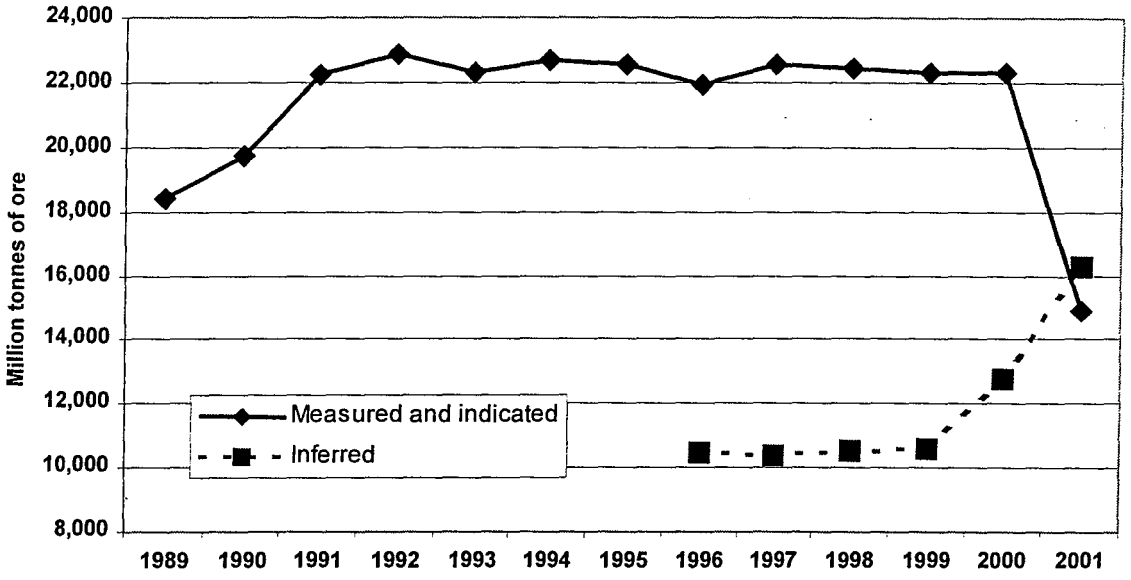


Figure 1.9 Western Australia's high-grade iron-ore resources (measured and indicated versus inferred) 1989–2001

Western Australia's high-grade iron ore resources in the measured and indicated category plunged substantially during 2001 (Figure 1.9), falling by 7424 Mt (33%) to 14 892 Mt. Conversely, inferred resources of iron ore increased but by a smaller amount, 3492 Mt (27%), to 16 288 Mt. Several factors combined to produce this result. These include:

- More companies using the current JORC code for reporting of resources;
- Elimination of 20 to 30 year old resources that are no longer regarded by industry as part of the official resource base;
- MPR obtaining extensive new JORC-compliant estimates from the major producers Rio Tinto Ltd and BHP Billiton;
- MPR conducting a thorough update and audit of the resources in MINEDEX, including MPR eliminating double counting of some of the resource estimates in MINEDEX.

The final result is regarded as a more realistic assessment than previously of the current high-grade iron ore resources in Western Australia, but it is still regarded as somewhat optimistic as it does not distinguish between deposits hosted by the Brockman and Marra Mamba Iron Formations.

Diamond

Western Australia's diamond resources increased substantially during the late 1990s after about eight years of slight growth (Tables 1.1 and 1.6, Figure 1.10). Western Australia's diamond resources (including proven and probable reserves) are dominated by those at Argyle, with the AK1 pipe and nearby alluvials containing 100%, 99.8% and 97.8% of the State's diamond resources in the measured, indicated and inferred categories respectively. Hence Figure 10 can be interpreted as a picture of the change with time of the resource situation at Argyle. Mining of diamond at Ellendale commenced during 2002, but the resources and reserves are very small by comparison with the world's largest (but low-grade) diamond mine at Argyle.

Table 1.6 Western Australia's diamond resources and reserves as at 30 June 2002

Resources			Reserves		
Category	Ore (Mt)	Contained diamond (Mcts)	Category	Ore (Mt)	Contained diamond (Mcts)
Measured	130	324	Proven	53	150
Indicated	60	127	Probable	2	11
Inferred	93	33			

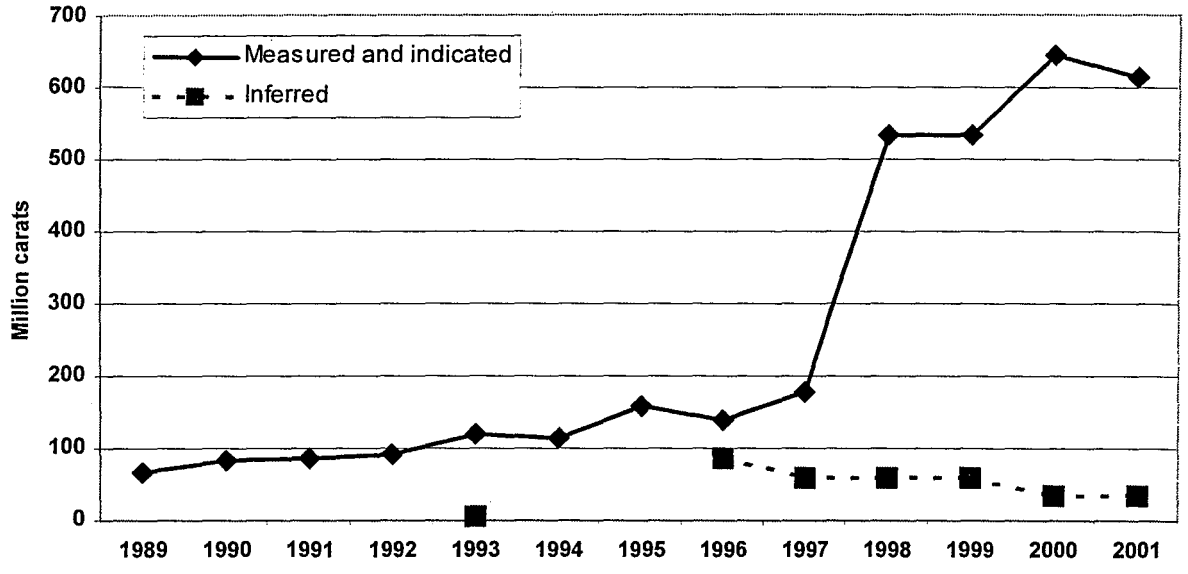


Figure 1.10 Western Australia's diamond resources (measured and indicated versus inferred) 1989–2001

During the last ten years, annual production from Argyle has ranged from 21 Mcts to 53 Mcts, averaging about 37 Mcts per year, with a value of production in the $400–700 million range.

Obviously the future of diamond mining in Western Australia depends largely on Argyle, but its future lacked sparkle a few years ago and with predictions of mine closure in about 2005. However, successful exploration at depth in AK1 and increased resources have increased the likelihood of further cutbacks in the opencut and enhanced the prospect of underground mining. Feasibility studies are continuing.

Current proven and probable reserves at Argyle, which total about 160 Mcts of contained diamond, are sufficient for only 4–5 years at the current average production rate.

Assuming all currently known measured and indicated resources at Argyle become available for mining and are converted to reserves, the present rate of production may support an additional 13 years of mine life.

The Western Australian diamond industry, worth $400–700 million annually, currently hinges on one mine unless other large economic deposits can be found quickly.

Heavy mineral sands

Western Australia's resources of heavy mineral sands have remained relatively static since 1998 (Figure 1.11). The increase in resources evident in Figure 1.11 is probably apparent, rather than real, and probably relates to the rate at which information is added to MPR's MINEDEX database. The heavy minerals industry is relatively mature and over the last few years exploration expenditure for heavy minerals has declined as the focus has switched to the Murray Basin.

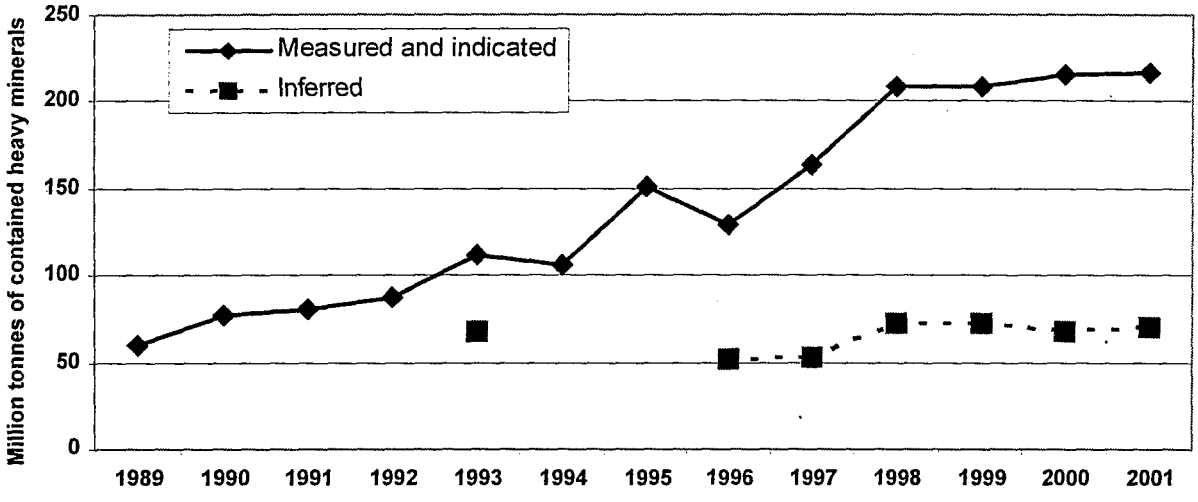


Figure 1.11 Western Australia's heavy-mineral sands resources (measured and indicated versus inferred) 1989–2001

A detailed breakdown of the heavy mineral sand resources, by mineral, as at 30 June 2002 is shown in Table 1.7.

During 2001, Western Australia produced 836 kt of ilmenite and 353 kt of zircon, and with the value of production by the heavy mineral sand industry totalling $909 million.

The proven and probable reserves of ilmenite and zircon in Western Australia are adequate for 30 years and 10 years of industry life respectively.

Resources of both minerals are substantial (Table 1.7.) and are adequate to support the industry in the longer term. Access to the resources, because of competing land use, is the biggest problem facing the industry now and in the future.

Table 1.7 Resources and reserves of heavy mineral sands in Western Australia (June 2002)

Mineral	*Category*	*Status*	*Ore tonnage (Mt)*	*Grade (%)*	*Contained heavy minerals (Kt)*
Heavy mineral concentrate	Proven	Reserve	34.3	100	34 374
	Probable	Reserve	16.4	100	16 445
	Measured	Resource	22.0	100	22 008
	Indicated	Resource	138.6	100	138 630
	Inferred	Resource	83.2	100	83 231
Ilmenite	Proven	Reserve	34.3	49.9	17 174
	Probable	Reserve	16.4	54.7	8 996
	Measured	Resource	21.0	68.2	14 392
	Indicated	Resource	121.3	69.5	84 414
	Inferred	Resource	29.7	68.1	20 287
Leucoxene	Probable	Reserve	2.3	3.2	75
	Measured	Resource	10.7	4.9	531
	Indicated	Resource	82.6	4.5	3 767
	Inferred	Resource	20.2	4.0	817
Rutile	Proven	Reserve	7.3	12.5	923
	Probable	Reserve	12.5	5.6	710
	Measured	Resource	19.4	8.8	1 729
	Indicated	Resource	42.8	5.3	2 306
	Inferred	Resource	15.4	2.7	425
Zircon	Proven	Reserve	7.3	17.3	1 280
	Probable	Reserve	13.1	15.3	2 013
	Measured	Resource	21.0	12.9	2 730
	Indicated	Resource	93.3	8.7	8 201
	Inferred	Resource	29.0	6.4	1 887
Monazite	Probable	Reserve	5.9	0.2	16
	Measured	Resource	2.6	0.2	5
	Indicated	Resource	31.3	0.4	140
	Inferred	Resource	21.1	0.4	88
Xenotime	Probable	Reserve	1.7	0.3	5

Garnet	Probable	Reserve	3.9	77.8	3 052
	Measured	Resource	0.5	83.0	459
	Indicated	Resource	23.2	43.6	10 168
	Inferred	Resource	2.9	51.4	1 508
Kyanite	Probable	Reserve	1.7	2.0	34
	Indicated	Resource	0.05	0.8	0.4

Bauxite

Western Australia's resources of bauxite have remained relatively static since at least 1993 (Figure 1.12). The bauxite resources may have stayed the same for a much longer period, with the increase in resources evident in Figure 1.12 probably apparent, rather than real, and probably relates to the rate at which information was historically added to MPR's MINEDEX database. The bauxite–alumina industry is relatively mature and over the last few years exploration expenditure for bauxite has been minimal. Exploration expenditure is likely to have been at existing operations and directed at proving up reserves.

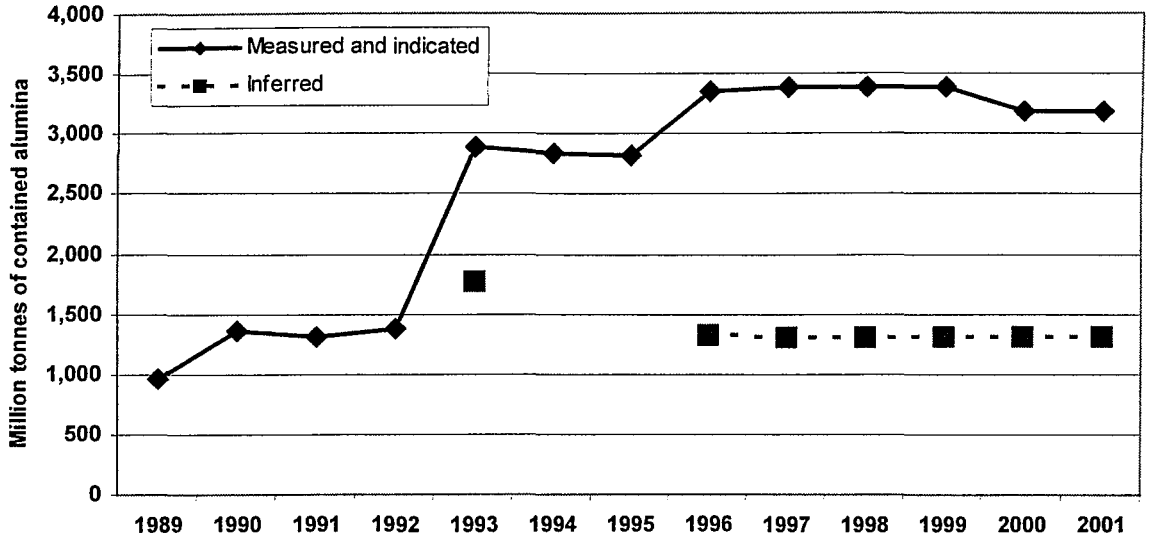


Figure 1.12 Western Australia's bauxite resources (measured and indicated versus inferred) 1989–2001

A detailed breakdown of the bauxite resources by resource category and status, as at 30 June 2002, is shown in Table 1.8.

Table 1.8 Western Australia's bauxite resources and reserves as at June 2002. Contained alumina is that extractable via the Bayer process.

Resources			Reserves		
Category	Ore (Mt)	Contained alumina (Mt)	Category	Ore (Mt)	Contained alumina (Mt)
Measured			Proven	9	3
Indicated	2 663	893	Probable	522	158
Inferred	1 313	388			

During 2001, Western Australia produced 10.75 Mt of alumina, corresponding to mining about 20 Mt of bauxite.

The proven and probable reserves of bauxite in Western Australia are adequate for about 15 years of industry life. Resources of bauxite are substantial (Table 1.8), by almost an order of magnitude again, but none of these are currently in the measured category and substantial resources exist within the environmentally sensitive Mitchell Plateau region in the Kimberley.

Mineral exploration expenditure in Western Australia, by commodity

Despite the large fall in gold exploration expenditure in Western Australia since 1997, gold remains the main focus of mineral exploration in Western Australia, accounting for about 66% of all exploration expenditure (Figure 1.13). Other commodities in their order of importance as exploration targets in Western Australia are nickel–cobalt (14%), copper–lead–zinc–silver (5%), iron ore (5%), diamond (5%), heavy mineral sands (1%) and with 'others' totalling 4%.

Although the fall in exploration activity in Western Australia is being led by a weak gold sector, exploration for many of the major commodities in the March quarter 2002 is at lower levels than for the same quarter in 2001. Examples of the fall are gold (down $11.7 million; -18%), base metals and nickel–cobalt (down $5.4 million, -33%), and iron ore (down $0.7 million; -21%).

Exploration expenditure in Western Australia for gold and base metals (plus nickel–cobalt) is now close to their lowest levels for a decade, with exploration expenditure activity similar to the recession years of the early 1990s.

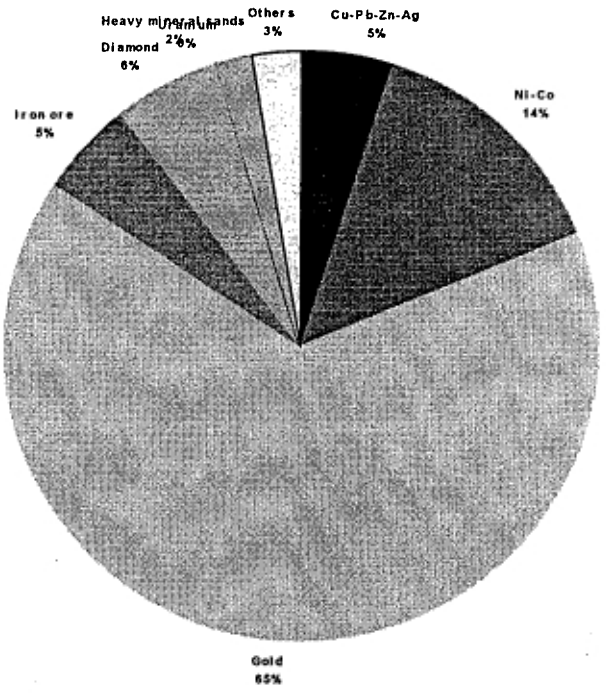


Figure 1.13 Mineral exploration expenditure in Western Australia, 2000-01, by commodity

Gold

Gold exploration expenditure in Western Australia was $286.7 million in 2000–01 (Figure 1.14). This depressed level of exploration is at a level last experienced in the recessionary years of the late 1980s and early 1990s (Figure 1.15), and gold exploration expenditure has plummeted by 50% ($298 million) during the four years since 1996–97.

Despite the large falls in exploration expenditure for gold in Western Australia since 1996–97, Western Australia's proportion of the Australian exploration expenditure for gold has been maintained in the range of 68–74.5% since 1996–97. This is consistent with the long-term trend throughout the 1990s of Western Australia attracting over 65% of the Australian exploration expenditure for gold.

In 1999–00 to 2000–01 the proportion of the Australian gold exploration expenditure that Western Australia attracts rose sharply from 67.5% to 74.5% (Figure 1.14), with this being the highest since detailed statistics were compiled by the Australian Bureau of Statistics in 1984–85. This is consistent with the perceived greater prospectivity of Western Australia for gold, Western Australian gold exploration starting to recover first, and with gold exploration in other States continuing to fall. Gold exploration in Western Australia rose $18.5 million in 2000–01, whereas the total Australian gold exploration rose only $10.2 million.

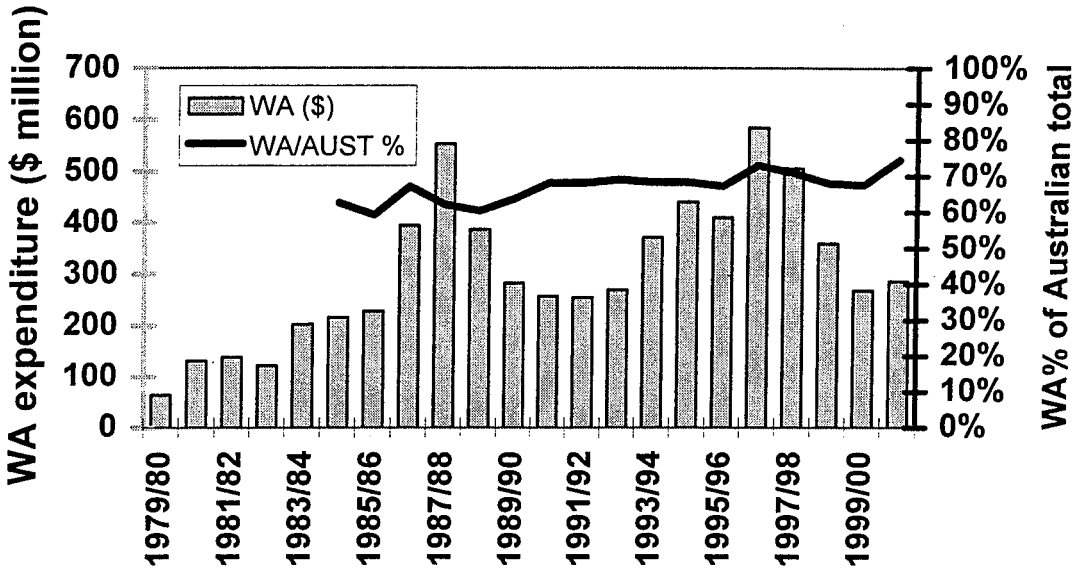


Figure 1.14 Gold exploration expenditure in Western Australia (2000–01 dollars)

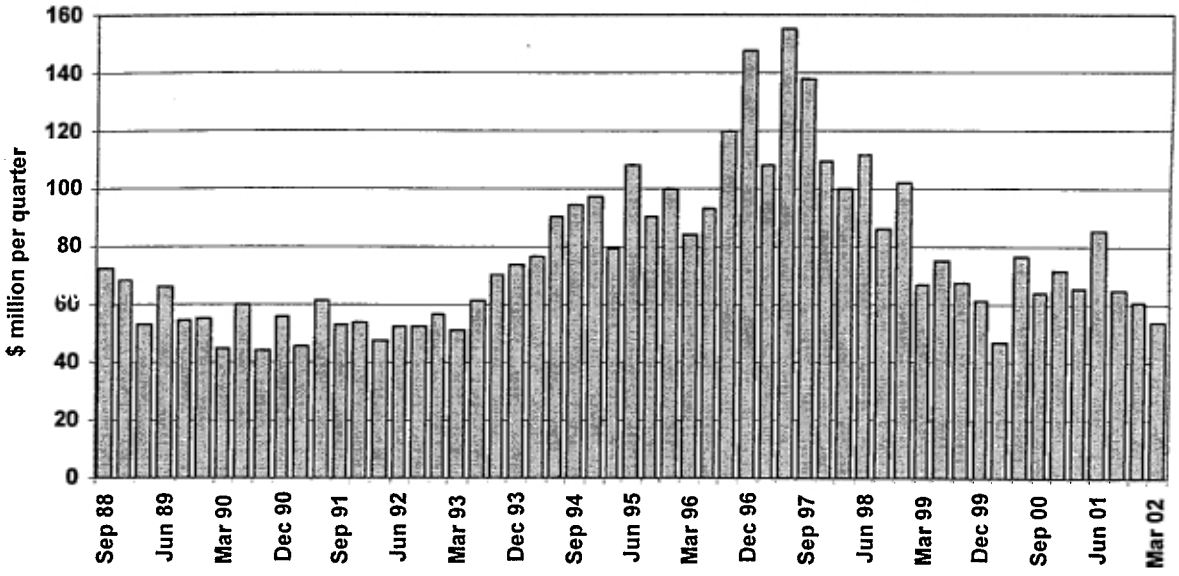


Figure 1.15 Gold exploration expenditure in Western Australia, by quarter (original figures)

Nickel–cobalt

Western Australia attracted 83% of the Australian exploration expenditure for nickel–cobalt during 1999–00 and 2000–01.

Accurate estimates of the exploration expenditure for nickel–cobalt in Western Australia are only available from the Australian Bureau of Statistics since late 1999. Prior to that,

exploration expenditure for nickel–cobalt was not specifically identified, but was incorporated within the commodity group 'selected base metals', which includes copper, lead, zinc, silver, nickel and cobalt. The more detailed data shows that within Western Australia in recent years, exploration expenditure for nickel–cobalt dominates this group, representing about 70% of the total. Hence for the period prior to 1999–00, the exploration expenditure for 'selected base metals' is used as a proxy for nickel–cobalt exploration expenditure in Western Australia. This relationship is unlikely to exist for the other States.

Nickel–cobalt exploration expenditure in Western Australia has stayed steady at $60–61 million annually for 1999–00 and 2000–01.

However, the 'selected base metals' data reveal a sharp 3-year decline, after a long period of growth since about 1986–87 (Figure 1.16). The 11-year growth period saw exploration expenditures almost treble and reach a peak of $128.7 million (in 2000–01 dollars) in 1997–98, of which about $90 million is expected to have been exploration expenditure for nickel–cobalt.

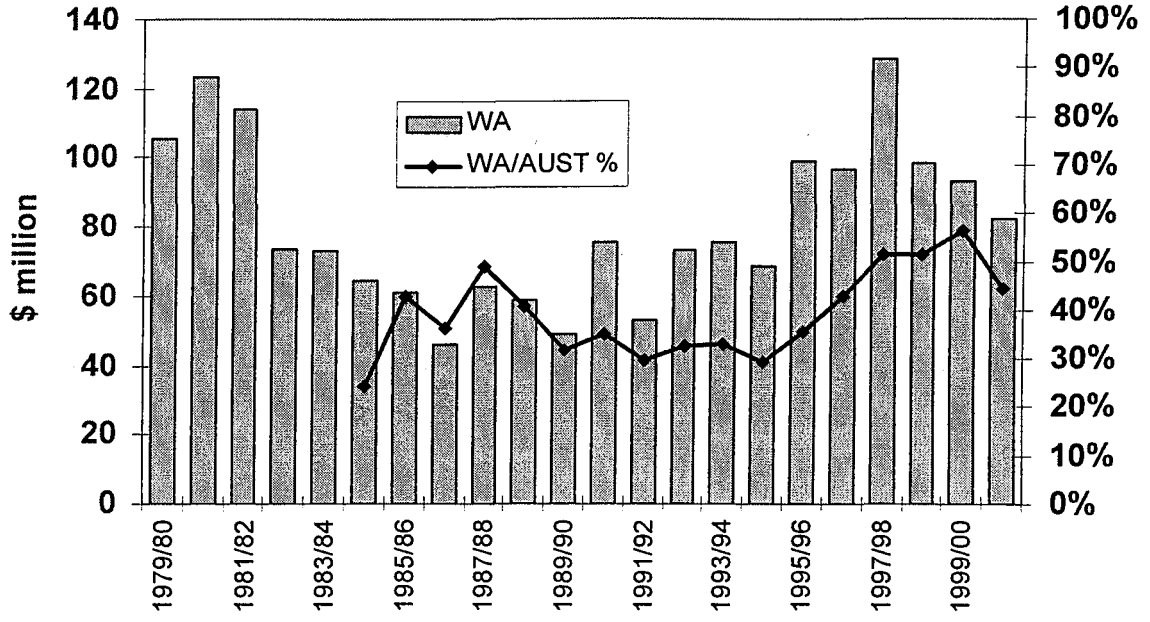


Figure 1.16 Base metals exploration expenditure in Western Australia (2000–01 dollars) (base metals = copper, lead, zinc, silver, nickel and cobalt)

The most recent quarterly data from the Australian Bureau of Statistics indicate that the downtrend in nickel–cobalt exploration is continuing into 2001–02 and is firmly entrenched (Figure 1.17).

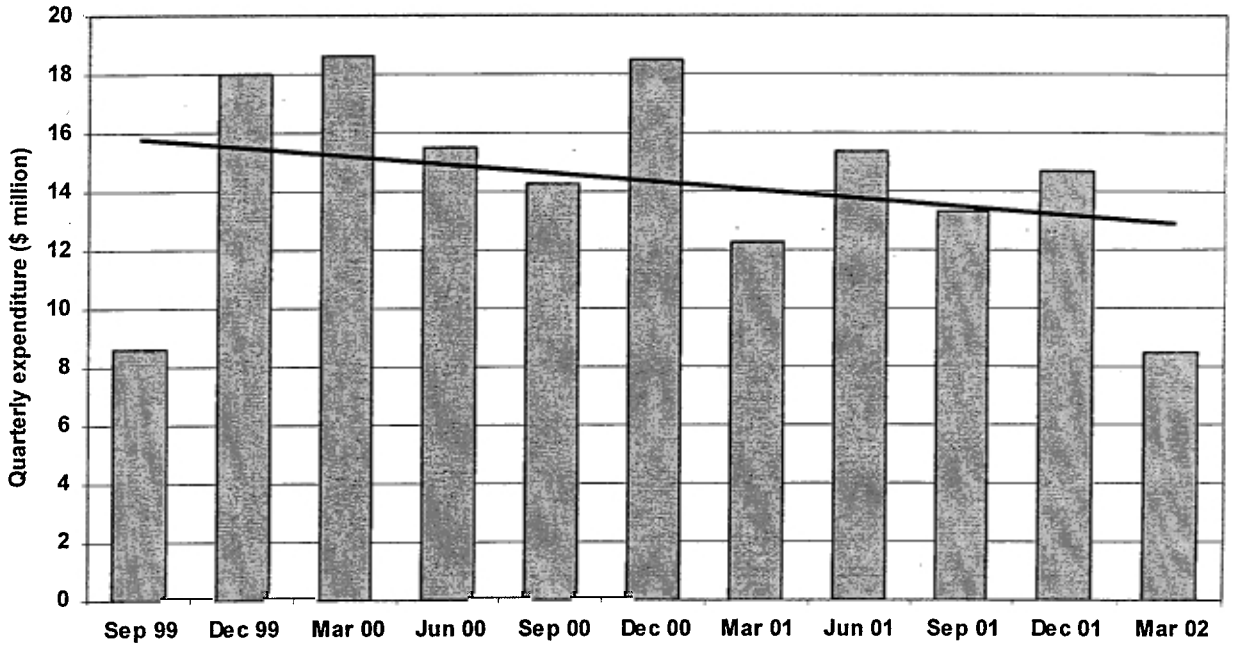


Figure 1.17 Exploration expenditure for nickel–cobalt, Western Australia, by quarter

Copper–lead–zinc–silver

As for nickel–cobalt, detailed expenditure data for copper–lead–zinc–silver exploration in Australia are only available from the Australian Bureau of Statistics since late 1999. These data reveal that within Western Australia, exploration expenditure for both copper and silver–lead–zinc have declined from 1999–00 to 2000–01 (Table 1.9) and that the trend lines based on the most recent quarterly data are still down (Figures 1.18 and 1.19)

Table 1.9 Exploration expenditure for copper and silver–lead–zinc in Western Australia during 1999–00 and 2000–01

	Copper($ million)	Silver–lead–zinc ($ million)	Total($ million)
Western Australia			
1999–00	5.0	22.7	27.7
2000–01	2.7	19.3	22.0
Western Australia's proportion of the Australian total			
1999–00	17.7%	41.0%	33.1%
2000–01	8.3%	32.3%	23.8%

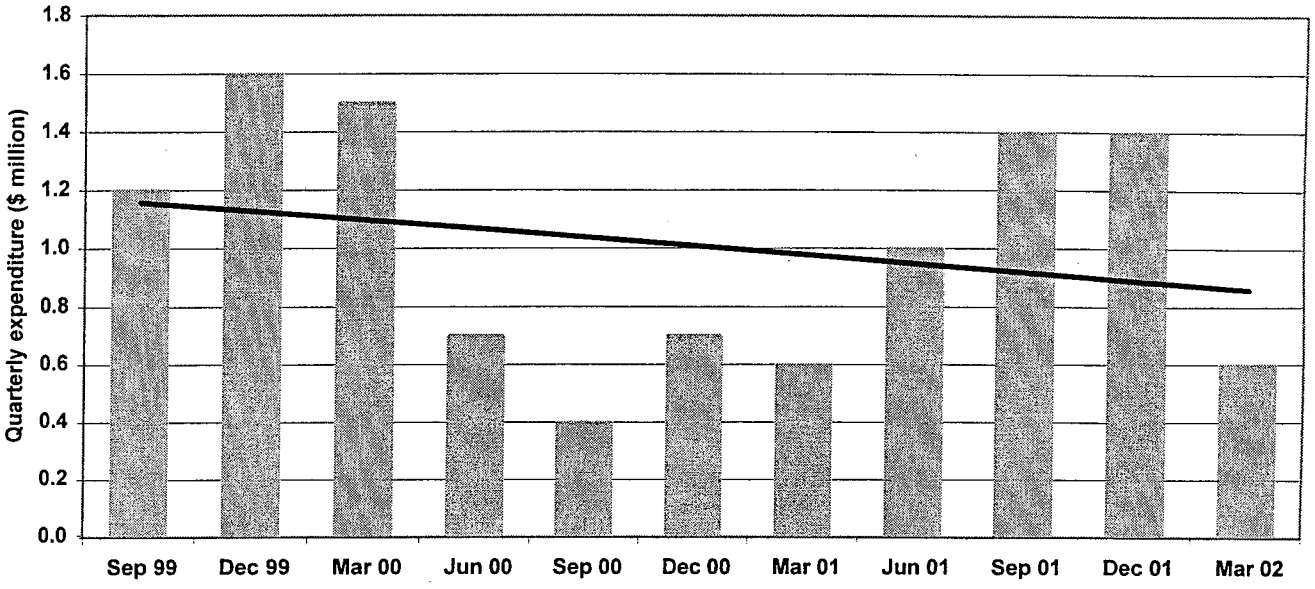


Figure 1.18 Exploration expenditure for copper, Western Australia, by quarter

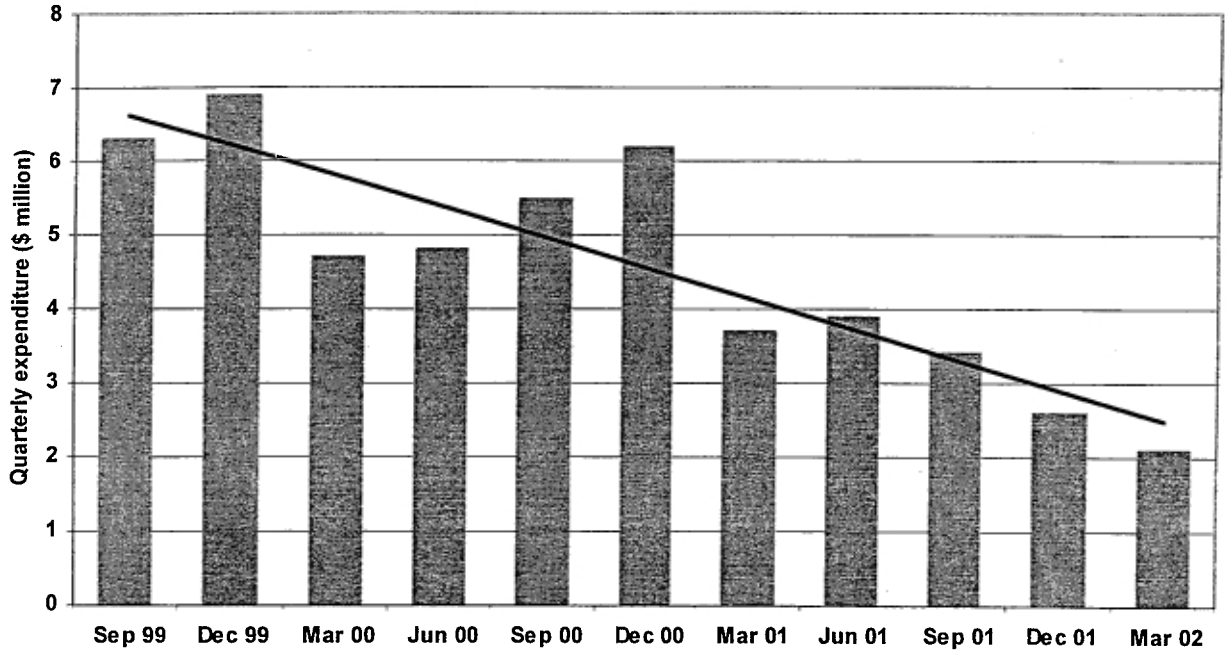


Figure 1.19 Exploration expenditure for lead–zinc–silver, Western Australia, by quarter

The long-term data (with base metals undifferentiated and including nickel–cobalt, and as shown in Figure 1.16) shows exploration expenditure for copper and silver–lead–zinc in Western Australia are currently at levels last seen in 1994/95.

Data so far available for 2001–02 indicate that Western Australia is currently attracting around 12% of Australia's exploration expenditure for copper (slightly up on 2000–01) and about 30% for silver–lead–zinc (slightly down on 2000–01).

Iron ore

Western Australia dominates the Australian iron ore industry, consistently attracting over 90% of all exploration expenditure for iron ore in Australia. Iron ore represents Western Australia's main mineral export (by value, and excluding petroleum), a position iron ore has achieved since 1997–98 when it exceeded the value of gold production (Figure 1.20).

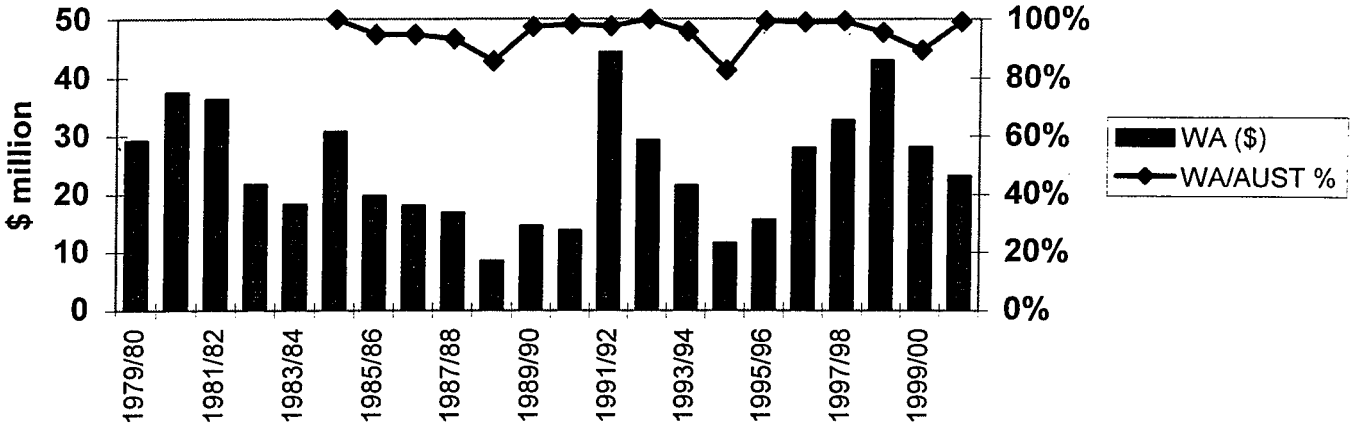


Figure 1.20 Iron ore exploration expenditure in Western Australia 2000–01 dollars

Despite its importance and despite iron ore production increasing in recent years and forecast to increase further in the next few years, iron ore exploration in Western Australia is declining (Figure 1.20). Iron ore exploration of $23.2 million in 2000–01 was down almost 50% from its historical highs 1991–92 ($44.4 million) and 1998–99 ($43.0 million; in 2000–01 terms).

The recent falls in exploration expenditure for iron ore in Western Australia have resulted from finalisation of feasibility studies on major projects in the Pilbara, some of which are moving to the development stage. Projects in this category include Mining Area C (deposit C), West Angelas, and Eastern Range at Paraburdoo. In addition, exploration expenditure on the Mid West project (Kingstream Ltd) has stopped. In addition, there has been uncertainty over the development scenarios of Hope Downs where access to existing railway infrastructure is yet to be obtained, and funding problems experienced by Kingstream Steel Ltd for the Mid West project.

These falls in exploration expenditure far outweigh the increased exploration effort by Portman Ltd at Koolyanobbing and by Austeel Ltd in the north Pilbara, and renewed interest in the Mount Gibson deposit, 400 km northeast of Perth.

Western Australia is again attracting close to 100% of the Australian exploration expenditure for iron ore as expenditure by AuIron on the South Australian iron ore and pig iron project is wound back.

The iron ore industry followed the pattern of the gold sector, with substantial consolidation during 2000–01. Rio Tinto Ltd acquired North Ltd, which owned a majority stake in Robe River, leading to a domination of the Western Australia iron-ore industry by Rio Tinto Ltd and BHP Billiton.

Diamond

Western Australia has consistently attracted 50–80% of the Australian exploration expenditure for diamond, but exploration expenditure in Western Australia has been at subdued levels since the boom period of the late 1970s and early 1980s (Figure 1.21). Ellendale and Argyle were discovered in 1977 and 1979 respectively, and production from Argyle commenced in 1983. The lack of additional economic discoveries since then has been a major deterrent to exploration.

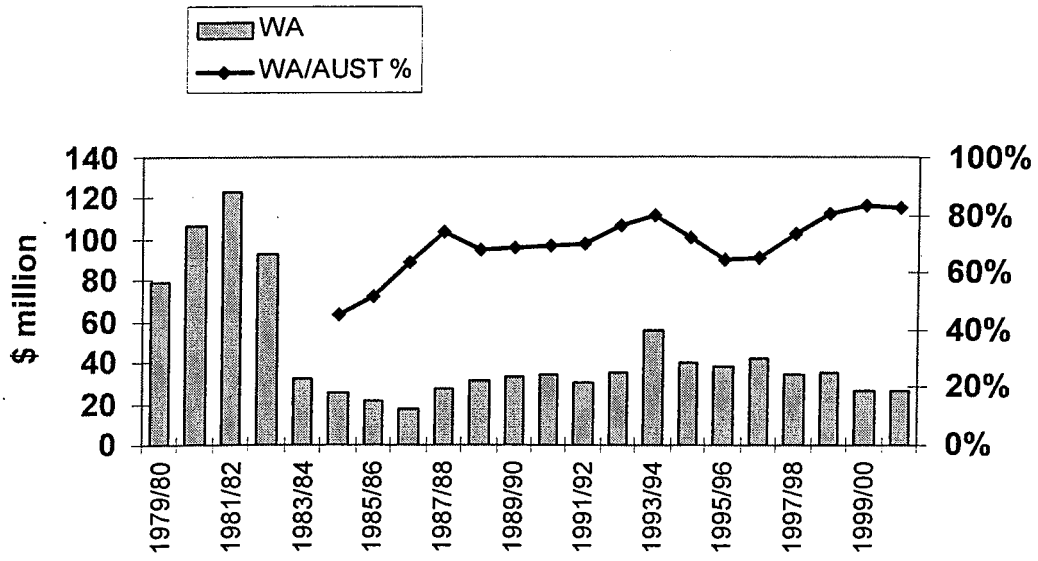


Figure 1.21 Diamond exploration expenditure in Western Australia 2000–01 dollars

Exploration expenditure for diamond in Western Australia has fallen by 46% ($19.8 million) over the last two years (Figure 1.21), and in 1999–00 and 2000–01 was steady at levels of around $25 million per year. The flat to very slightly down trend in exploration expenditure is still evident in the more recent quarterly data so far available for 2001–02 (Figure 1.22).

This subdued level of exploration is despite commencement of mining by Kimberley Diamond Company NL in 2002 at Western Australia's second diamond mine at Ellendale, and renewed interest in the Kimberley region with use of BHP's Falcon technology, which has resulted in location of numerous prospective targets.

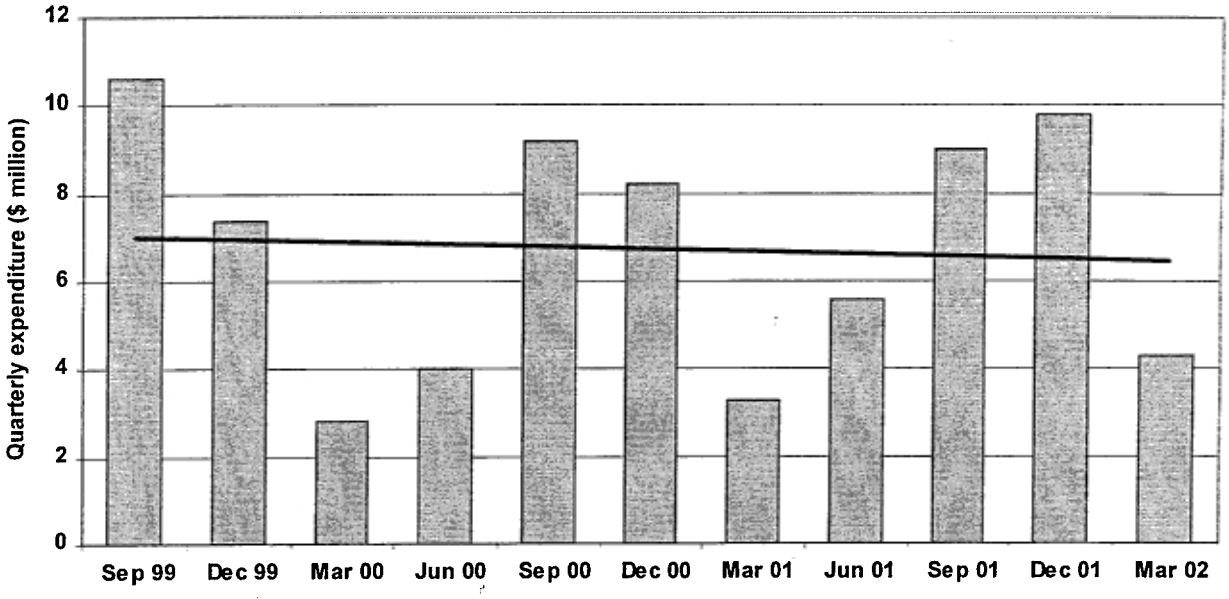


Figure 1.22 Exploration expenditure for diamond, Western Australia, by quarter

Heavy mineral sands

In Western Australia, heavy mineral sands include both titaniferous and garnetiferous mineral sands.

Since the mid-1980s, Western Australia has attracted 30–70% of the Australian exploration expenditure for heavy mineral sands (Figure 1.23). The boom period in Western Australia was broadly through the mid-1990s, but exploration expenditure for heavy mineral sands in Western Australia has fallen by 39% ($3.8 million) over the two years to 2000–01. Annual expenditure for heavy mineral sands in Western Australia was $5.8 million in 2000–01.

The fall in exploration expenditure for heavy mineral sands in Western Australia is largely a result of a focus of exploration effort in the Murray Basin of the eastern States, and as a result the proportion of the Australian exploration expenditure for heavy minerals that Western Australia attracts has plummeted over the last three years — from 63% in 1997–98 to only 22% in 2000–01 (Figure 1.23).

Recent quarterly data so far available for 2001–02 indicate that the falls have stopped and that exploration expenditure for heavy minerals in Western Australia has levelled off at around $8 million per year (Figure 1.24). This flat trend is likely to continue in the short to medium term, although the ongoing success by Magnetic Minerals Ltd in delineating substantial resources at its Dongara project, only 35 km from Eneabba, has rekindled some interest in exploring for heavy minerals in Western Australia.

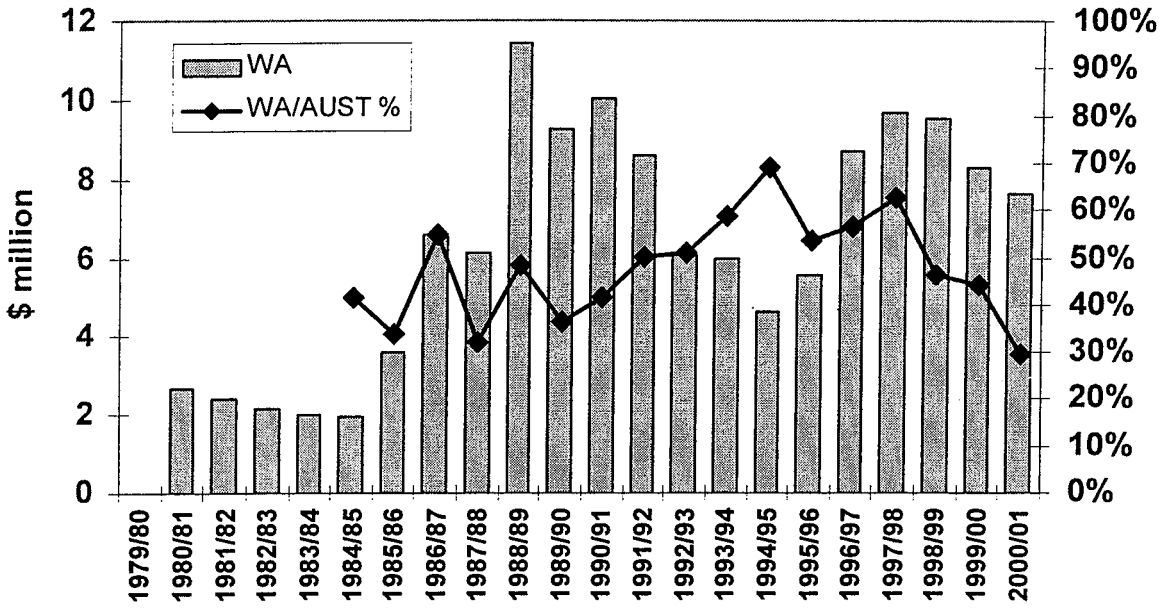


Figure 1.23 Western Australia's exploration expenditure for heavy mineral sands (2000–01 dollars)

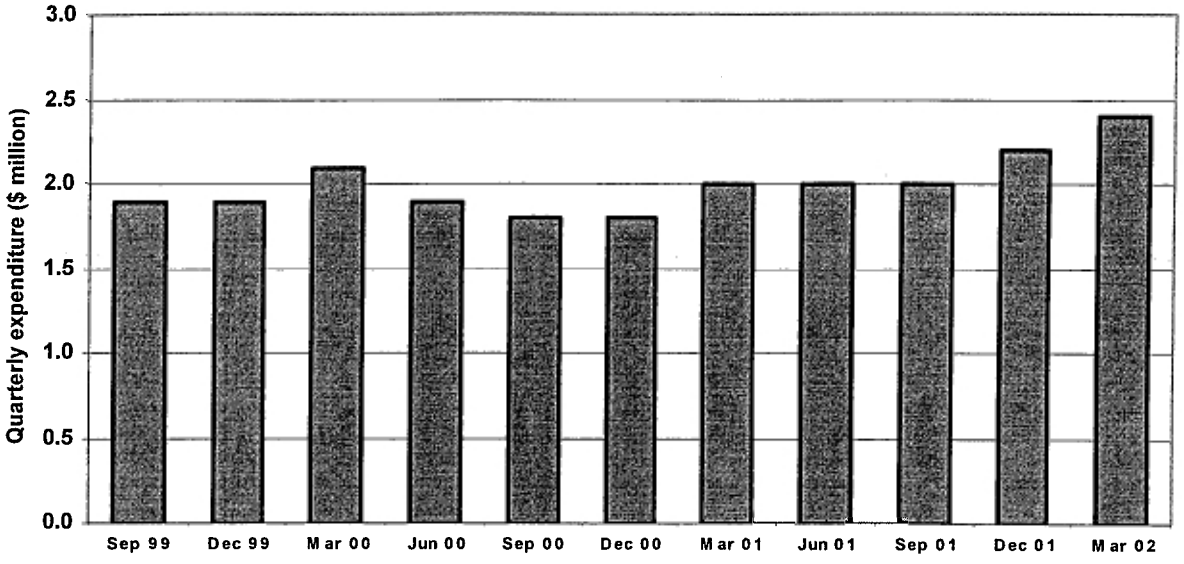


Figure 1.24 Exploration expenditure for heavy mineral sands, Western Australia, by quarter

Other minerals

The category of 'others' in Western Australia includes alumina/bauxite, chromite, clays, coal, construction materials, dimension stone, gypsum, feldspar, limesand, limestone, lithium,

manganese, pigments (iron oxide), platinum group elements, salt, semi-precious gemstones, silica, spongolite, talc, tin, tantalum, vanadium. The main interest during 2000–01 and the early part of 2001–02 in 'other' minerals was in tantalum and platinum exploration. This has been successful in expansion of existing tantalite operations at Greenbushes and Wodgina, commissioning of new tantalite mines (Bald Hill and Cattlin Creek), and will hopefully lead to a platinum mine at either Panton Sill or Munni Munni in the near future.

Despite interest over the last few years in tantalum and then platinum group elements, exploration expenditure for 'other minerals' is only at levels of $12–15 million per year (Figure 1.25). This is well down from the historical highs (in 2000–01 dollars) of $72 million in 1981–82 and $37 million in 1988–89. This is partly attributed to the low levels of recent and current exploration for bauxite and coal. Despite alumina/bauxite representing Western Australia's second most important mineral product, with an annual value of production of over $3 billion, the level of on-going exploration expenditure in terms of proving up resources is not available.

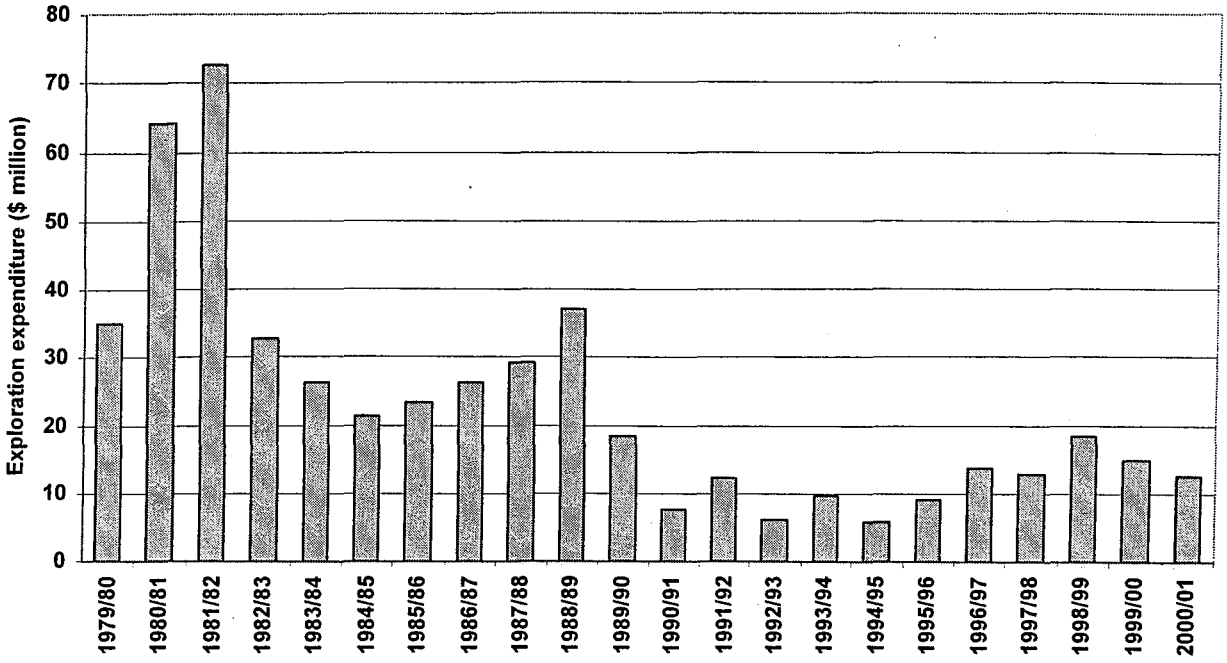


Figure 1.25 Exploration expenditure for 'other minerals', Western Australia (2000–01 dollars)

Uranium is not included in 'other minerals', but exploration expenditure for uranium has fallen in Western Australia as a result of Commonwealth and State policies, including the 'three mine policy' (Commonwealth policy) and a new (2002) State Labor policy of 'no uranium mining for energy purposes'. Exploration expenditure for uranium has plummeted from $35 million per year in 1979–81 down to essentially nothing in 2001.

Drilling activity in Western Australia

Drilling data compiled by the Australian Bureau of Statistics and by the Department of Mineral and Petroleum Resources indicate that cutbacks in drilling are more severe than the general decline in exploration expenditure. The most recent quarterly data show that the level of mineral exploration drilling is at a level not previously experienced this decade. This trend must be turned around if the mineral industry is to be sustainable in the longer term.

Drilling activity since the peak of exploration in 1996–97 clearly shows that cutbacks in exploration budgets have had a severe impact on rotary air blast (RAB) and reverse circulation (RC) drilling (Figure 1.26). RAB drilling was the first to be adversely affected as companies reduced expenditure and moved away from grassroots greenfields exploration, and this was followed one year later by declining RC drilling, as expenditure cuts deepened. RAB and RC drilling continued their decline during 2000–01, with the drilling data reported to the Department showing a decline in RAB and RC drilling of an estimated 20% (0.391 million metres) and 25% (0.860 million metres) respectively, whereas diamond drilling has increased by an estimated 10% (0.86 million metres).

Given that there is approximately a one-year delay in companies reporting drilling statistics (via the annual statutory mineral-exploration reports) to the Department, the stabilization of overall exploration expenditure during 2000–01 is likely to lead to a leveling off of drilling activity data during 2001–02.

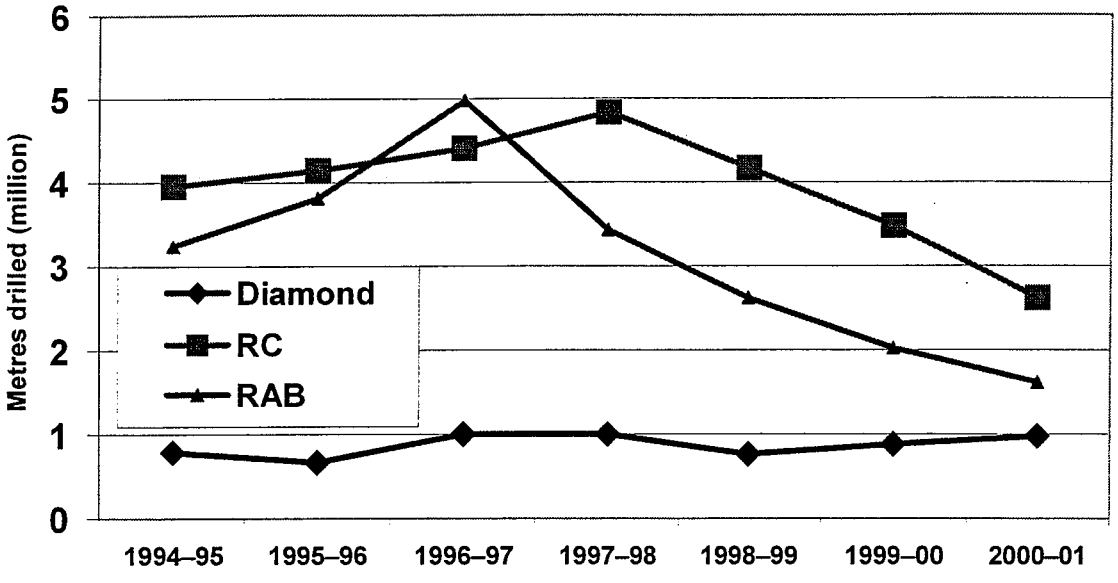


Figure 1.26 Mineral exploration drilling in W.A., by drilling type
Note: 2000–01 partially estimated

The falls in RAB and RC drilling statistics from their earlier peak levels are more severe than the general fall in overall exploration expenditure. RAB and RC drilling has borne the brunt of the cutbacks. RAB drilling has now declined by 67% (3.35 million metres) since the peak activity of 4.976 million metres in 1996–97. RC drilling has declined by a substantial

45% (2.2 million metres) since the peak activity of 4.825 million metres in 1997–98. The decline in RAB and RC drilling since the peak of the boom, 67% and 45% respectively, should be compared with the corresponding drop of 'only' 36% in total exploration expenditure. It is evident that exploration and prospect drilling has been severely curtailed in recent years, thus significantly lowering the chances of discovering new mineable deposits.

However, diamond drilling activity has changed relatively little over the last seven years, with recent levels almost unchanged from those at the middle of the 1996–97 boom (Figure 1.26). This is apparently a result of ongoing brownfields exploration where there is a need for the drilling of deep targets close to existing mine sites. Such drilling is often successful in the short-to-medium term in finding additional resources and reserves, but does not find the big deposits in greenfield areas that result in the mines of the future.

Recent quarterly data from the Australian Bureau of Statistics show that the downward trend is still firmly in place and has not shown any sign of levelling off (Figure 1.27). That data, which includes all mineral exploration drilling of all types, both on and off production leases, shows that mineral exploration drilling in Australia has declined by 75% (2.79 million metres) since mid-1997. Falls of that magnitude should be ringing alarm bells in the ears of anyone concerned with the future of the mineral industry in Australia.

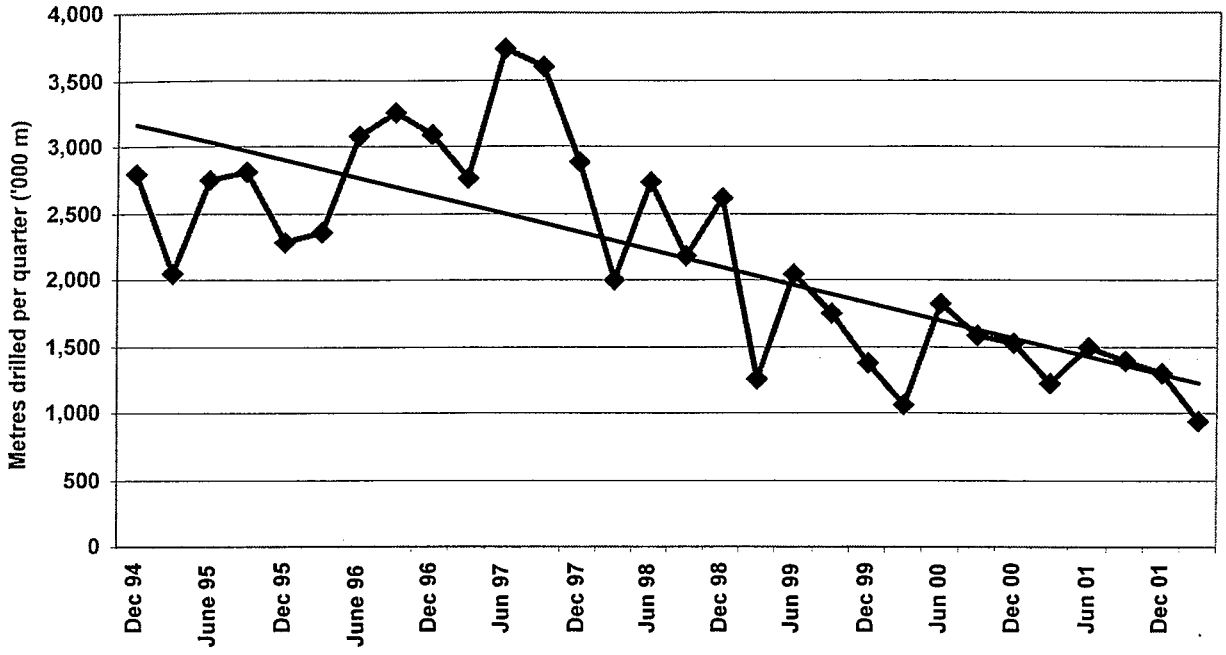


Figure 1.27 Australian mineral exploration drilling, by quarter

A breakdown of the same data for Australia, but in terms of drilling on and off production leases, shows that the percentage fall since mid-1997 until the March quarter of 2002 is almost identical — with falls of metres drilled on and off production leases of 77% (0.95 million metres) and 74% (1.8 million metres) respectively. Although the fall in percentage terms is very similar, the magnitude of the fall is almost twice as large in areas classed as 'off production leases' (Figure 1.28). The Australian Bureau of Statistics defines a production lease as 'an area on which development to extract coal, minerals, liquids or

gaseous materials is underway or where extraction/mining of these substances is already occurring'.

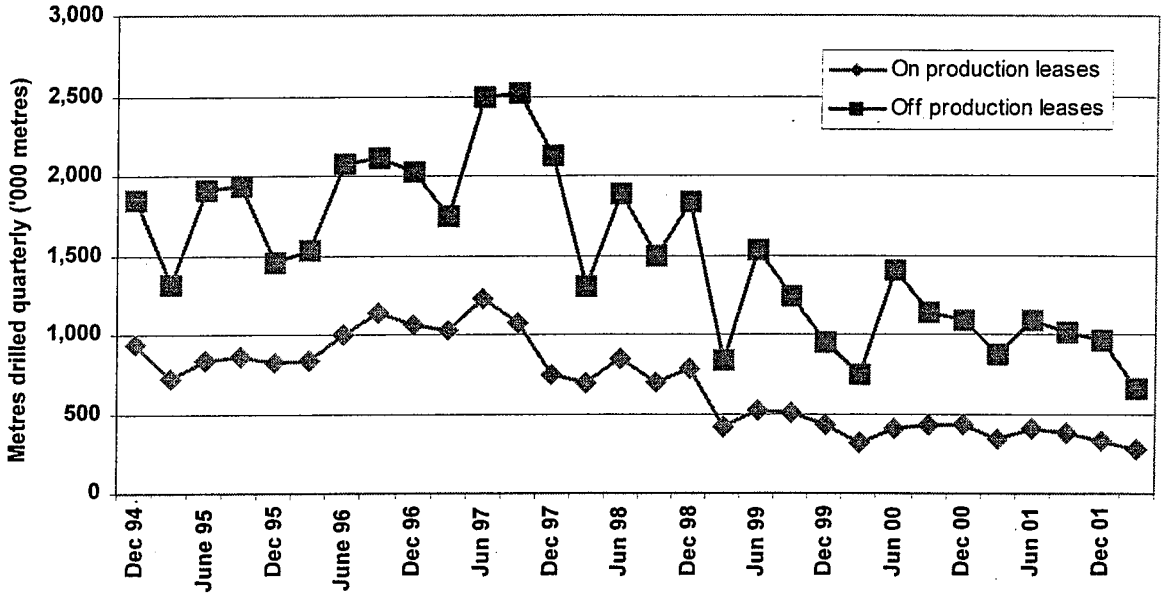


Figure 1.28 Australian mineral exploration drilling, on/off production leases, by quarter

Petroleum

Western Australia's petroleum industry underwent rapid growth during the 1990s. The value of petroleum production quadrupled, from $2.2 billion in 1990 to over $10 billion in 2001. Petroleum became the most valuable commodity produced in Western Australia, having surpassed iron ore in 1994 and gold in 1996.

An examination of exploration trends and status shows that Western Australia is attracting high levels of petroleum exploration, $500–600 million per year or 60–70% of Australia's total petroleum exploration expenditure. On average, 45 exploration wells have been drilled each year over the past four years with an average commercial success rate of about 20%. It is anticipated that about 50 wells per year will be drilled for the next five years. If the current discovery rate can be maintained or even improved, then we can expect that 50 new commercial discoveries will be made by 2007.

Sustained high oil prices, improvements in technology, and Government efforts to provide information and expedite access to acreage are some of the factors that will assist companies in their efforts.

With regards to petroleum development, commercialisation of the huge gas resources off the Western Australia coast (more than 2.83 Tm^3 (100 Tcf) of uncommitted gas) will be key to major industrial growth. Signs are positive for LNG markets as well as for potential for

gas-to-liquids and petrochemical projects. However, current industry projections are that much of the more remote gas will not be developed until 2015 or later.

A number of liquid hydrocarbon (crude and condensate) developments are projected to proceed within the next five years. These will help offset the decline in Australia's self-sufficiency in liquid hydrocarbon production (Figure 1.29) and provide additional security of supply. These issues have emerged as national issues due to growing economic and security driving forces.

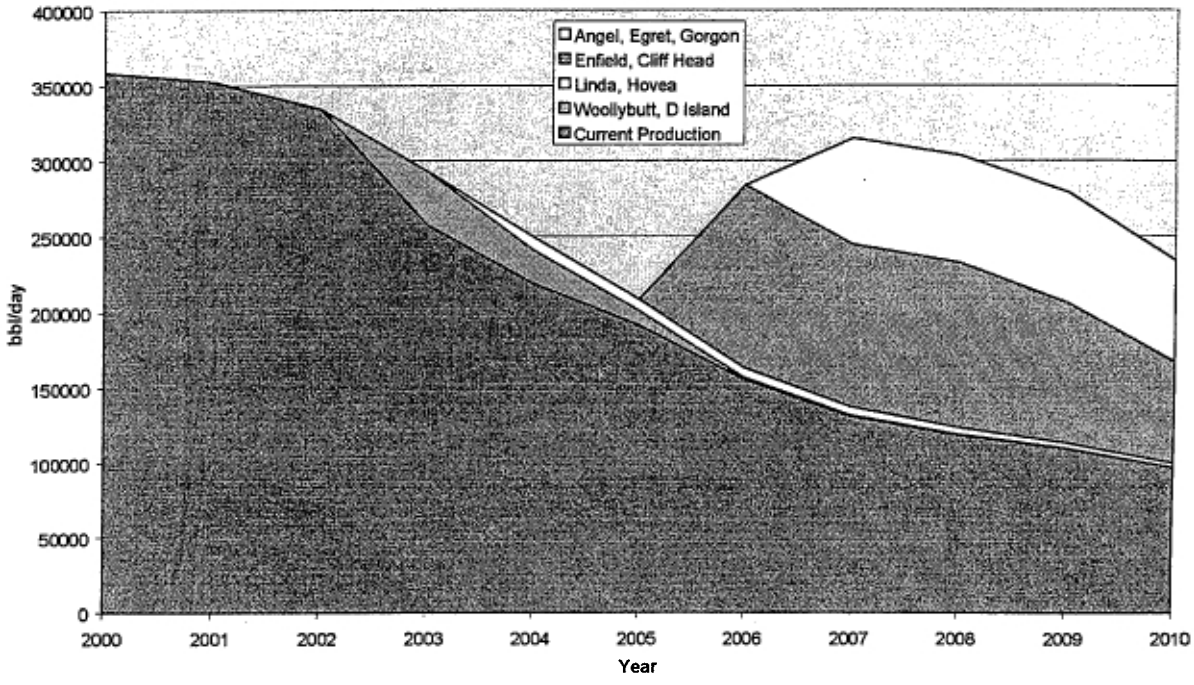


Figure 1.29 Liquid hydrocarbon production forecast for Western Australia to 2010

In addition to projects already underway, which include the fourth LNG Train and the second trunkline on the North West Shelf, twelve upstream oil and gas projects and ten downstream value added gas projects are planned. More than $10 billion worth of new projects in the petroleum industry will contribute to Western Australia's economy in the next five years.

These projects will benefit Western Australians through increases in revenue for Government, employment, regional development, and infrastructure development.

Exploration trends and status

Examination of trends in petroleum exploration in Western Australia indicates a number of significant developments:

- Western Australia has had significant growth over the past decade in exploration expenditure. In 2001, Western Australia attracted 61% of Australia's petroleum

exploration expenditure (Figure 1.30), a total of $660 million, an increase from a 50% share and a total of just over $250 million ten years ago;

- While exploration offshore has continued to increase, there has been a long-term decline in onshore exploration. However, there were signs of a turnaround in onshore exploration assisted by significant discoveries in the second half of 2001;
- There has been a large increase in seismic acquisition (a leading indicator for petroleum exploration drilling) over the last five years, with a shift from 2D to 3D seismic and a huge increase in multi-client surveys (Figure 1.31);
- Exploration drilling has increased to an average of 45 exploration wells drilled per year in the last four years (Figure 1.32);
- Although world-class gas discoveries have led the way, significant oil discoveries have been made;
- The success rate for exploration drilling has been maintained above world averages and has continued to improve on a long-term trend (Figure 1.32).

Continued high levels of exploration activity, at least in the short term, are indicated by current trends and commitments.

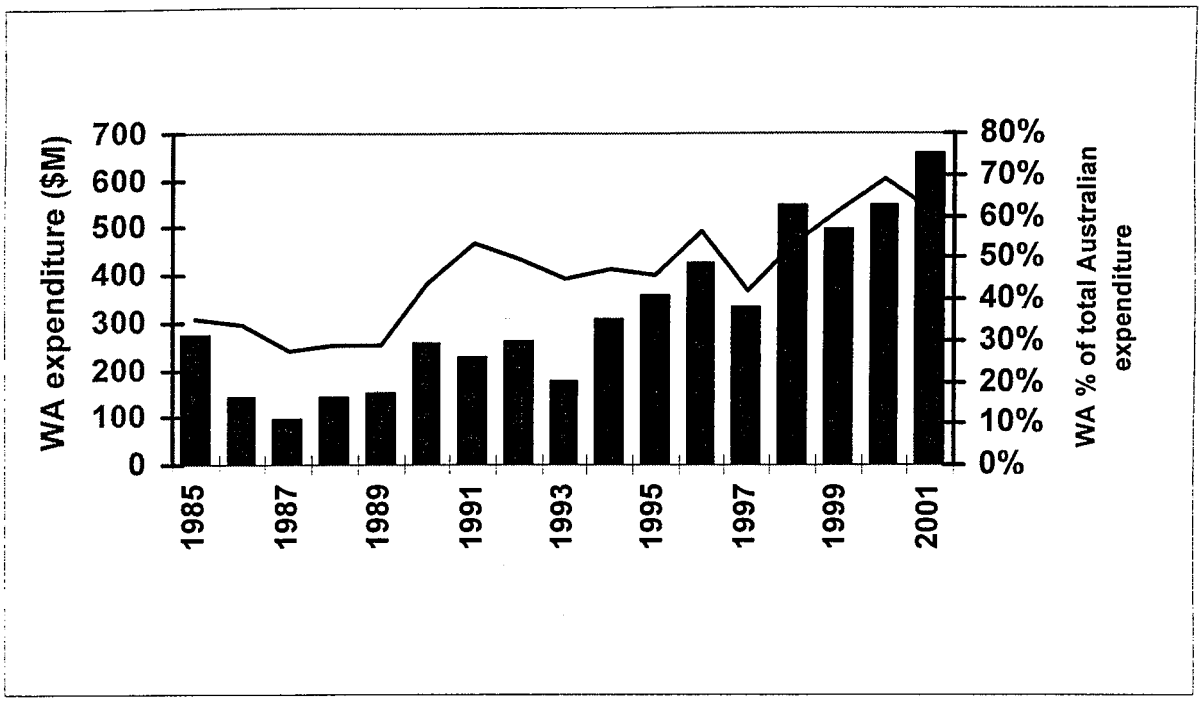


Figure 1.30 Petroleum exploration expenditure, WA versus Australia (dollars of the day)

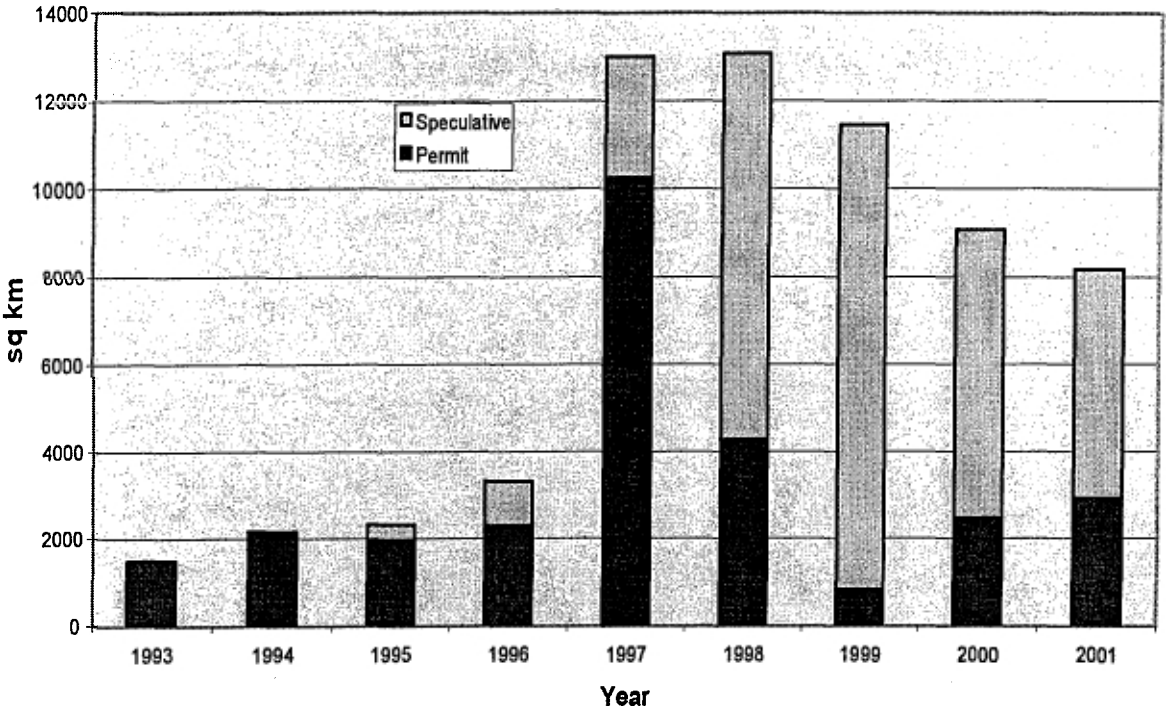


Figure 1.31 Seismic acquisition in Western Australia

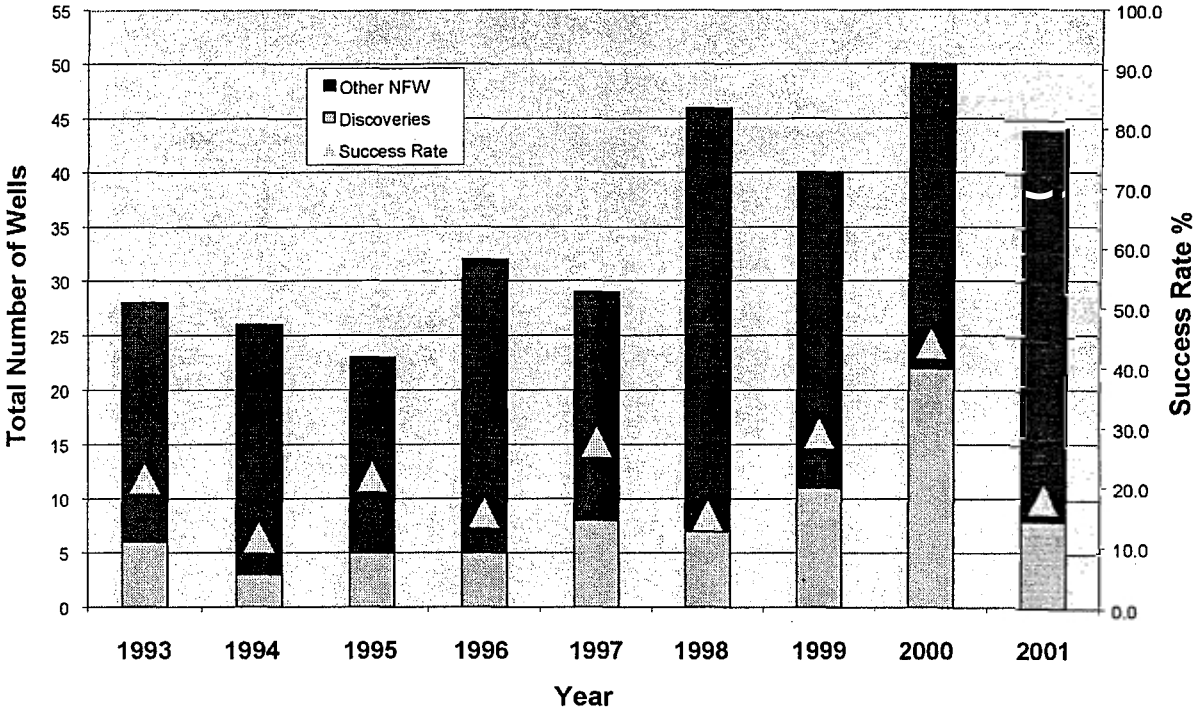


Figure 1.32 New field wildcats and discoveries in Western Australia (1993 to 2001)

On the other hand, Western Australia cannot be complacent. Fewer companies have participated in recent gazettals. There are some indications that larger companies are withdrawing from exploration, in particular in frontier areas. Major companies appear to be more focused on acquisition of assets, to become 'super majors' rather than focusing on growth through exploration. Examples from Western Australia include the recent take-overs and mergers involving Ampolex, Mobil, and Exxon. In the past these companies used to compete for acreage at gazettal.

A synopsis of Western Australian petroleum exploration activity for 2001 is:

- In total, 44 new field wildcats were drilled, down from 50 in 2000. The majority of drilling occurred in the offshore Carnarvon Basin;
- The potential commercial discovery rate was 18%. Three significant gas and five oil discoveries were made from 44 new field wildcat wells drilled;
- Exploration drilling offshore fell to 34 new field wildcats compared to the 44 drilled during 2000;
- Onshore, there was some evidence of a recovery, however well numbers continued at relatively low levels, with only 10 new field wildcats drilled compared to 6 in 2000;
- Offshore 2D seismic activity increased dramatically in 2001, with a total of 33 575 line km of new 2D data acquired compared to 17 353 km in 2000. 3D seismic was relatively constant at 8 006 km^2 compared to 9 073 km^2 in 2000. Both 3D and 2D seismic activity was concentrated in the Carnarvon and Browse Basins. Onshore, a total of only 60 km of new 2D and 180 km^2 of 3D seismic were acquired, showing little improvement over recent years.

The short-term exploration outlook for Western Australia is good. During the early part of the 1990s (through 1997) there was an average of 26 exploration wells drilled each year. Forty-one wells were drilled in 1998, 38 in 1999, 50 in 2000 and 44 in 2001.

Current total exploration commitments (2001/02 – 2007/08) amount to $1.58 billion and 207 exploration wells. Table 1.10 shows existing exploration drilling commitments (both guaranteed and secondary over 5 years). Industry is currently committed to drilling an average of over 40 exploration wells per year for the next four years. The level of current commitments compares with previous levels, see Table 1.11.

Table 1.10 Petroleum expenditure and well commitment levels in Western Australia, by year

Date	*Commitment level*	*Number of wells committed for 5-year work programme*
01/1999	$1.59 billion	254
10/2000	$1.64 billion	210
09/2001	$1.27 billion	171
05/2002	$1.58 billion	207

Table 1.11 Oil and gas exploration drilling commitments (number of wells) in Western Australia

	2001–02	*2001–03*	*2003–04*	*2004–05*	*2005–06*
Commonwealth Offshore					
Guaranteed	13	9	5	3	0
Secondary	3	14	14	12	18
WA Offshore					
Guaranteed	0	0	0	0	0
Secondary	1	4	4	7	1
WA Onshore					
Guaranteed	0	1	1	0	0
Secondary	14	23	19	15	5
Total					
Guaranteed	13	10	6	3	0
Secondary	18	41	37	34	24
Grand Total	**31**	**51**	**43**	**37**	**24**

Although there has been some trend towards the submission of less ambitious work programmes and thereby, a trend towards lower overall commitments, current commitments will maintain the exploration industry at a reasonable level. It is reasonable to expect, given existing commitments, company plans (following recent encouragement from new oil discoveries), and upcoming gazettals that in the order of 50 exploration wells will be committed for drilling in work programmes for each of the next 5 years.

However, the WA Department of Mineral and Petroleum Resources, as a member of the Joint Authority, was probably over enthusiastic in proposing areas for release following the good response to gazettals in the mid 1990s. Numbers of areas released in the Western Australia Commonwealth Adjacent Area during the year are shown in Figure 1.33 as well as the numbers of areas awarded. As illustrated in Figure 1.33, the take up of Commonwealth acreage has not been particularly good. Concern has been expressed over devaluing acreage by re-gazetting so many Commonwealth areas. The Department of Mineral and Petroleum Resources intends for future gazettals to follow a more reserved approach, with fewer areas made available.

In addition, the WA Department of Mineral and Petroleum Resources released seven State Waters areas in 2000 and five in 2001. Of these, two of the seven 2000 areas (one subject to Native Title negotiations as it included an island) and all five from 2001 were awarded.

Recognising issues that member companies are facing, as well as longer term declining onshore exploration, APPEA proposed processes for the release and award of new exploration acreage that could potentially resolve many of these issues. The proposal was called the Accelerated Exploration process and is discussed more fully in Term of Reference 5.

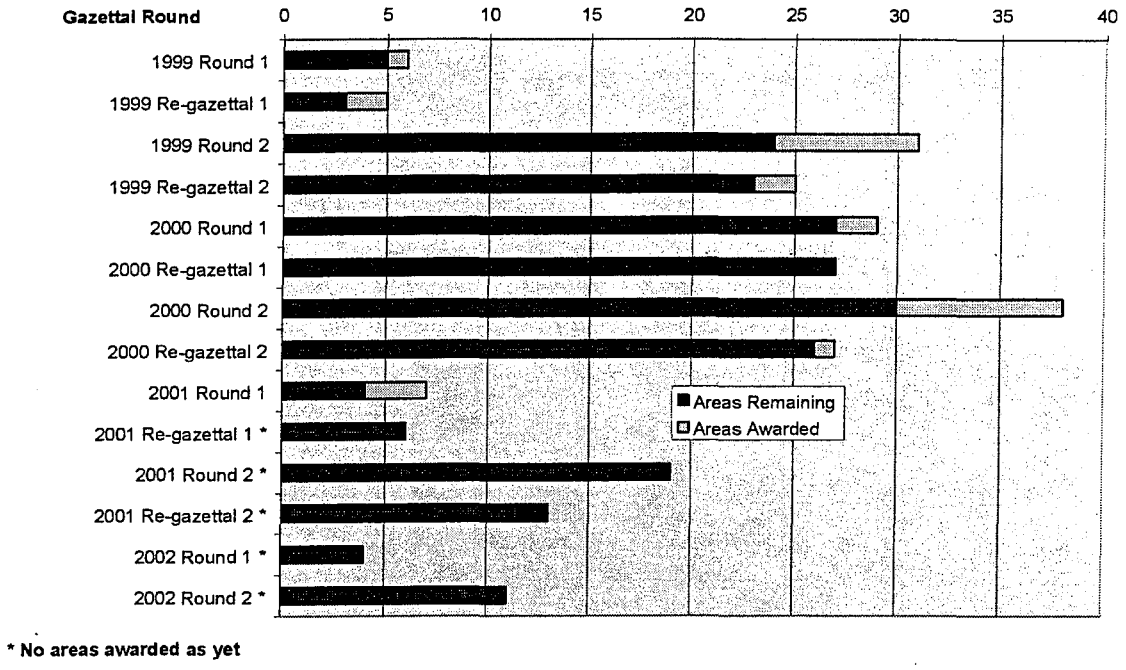


Figure 1.33 Western Australian Commonwealth gazettals and re-gazettals (1999 to 2002)

Summary

The North West Shelf and the Perth Basin are becoming more mature exploration provinces, but significant new plays are being uncovered. The rest of Western Australia remains under-explored. To date, statewide, in over 2.5 million km^2 of the State's onshore area (including islands), there have only been 409 exploration wells drilled. In addition, only 522 wells have been drilled in the huge offshore area. Future trends point towards a continued high level of exploration activity, at least in the short term, worth $500–600 million per year. This is expected to uncover about 50 new commercial discoveries over the next five years, based on current projected success rates.

All the signs point towards the continued healthy growth of the Western Australian petroleum industry as a whole, as long as the level of exploration expenditure onshore in frontier basins, is accelerated.

Exploration expenditure versus the value of production, Western Australia

Western Australia is one of the great resource provinces of the world. There are more than 300 commercial mining and petroleum projects in operation producing over 50 different mineral and petroleum products for distribution to markets across the globe. The minerals and petroleum sector continues to drive the State's economy, accounting for close to 70% of its export income and around 32% of gross State product. Royalties to the State Government from the resources sector totaled a record $1.2 billion for 2000–01.

In 2000–01, the value of mineral and petroleum production rose sharply by $6248 million (29.3%) and totaled $27 593 million, setting a new record for Western Australia. The value of mineral production alone (i.e. excluding petroleum) also rose sharply by $3307 million (24.1%) to a total of $17 037 million, with rises recorded for the value of alumina, base metals (copper–lead–zinc), ilmenite, upgraded ilmenite, rutile, leucoxene, zircon, iron ore, manganese, nickel, cobalt, spodumene, tantalite, tin, and vanadium. The rise in production value of the major commodities (alumina, gold, iron ore, and nickel) during the last eight years is illustrated in Figure 1.34, with the increases greatly assisted by the fall in the value of the Australian dollar. During 2000–01, the value of the alumina industry exceeded the gold industry for the first time. In addition, the value of the nickel industry may exceed that of the gold industry within the next two years. Falls were recorded for the production value of coal, diamond, and garnet.

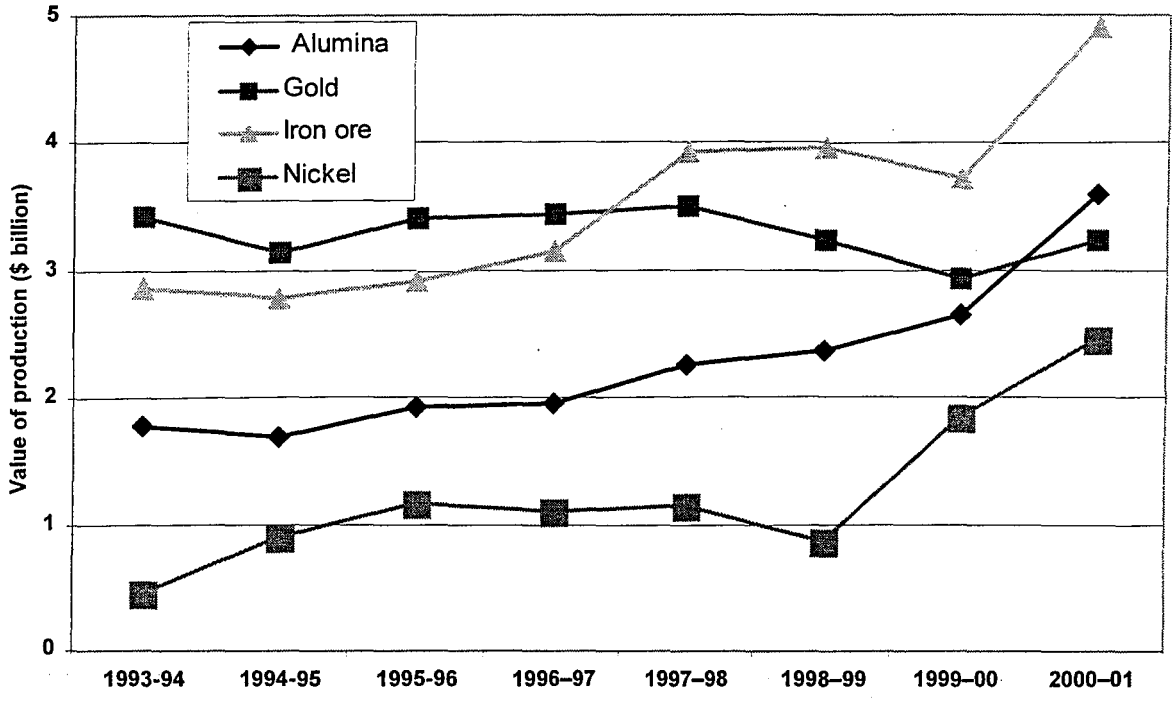


Figure 1.34 Comparative value of mineral production in Western Australia

In a world-market context, Western Australia continues to be a very significant producer of the following minerals or mineral products (with an estimate of the proportion of world production shown in brackets) — diamond (38%, includes industrial diamond), zircon (32%), tantalite (25%), rutile (24%), ilmenite (20%), alumina (20%), iron ore (14%, and with 34% of world seaborne trade in iron ore), nickel (14%), gold (8%), and vanadium (7%).

Each commodity sector in Western Australia has its own profile in terms of the proportion of the value of production that it is prepared to return as exploration expenditure, with this relationship being sufficiently consistent in many cases to be a good predictive tool. Figure 1.35 illustrates the relationship for the main mineral commodities where adequate data exists — gold, base metals (including nickel–cobalt), heavy mineral sands, iron ore and diamond. All major commodities are exhibiting that during either 1999–00 and 2000–01 low points were reached in that sector's spending on exploration (relative to the value of production.

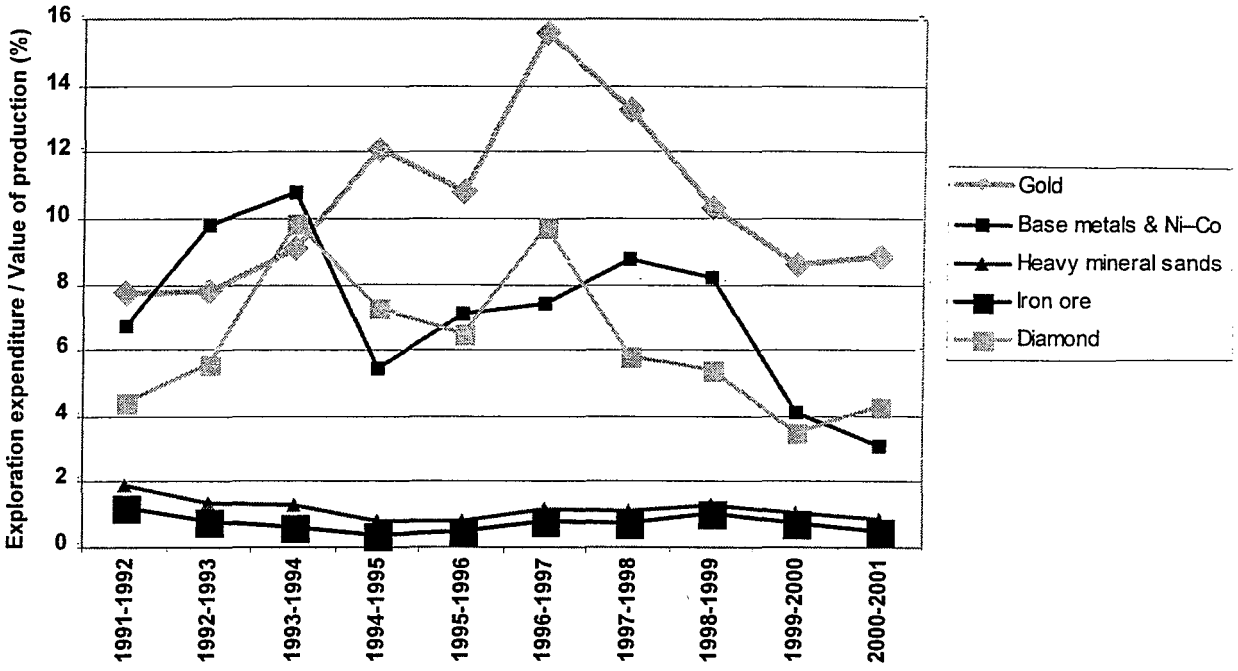


Figure 1.35 Exploration expenditure as a percentage of the value of production Western Australia, by commodity

The gold sector stands out as the industry sector most prepared to fund on-going exploration, with a preparedness to remit about 8% of the value or production back in to exploration during recessionary times, rising to almost 16% during mineral booms (Figure 1.35). The sustainable level of exploration expenditure in the gold industry in Western Australia may be about 10% of the value of gold production.

Expenditure on base metal (including nickel–cobalt) exploration, relative to the value of production, is now only 3% — the lowest level for a decade (Figure 1.35). Expenditure has fallen over the last few years as feasibility studies on lateritic nickel projects were completed and the projects commissioned. Ongoing technical and financial problems with those projects have caused minimal expenditure at the second generation of nickel laterite projects.

Expenditure on diamond exploration, relative to the value of production, has fluctuated during the last decade in the 3.5–10% range (Figure 1.35). The expenditure is primarily at Argyle and the high percentages are a reflection on the amount of exploration that was essential in terms of prolonging the mine life at Argyle, or at least creating the opportunity to extend it. Now that substantial resources have been established at Argyle, the proportion of exploration expenditure relative to the value of production has eased back over the last few years to around 4% — again, the lowest level for a decade.

Exploration expenditure for iron ore and heavy mineral sands, relative to the value of production, reflects the very mature stage of these industry sectors. Both have consistently returned less than 2% of the value of mineral production back in to exploration (Figure 1.35). Although the proportion of expenditure did rise slightly during the minerals boom of the late 1990s, exploration expenditure relative to the value of production has declined since then and both are now matching historic low points of below 1%.

Exploration expenditure for petroleum, relative to the value of production, has typically averaged 8–10% during the last decade, but has swung more erratically since 1998–99 (Figure 1.36). The more recent swings reflect the large increase in the value of petroleum production, brought about by a weak Australian dollar, rather than underlying changes in the amount of exploration expenditure. Petroleum exploration expenditure had actually been rising during the same period, but not at a sufficient rate to counteract the rapid rise in the value of petroleum production.

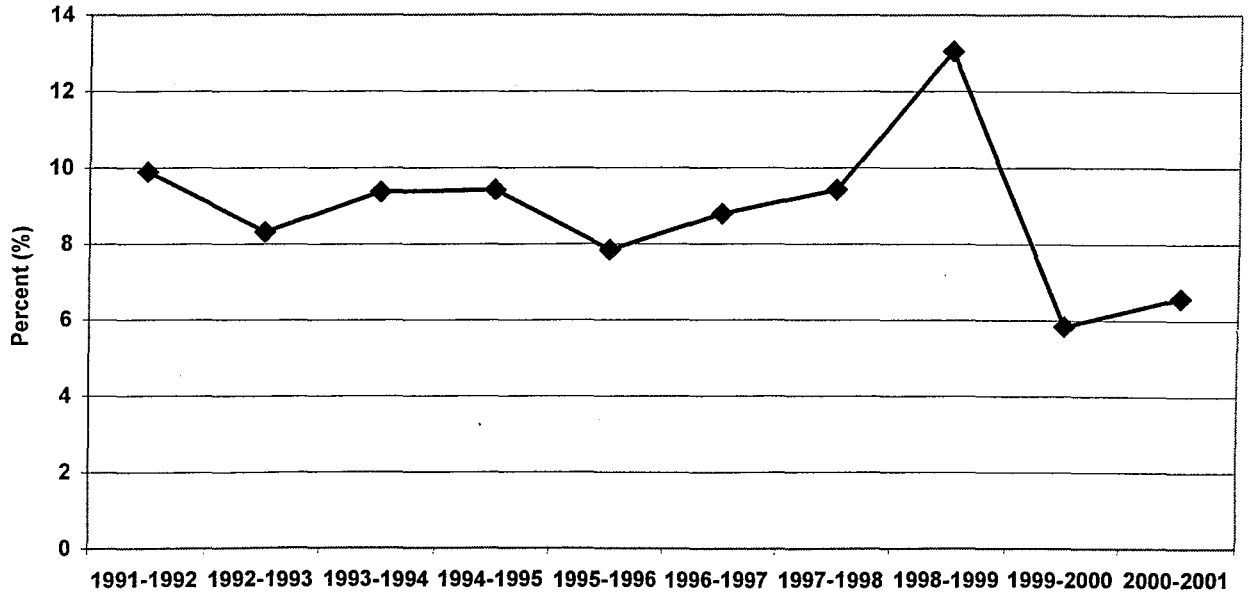


Figure 1.36 Petroleum exploration expenditure versus value of production Western Australia

Summary of Recommendations

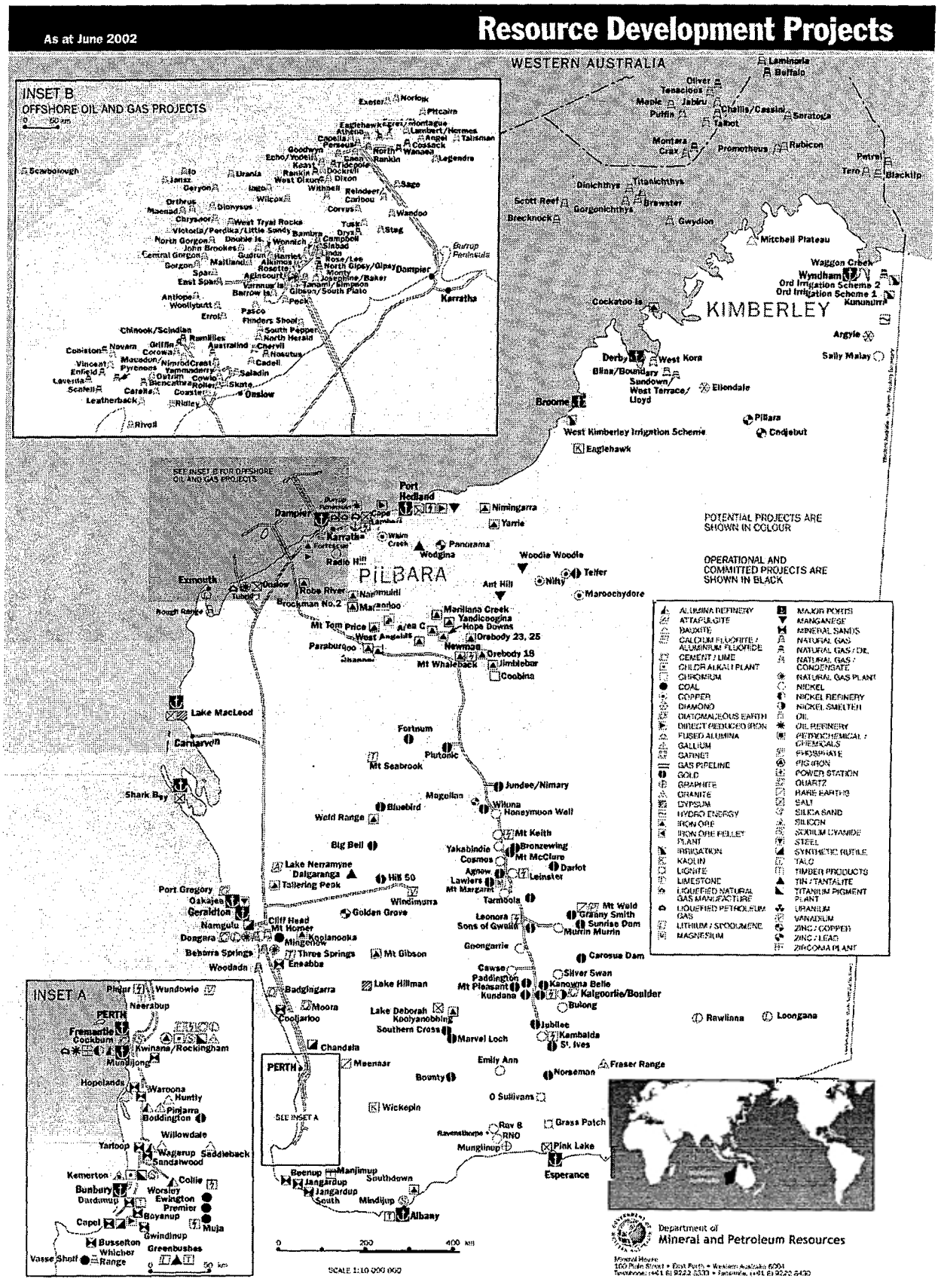
Recommendation 1.1: The Commonwealth acknowledges that Australia's mineral and petroleum resources endowment is a strategic national endowment to be viewed in the national interest.

Recommendation 1.2: The Commonwealth acknowledges that it is only through having strategic gas reserves that Australia is able to enter into long term LNG contracts with countries like China.

Recommendation 1.3: The Commonwealth acknowledges that Australia's strategic mineral and petroleum resources endowment needs specific national policy formulation to ensure the responsible and sustainable development of these resources.

Recommendation 1.4: The Commonwealth acknowledges that a national mineral and energy policy needs to commence with a national exploration policy as the first phase in the discovery and development of our national resources endowment.

Recommendation 1.5: The Commonwealth acknowledges that the gold industry (in particular) in Western Australia is at the cross-roads, with gold production already falling significantly and with exploration at current levels not being sufficient to sustain the resource base.


As at June 2002
Resource Development Projects
WESTERN AUSTRALIA
INSET B
OFFSHORE OIL AND GAS PROJECTS
KIMBERLEY
PILBARA
Port Hedland
Dampier
Karratha
Broome
Derby
West Kora
Blina/Boundary
Sandown
West Terrace/
Lloyd
Ellendale
Cockatoo Is
Wyndham
Ord Irrigation Scheme 2
Ord Irrigation Scheme 1
Kununurra
Argyle
Sally Malay
Mitchell Plateau
Waggon Creek
West Kimberley Irrigation Scheme
Eaglehawk
Pilbara
Ondjebut
Nimingarra
Yarrie
Panorama
Wodgina
Woodie Woodie
Telfer
Nifty
Maroochydore
Ant Hill
Exmouth
Robe River
Nanmuldi
Brockman No.2
Marandoo
Marillana Creek
Yandicoogina
Hope Downs
Area C
Orebody 23, 25
Newman
Orebody 18
Jimblebar
Mt Whaleback
Mt Tom Price
West Angelas
Paraburdoo
Coobina
POTENTIAL PROJECTS ARE SHOWN IN COLOUR
OPERATIONAL AND COMMITTED PROJECTS ARE SHOWN IN BLACK
Lake MacLeod
Carnarvon
Fortnum
Pluto
Mt Seabrook
Shark Bay
Jundee/Nimary
Magellan
Wiluna
Honeymoon Well
Bluebird
Weld Range
Mt Keith
Big Bell
Yakabindie
Bronzewing
Mt McClure
Cosmos
Agnew
Darlot
Leinster
Lawlers
Mt Margaret
Lake Nerramyne
Dalgaranga
Tallering Peak
Hill 50
Windimurra
Tambola
Port Gregory
Oakajee
Geraldton
Golden Grove
Mt Gibson
Three Springs
Eneabba
Woodada
Mt Weld
Granny Smith
Sunrise Dam
Murrin Murrin
Leonora
Sons of Gwalia
Gwangarrie
Carosue Dam
Cawse
Paddington
Mt Pleasant
Kundana
Silver Swan
Kanowna Belle
Kalgoorlie/Boulder
Bulong
Lake Hillman
Badgingarra
Moora
Coolgardie
Lake Deborah
Koolyanobbing
Southern Cross
Marvel Loch
Jubilee
Kambalda
St. Ives
Chandala
Maenar
Emily Ann
Norseman
Fraser Range
Rawlinna
Loongana
Bounty
O Sullivans
Wickepin
Grass Patch
Ravensthorpe
Rav 8
RNO
Mungtinup
Pink Lake
Esperance
Manjimup
Southdown
Beenup
Jangardup
Mindijup
Albany
PERTH
SEE INSET A
INSET A
Pinjar
Wundowie
Neerabup
Fremantle
Cockburn
Kwinana/Rockingham
Mundijong
Hopelands
Waroona
Huntly
Pinjarra
Boddington
Willowdale
Yarloop
Wagerup
Saddleback
Sandalwood
Kemerton
Collie
Bunbury
Worsley
Dardanup
Ewington
Premier
Boyanup
Capel
Muja
Gwindinup
Busselton
Whicher Range
Greenbushes
Vasse Shoal
ALUMINA REFINERY
ATTAPULGITE
BAUXITE
CALCIUM FLUORITE / ALUMINIUM FLUORIDE
CEMENT / LIME
CHLOR ALKALI PLANT
CHROMITE
COAL
COPPER
DIAMOND
DIATOMACEOUS EARTH
DIRECT REDUCED IRON
FUSED ALUMINA
GALLIUM
GARNET
GAS PIPELINE
GOLD
GRAPHITE
GRANITE
GYPSUM
HYDRO ENERGY
IRON ORE
IRON ORE PELLET PLANT
IRRIGATION
KAOLIN
LIGNITE
LIMESTONE
LIQUEFIED NATURAL GAS MANUFACTURE
LIQUEFIED PETROLEUM GAS
LITHIUM / SPODUMENE
MAGNESIUM
MAJOR PORTS
MANGANESE
MINERAL SANDS
NATURAL GAS
NATURAL GAS / OIL
NATURAL GAS / CONDENSATE
NATURAL GAS PLANT
NICKEL
NICKEL REFINERY
NICKEL SMELTER
OIL
OIL REFINERY
PETROCHEMICAL / CHEMICALS
PHOSPHATE
PIG IRON
POWER STATION
QUARTZ
RARE EARTHS
SALT
SILICA SAND
SILICON
SODIUM CYANIDE
STEEL
SYNTHETIC RUTILE
TALC
TIMBER PRODUCTS
TIN / TANTALITE
TITANIUM PIGMENT PLANT
URANIUM
VANADIUM
ZINC / COPPER
ZINC / LEAD
ZIRCONIA PLANT
SCALE 1:10 000 000
Department of
Mineral and Petroleum Resources

Term of Reference 2
The structure of the industry and role of small companies in resource exploration in Australia

Minerals

Mineral exploration trends in Western Australia

In line with worldwide trends, and Australia as a whole, Western Australia experienced subdued exploration activity during 2001. Mineral exploration expenditure (excluding petroleum) in Western Australia, at $408.5 million, experienced a decrease of $12.2 million or 2.9% on the previous year.

Exploration activity in Western Australia is now at levels around 41% lower than the peak of activity in 1997 when $700.8 million was spent (Fig. 2.1). Following the sharp two-year fall in mineral exploration activity after 1997, mineral exploration expenditure in Western Australia has remained relatively static at around $400–410 million per year.

However, the quarterly trend data for Western Australia is still in decline for all of 2001 and for the first quarter of 2002 (Fig. 2.2). The March quarter 2002 estimate for mineral exploration expenditure of $92.8 million for Western Australia was 14.2% lower than the estimate of $108.2 million for the March quarter 2001 (Fig. 2.2). The trend for Australia as a whole is similar, but with only a 9.2% decline for the March quarter 2001 (with respect to March 2001 quarter).

Mineral exploration expenditure in Western Australia continues at very depressed levels. During the last two quarters, less than $100 million per quarter has been spent on exploration in Western Australia — the lowest expenditures per quarter (in dollars of the day terms) since at least 1994 (Fig. 2.2).

Despite the falls, Western Australia's prospectivity is still widely recognised and is highlighted by the continuing high proportion (61.5%) of Australian mineral exploration expenditure that the State attracts (Fig. 2.1). Western Australia has retained its share of the total Australian mineral exploration expenditure at a relatively constant at 60–62% over the last five years despite the large cutbacks that have occurred in the Western Australian gold sector.

Greenfield versus brownfield exploration in WA

There is the commonly held belief in the mining industry that since exploration activity peaked in 1997 there has been a trend to near-mine (i.e., brownfield) exploration. This has been reinforced by some company announcements that undoubtedly indicate that selected

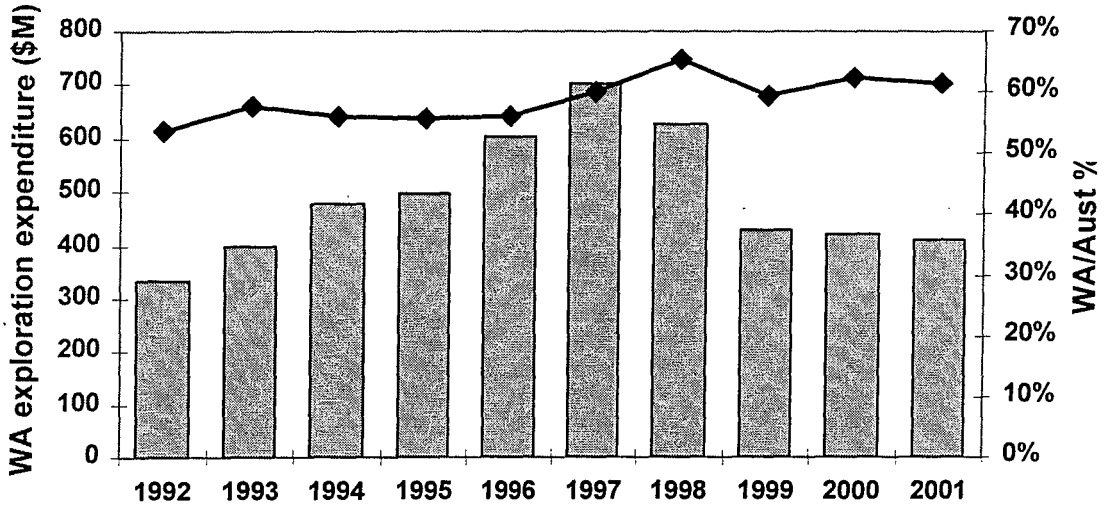


Figure 2.1 Mineral exploration expenditure — WA v Australia, by calendar year (dollars of the day)

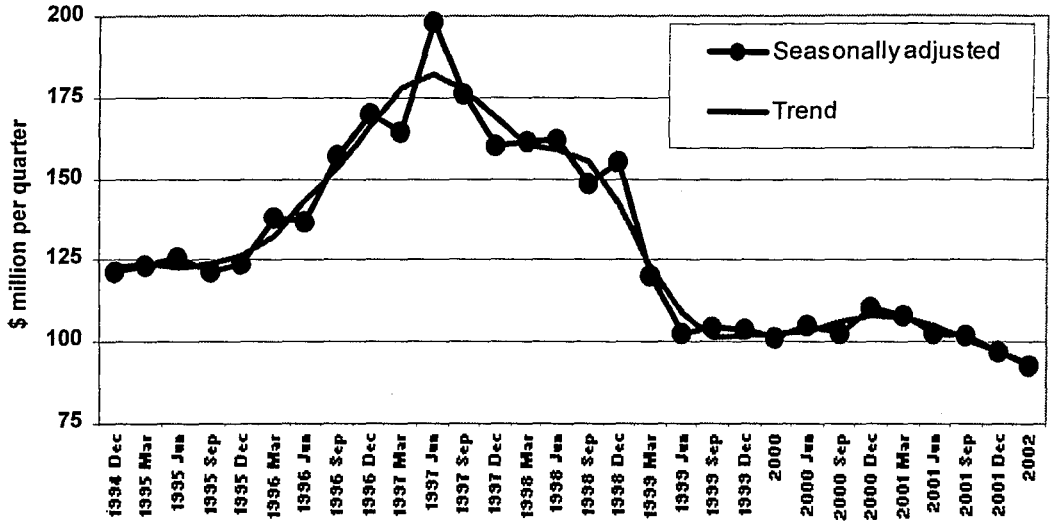


Figure 2.2 Mineral exploration expenditure (excluding petroleum) in Western Australia Trend series versus seasonally adjusted data

companies at least were adopting this policy. Whether this policy reflected the industry as a whole has been difficult to prove because of the lack of sufficiently detailed data.

The WA Department of Mineral and Petroleum Resources (MPR) is conducting a detailed spatial analysis of tenement expenditure data in order to quantify this phenomenon. MPR is analyzing expenditure data at distances of 1.75 km (i.e., within a radius of one mining lease), 5 km, 10 km, 20 km and 40 km from selected mine sites. The working definition of greenfield exploration is exploration occurring at more than trucking distance away from the selected mine sites, that is, a nominal 40 km. The selected mine sites approximately correspond to mines that are operating, under development or have operated since about 1980, and specifically exclude sites associated with construction materials and basic raw materials (for which there is minimal corresponding exploration expenditure).

Progress results indicate that:

- The number of granted tenements in greenfield areas has dropped from 1407 in 1997 to 802 in 2001, a decline of 43% over four years. Greenfield tenements now represent 7% of the granted tenements;
- The exploration expenditure on those tenements has dropped from $76 million (1997) to $45 million (2001), a decline of 41% over the four years;
- That exploration expenditure in greenfield areas has dropped from 2.0% (1997) to 1.2% (2001) of reported expenditure on granted tenements (i.e., including mining and all other costs);
- Granted exemptions from expenditure commitments under the Mining Act have steadily declined from totaling $162 million in 1996 to $112 million in 2001. During that period 11–15% of the total granted amount exempted is in greenfield areas, but there is no distinct trend in the period 1996–2001.
- A total of 11 768 tenements were at the application stage in June 2002. If those were granted immediately (and assuming no overlap), the expenditure commitment would total $458 million. This compares with a total of only $408 million of exploration expenditure spent on all the granted tenements in Western Australia during 2001;
- Of those pending tenements, only 11.5% (1 356) are in greenfield areas and the related expenditure totals $71.4 million (15.6% of the total);

These results, derived from MPR databases, are at variance with ABS statistics relating to exploration expenditure on- and off- production leases. These showed that off-production lease expenditure has remained at 80% of total exploration expenditure. The issue here is that ABS's off-production lease classification does not equal the "greenfields" classification. Given the importance of effective levels of greenfields exploration for the sustainability of the mineral industry, a clear definition of "greenfields" is necessary. This is even more so if public policy initiatives are to be directed at fostering greenfields exploration expenditure.

Recommendation: As a matter of urgency, given the importance of greenfields exploration to the sustainability of the minerals industry, the Chief Government Geologist's Conference and ABS reach agreement on the definition of greenfields exploration.

Mineral exploration trends worldwide

The decline in mineral exploration in Australia since 1997 has been matched by declines worldwide, but with Australia and Western Australia maintaining their share of global exploration at around 17.5% and 10% respectively (based on worldwide surveys by the Metals Economic Group of Canada).

The continued decline is attributed to low metal prices in general in recent years, particularly in the case of the gold price, which reached a 20-year low point in $US terms during 1999–2000. In recent years, companies have focused on increasing their return on capital and on reducing costs. Surveys have shown that, on average, mining is often a low-profit activity, and speculative venture capital continues to be directed away from the resources sector, but not to the same extent as during the 'dot-com' boom of 1999–2000. The perception existed during 1999–2000 that mining was 'old economy' and that exploration, particularly greenfields exploration, destroyed shareholder value. This perception continued throughout 2000–01 and resulted in reduced exploration activity, less preparedness to risk funds on greenfields exploration, and a lower percentage of profits directed back as exploration expenditure. In Australia, the effect of Native Title issues on land access continues to compound the problem. These negative factors have presumably at least to some degree, outweighed the positive impact from a weak Australian dollar during 2000–01. Strengthening of the Australian dollar during 2001–02 is, in general, not good news for Australian mineral exporters.

Exploration expenditure cycles

From 1970 to 1998, exploration expenditures for the world-wide mining industry rose from US$600 million to US$3500 million. However, cyclical swings took the values as low as $US500 million and as high as US$5100 million (Harper and Andrews, 2000).

The cyclical pattern since 1970 follows the world economy through several business cycles, with a best-fit straight-line annual increase of 10% per annum for 29 years (Harper and Andrews, 2000). However, the pattern does vary from one commodity to another:

- Nickel companies were found to have spent a consistent 2% per annum increase over the 29-year period, indicating expenditure did not keep up with inflation (average 7% according to Harper and Andrews, 2000);
- Gold companies averaged 13% per annum increases in the same time frame, but the gold companies started from a very low base and showed a dramatic increase during the 1990s;
- Base metal and multi-metals averaged a steady 8.5% per annum increase over the whole period, and have been the major contributors to exploration expenditure over the total 29-year period (Harper and Andrews 2000).

Analysis of the 29-year trend by spending characteristics of corporate entities showed three trends, which can be characterised as "steady spenders", "exaggerated swings," and "flavour of cycle" expenditure.

- The analysis indicated that nickel explorers were steady spenders, and all nickel exploration companies spent at approximately the same rate;
- Gold showed an exaggerated business cycle, as did uranium;
- The spending of the "flavour of cycle" group depended on which metals had the best commodity prices in the short term in each economic cycle, and with gold and uranium also typifying this group (Harper and Andrews, 2000).

Other aspects of the spending characteristics, both past and present, of corporate entities include:

- Historical exploration expenditures have tracked metal prices with a one-year lag, with the level of exploration expenditure correlated to commodity cycles (Bogden, 2001);
- When metal prices are low, exploration budgets are cut, leading to less exploration, and fewer growth prospects, and a decrease in share price;
- Low levels of joint venture funding, no ability to carry debt, and virtually closed equity markets lead to few sources of funding for junior companies;
- Current market trends in fund raising utilise alternative and innovative ideas such as special warrant financing, rights issues, convertible debentures, London Alternative Investment Market listing, flow-through financing (only for companies that have exploration ground in Canada), royalty sales, and private equity;
- Computerised inventory has an impact on exploration cycles, and has resulted in a fundamental shift to lower critical metal stock levels, so that producers, on-sellers and purchasers are able to run on much lower inventory levels;
- A fewer number of companies in the metal commodity cycle allows for more flexibility in reaction to commodity price fluctuations. Majors can hold back excess inventory during downside cycles, and feed it onto the market during upside cycles, lessening the impact of the commodity price swings (Ranieri, 2001);
- There is the perception amongst larger companies that tighter price ranges encourage adequate returns on shareholder equity over fluctuating price cycles, thus providing advantages in attracting new investment;
- In addition, the large companies appear to believe that tighter commodity price ranges encourages economically viable and responsible projects and prevents marginal projects being developed;
- If producers can control (or at least lessen the impact of) the boom and bust cycles of metal prices, there is more ability to spread out cashflow over the life of a project, and help out with capital expenditure planning (Ranieri, 2001);
- There is nothing to suggest that the mining industry is more risky, more competitive or less attractive than any other industry, but the industry does have a chronic problem with matching supply to demand. The mining industry as a whole appears unable to curb its optimistic view that markets are able to absorb increased metal production;

- The latest recession was unusually severe. After-tax corporate profits fell by 21% in 2000–01, nearly double the declines of the recessions of 1981–82 and 1990–91. The business investment figures fell by nearly 10% in real terms during 2001, almost twice that of previous recessions (Chamber of Minerals and Energy of Western Australia, 2002).

Stock Exchange Listings

There is a total of 385 companies either listed on the Mining Board of the ASX, about to list, or are listed but currently suspended (according to the MINMET mining industry database). The majority are involved in mineral exploration or production, but some are technology (dot.com) stocks. A breakdown of those companies by mining industry segment is as follows:

- A total of 297 companies (77%) are listed as mineral explorers or producers. Of these, 201 (52%) are mineral explorers, 81 (21%) are mineral producers, and 15 (4%) are suspended;
- A total of 58 companies (15%) are listed as oil and gas explorers or producers, of which 37 (10%) are involved in exploration, and 18 (5%) in production. Three companies (1%) are suspended;
- A total of 12 companies (3%) are listed as combined oil and mineral explorers or producers;
- A total of 18 companies (5%) are listed as "other", which includes companies listed with the ASX but not yet trading.

Market capitalisation

A total of 84.2% of the companies had a market capitalisation of less than $100 million, 9.6% had a capitalisation of between $100 million and $1 billion, and 3.9% had a market capitalisation of over $1 billion. Approximately 2.3% of companies were listed but not yet trading, an indication of the 2002 increase in Initial Purchase Offer (IPO) activity. Other features of the market capitalisation of the mining sector include:

- A total of 324 companies had a market capitalisation of less than $100 million, 37 companies were valued at between $100 million and $1 billion, while 17 companies had market capitalisations exceeding $1 billion;
- The total capitalisation for the 324 companies with less than $100 million individual capitalisation is 5.38 billion, less than the capitalisation of the top four mining companies;
- The combined market capitalisation of the world mining sector has declined to approximately 1% of the total world market capital;
- In the 12 months to May 2002, the average share price rise among mineral explorers was 22%, with falls outnumbering rises by 78 to 59. However, since January 2002, the average performance was a 1% decline in share price, with falls outnumbering rises 88 to 73 (Gonnella, 2002). Investors still remain cautious and a number of floats were

withdrawn (including Galaxy Resources and Nugget Resources in May 2002) as there was not sufficient investor interest (Gonnella, 2002);

- The success of new floats is more reliant on track record of the management team involved, rather than the tenements in the prospectus (Gonnella, 2002);
- Some of the new floats are repackaged or renamed technological or exploration companies;
- The average cash reserves among explorers as at the end of March 2002 was A$2.1 million per company. A total of 95 listed mining board companies had less than A$1 million each, and 57 of those had less than A$0.441 million, which is approximately equivalent to the cash requirements per quarter for operation. Of the 82 capital raisings in the March 2002 quarter, 39 brought in less than A$0.5 million each (Gonnella, 2002).

The junior sector is smaller

The trend appears to be for major companies to spend less on early-stage or greenfields exploration, instead relying on junior companies to carry the exploration risk and find the deposits for them. However, research by the Metals Economic Group of Canada indicates that the combined market capitalization of junior mining companies (those with market capitalization of less than $US200 million) throughout the world has dropped by 28% in the three years since mid-1998. The lack of investor sentiment in this sector highlights how difficult it is for junior companies to fund exploration and advance promising projects towards feasibility. It is inevitable that the discovery rate of new deposits will decline and that this will have a negative impact in the longer term on new mine development and production, with the inevitable flow-on effect to exports.

Recommendation: The Commonwealth acknowledges that the declines are more than just cyclical and related to commodity price cycles—rather there are fundamental changes in the attitude of corporate entities and investors away from high risk and slow returns associated with the exploration sector.

Foreign ownership and mergers/acquisitions

The pace of consolidation or mergers and acquisitions, at both the international and national level, was pronounced during 1999–00 to 2001–02. This trend is regarded as having a negative impact on exploration expenditure in the short term at least. The merged entities often rationalize their exploration portfolio and have an exploration budget that is smaller than the aggregate of the pre-merger entities.

There has always been a degree of overseas ownership of Australian mineral assets. However, the change in ownership during 2000–2001 was radical. Overseas control of Australia's gold production was an estimated 20% in 1995–96, 30% in 1999–2000, but rose to 60% in 2000–01 (Close, 2002).

Other features of foreign ownership of the mining sector include the following:

Newcomers include the South African companies Durban Roodeport Deep Ltd, Harmony Gold Mining Co Ltd, Gold Fields Ltd, and the Canadian-based Barrick Gold Corporation. The South African Anglogold Ltd and American Newmont Mining Corporation are not entirely newcomers to the Australian mining scene, having been producers in the 1970s and 1980s. This is their first foray back into Australia for over a decade, however;

- There is a perception internationally that the A$ plunge against the US$ has allowed offshore companies to pay "Third World prices for good quality mines in a First World country" (Resource Stocks, 2002);
- Larger global companies are not just targeting one sector of the minerals market, but are spreading asset acquisition across a number of metals. This enables diversification of the spread and depth of the mining portfolio. In terms of supply, the diversity of metals controlled provides greater leverage in terms of supply elasticity, response to margins, and response to political factors in any one country;
- The degree of concentration in the aluminium and copper markets is actually less in 2002 than in the 1960s and 1970s (Klinger, 2002);
- The spread of risk is adding to the value of major companies. Barrick is advertising "the lowest political risk profile of any major", whereas Newmont is thought to have 31% of its revenue obtained from "politically sensitive areas" following the Normandy takeover, down from 42% pre-merger (Resource Stocks, 2002).

Examples of the substantial consolidation within the industry include the takeover by Rio Tinto Ltd of North Ltd and Ashton Mining Ltd, BHP merging with Billiton, Barrick Gold Corp merging with Homestake Mining Corporation, Delta Gold Ltd merging with Goldfields Ltd (to form Aurion Ltd), Sons of Gwalia Ltd purchasing PacMin Mining Corporation Ltd from its Canadian parent Teck Cominco Ltd, Gold Fields Ltd purchasing WMC's St Ives and Agnew gold operations, Croesus Mining NL acquiring Central Norseman Gold Corporation Ltd, takeover of Normandy Ltd by Newmont Mining Corp, takeover of New Hampton Goldfields Ltd and Hill 50 Gold NL by Harmony Gold Ltd, and Placer Dome Inc attempting to take over Aurion Ltd.

Another trend in recent times is for direct foreign investment to be strategically focused on supporting exploration and development of selected projects. Examples include Inmet Mining Corporation assisting Pilbara Mines Ltd with exploration of the Teutonic Bore volcanogenic massive sulphide deposits in the Eastern Goldfields, Kemet Corporation funding exploration and development of the Dalgaranga tantalite project in the Murchison Granite–Greenstone Terrane, and Lonmin funding exploration and feasibility studies of platinoid deposits at Panton Sill and Munni Munni.

This trend is assisted by the slow turnover of tenements in Western Australia, thus it is often considered more appropriate to form strategic alliances rather than wait for tenements to be relinquished.

Recommendation: The Commonwealth acknowledges that the Foreign Acquisitions and Takeovers Act 1975 implementation policy needs to be reviewed to include the mineral and petroleum resources industry as a key strategic industry along with the media, banks and real estate sectors of the economy.

Corporate growth — exploration versus acquisition

Historically, the attitude to growth by mining and exploration companies has been a mixture of acquisition and exploration strategies. Some aspects of these strategies include the following:

- Senior producers can't rely on commodity prices to fuel earnings growth in the short term, so they need other strategies such as production growth. Due to their size, major mining companies can't sustain growth through internal development of reserves particularly if they have more than one year's reduced exploration expenditure. Such major companies need acquisitions to prop up the production of 2–4 million ounces per year (Bogden, 2001);
- Exploration is often considered to be a high-risk strategy for growth, with mining companies generally preferring the apparent greater certainty for growth from acquisition of assets;
- During 1988–95, junior companies discovered 32 million ounces of gold resources, whereas large companies discovered 21 million ounces. In 1996–2001, junior companies discovered an additional 11 million ounces;
- The cost of acquisitions versus discovery costs is not necessarily well understood by the major companies. For the period 1990–2000, the discovery cost per ounce of gold in resources was A$21, while the acquisition cost was $A67 per ounce of resources. Reserve ounce costs through acquisition were $A120 (Brooke and Alexander, 2001);
- There is pressure on the mining industry to deliver better returns from existing assets rather than by creating new ones, an approach which favours acquisition;
- In addition, there is a drive to have economies of scale rationalisation based on accounting practices such as central purchasing. This enhances the attractiveness of acquisition over exploration;
- Consolidation, either by corporate merger, take-over, amalgamation of projects or acquisition of distribution outlets, does not always allow the huge cost savings seen in other industries, such as petroleum. Mining is essentially an upstream business, with few companies retaining ownership of products through to distribution and retail sales. What consolidation within the mining industry can do is allow companies to size themselves to the global market of the commodity in which they operate, meet global customer demands, and react to global wealth creation strategies (Klinger, 2002);
- In a brownfield area, exploration can be very profitable for a period of time, but the trend is to find small deposits at increasingly higher discovery costs. At some point, brownfield exploration becomes uneconomic (Parry, 2001).

Small company interests

Gold is the major driver of the junior market. Despite nickel booms, diamond fever and PGM rushes, the opportunities in these commodities for a junior are limited in comparison to gold (Klinger, 2002).

There is a very real chance for a junior company to achieve major market capitalisation growth through exploration and development. Delta Gold, Normandy Mining (in its original incarnation of Amad Resources), and Sons of Gwalia showed substantial growth between 1985 and 2001 and returned handsome early capital gains to investors.

Where small companies hold large stakeholds of grassroots ground, they need to attract investment from majors in the form of joint ventures or stock holdings to preserve the stakeholding, offset risk, and provide exploration funding. Such strategic alliances between large companies and juniors include the BHP Billiton/Minotaur Resources joint venture at Mt Woods in South Australia, which has encouraged the market with spectacular copper–gold–uranium intersections from the Prominent Hill prospect in 2001 and 2002.

Opening up of large corporate exploration databases to outside scrutiny does help junior companies. A recent example is Newmont, where an exploration database, worth $1 billion and collated over an 80-year period on 206 regions and countries, was offered to both junior and senior companies to see if the data fitted with the prospective partners' exploration ideas or generated new ones. If synergies existed, Newmont was prepared to negotiate a joint venture (Mining Journal, 2002). A local example is the 4-year deal by Gaia Resources NL with Rio Tinto, where Gaia has sole access to Rio Tinto's exploration database in Australia.

There is also recognition in the industry that exploration programs undertaken by the major mining companies may generate too many targets to be investigated alone, and joint ventures with juniors are a good way to progress the property portfolio of the major company.

There is also a greater trend toward co-sponsorship of resource development, with joint venture equity provided by strategic, experienced operators. This approach allows for additional cash raisings, spreads the risk, secures additional marketing and operating expertise, and can improve the terms of debt financing as the lending pool of guarantors increases (Bogden, 2001).

Divestment of assets from large consolidated groups often occurs where such assets do not fit corporate objectives. These assets can be "company makers" for junior companies.

Junior companies can redirect efforts to commodities other than gold, in particular to mineral sands, tantalum and platinum group minerals. This typically occurs as "flavour of cycle" commodities, or when there have been notable exploration successes, such as the Murray Basin mineral sands discoveries, or tantalum exploration in Western Australia.

Junior companies have the ability and flexibility to lead the way in terms of new areas of exploration effort and expenditure. Where a junior company is quick off the mark, properties that have been known but not reviewed for a number of years can add considerably to a junior company's value, and can lead to further discoveries resulting in giant orebodies. This discovery process in turn attracts the senior players to acquire the juniors on the basis of their large resources and land holdings.

The junior sector as a whole is much more nimble in reacting to opportunities, and this is reflected in Canadian data showing that junior exploration spending peaked out quickly after major discoveries or re-discoveries, and went elsewhere in the world.

Junior company activities mitigate the fear of a country becoming a "branch economy" with global takeovers involving large multinationals. Junior companies continue to ensure a state or country is an attractive destination.

The drive to keep costs under control results in an increase in output of material from individual treatment plants, although the numbers of operations decrease. Smaller plants are closed, and ore trucked to larger facilities. The smaller plants are frequently mothballed, and provide opportunities for juniors to join the list of producers under the right circumstances (Close, 2002).

Petroleum (onshore Western Australia)

There are established markets for any petroleum discovered and produced onshore in Western Australia. The State government is continuing with its program of deregulating and privatising the energy market and its infrastructure. The gas pipeline network is growing, particularly to service mining markets in this resource-rich State. Crude can be trucked and/or shipped to Kwinana refinery and other destinations.

The Department of Minerals and Petroleum Resources (MPR) seeks to encourage greater and ongoing responsible onshore activity. In support of the exploration effort by industry, the Department also conducts basin studies and (after a confidentiality period) makes available company petroleum well, survey and other data acquired by statutory reporting.

2001 and 2002 have the potential for being very active years for onshore drilling in Western Australia. There are costs savings with long-term rig hire and ongoing seismic field operations associated with minimising mobilisation–demobilisation costs. The exploration activity increases the likelihood that further commercial discoveries will be made and developed onshore, as is occurring in the more active offshore areas.

Onshore petroleum prospectivity of Western Australia

The Rough Range oil discovery in the 1950s was a great spur to oil exploration throughout Australia. Similarly, the Blina oil discovery provided a great stimulus to oil exploration in the Canning Basin in the 1980s. Empire Oil and Gas have revisited the Rough Range area and have recently achieved oil flows at commercial rates. In late 2000 road tankers commenced transporting Rough Range crude oil to BP's refinery at Kwinana in the Perth metropolitan area.

At times in recent years there have been no drilling rigs operating in prospective onshore Western Australian basins, a combined area several times the size of Texas. However, three onshore rigs were active in 2000 (several wells by Chevron at their giant Barrow Island oil field, a three-well program conducted by Tap Oil in the mainland Carnarvon Basin and a three-well program by Nerdlihc (a small North American company) commenced in the Canning Basin.

Numerous companies have plans to conduct onshore field operations in Western Australia in the coming year. Multi well programs are planned for the onshore Perth, Carnarvon and Canning Basins. Many of the plans for upcoming activity described in the

following sections are subject to change and could be revised depending on circumstances such as oil prices, availability of funds, farm-in agreements and joint venture approvals. Many prospects have been mapped with more modern processing techniques in recent years and opportunities for those with risk capital now abound. Re-assessment of the earlier Rough Range discovery has already borne commercial rewards as mentioned above. Other discoveries made in earlier years in the Perth, Canning, Carnarvon and Bonaparte Basins provide similar opportunities for re-appraisal and hopefully subsequent commercial development.

Smaller companies lead the way

Commercial onshore discoveries were made up to 1990 in times of more active exploration. Oil fields were found along the northern margin of the Canning Basin (Western Australia's largest basin), as well as oil and gas in the onshore Perth and Carnarvon Basins.

In the late 1980s the exploration spotlight in Western Australia firmly moved from the onshore to the offshore as commercial North West Shelf discoveries came on-stream. The oil price crash of February 1986 and then the stockmarket correction in October 1987 made it much more difficult to raise capital for onshore exploration where risks were perceived to be greater and seismic costs greater per kilometre than for offshore areas. Concerns over long legal delays and uncertainties associated with the introduction of the Native Title Act in 1994 also acted as a disincentive for potential new onshore explorers to come to Western Australia.

Smaller operators now appear to be more bullish with continuing high oil prices. There are also signs of increased investor interest in onshore petroleum exploration now that the dot-com bubble has deflated and energy demand has rebounded in key growth regions such as the Asia-Pacific. Drilling costs are much lower onshore than offshore and a number of onshore prospects have the potential to be company makers. Once more as the market appreciates the potential for great leverage afforded by onshore drilling then more risk capital may again flow to onshore exploration. Smaller onshore titleholders that might benefit from access to more capital for exploration include Amadeus Petroleum, Amity Oil, Arc Energy, Ausam, Australian Worldwide Exploration, Black Rock Petroleum, Carnarvon Petroleum, Empire Oil and Gas, Flare Petroleum, Gulliver Productions, Jervois Mining, Jubilee Oil, Kimberley Oil, Nerdlihc, New Standard Exploration, Origin Energy, Phoenix Energy, Tap Oil and Victoria Petroleum. Companies attracted to onshore Western Australia as farm-in partners in recent years include CalEnergy, Forcenergy and Pennzoil in the Perth Basin. There are signs of greater farm-in interest now in the Perth, Canning and Carnarvon Basins with negotiations in progress with various operators.

Greater cashflow, resulting from high world oil prices, has allowed mid-size companies such as Apache to plow substantial amounts of capital back into exploration offshore Western Australia. As the busiest well operator, Apache has also made the greatest number of Western Australia discoveries in recent years. Should companies aggressively explore onshore Western Australia, as Apache has done offshore, then commercial onshore discoveries would also be more likely. A number of US, Canadian, Japanese and European independent companies have been attracted to and become active participants in offshore Western Australia in recent years. Examples include Newfield, Kerr-McGee, Nexen, Alberta Energy,

International Frontier Resources, Inpex, OMV, British Borneo and Agip. A major onshore find could attract companies such as these to Western Australia onshore opportunities.

Major companies in recent years have been very conservative and appear to have been more focused on buying and selling assets, rather than increasing their exploration substantially. Shell, for example, agreed to sell its Barrow Island and Thevenard Island oil assets to Santos in 2000. Shell has expressed interest in taking over the Australian company Woodside Energy and has reported a strategy of focusing future investments on commercialising huge gas resources in Western Australia and the Northern Territory. Shell is the only major currently operating oil exploration in mainland Western Australia. Shell has interests in the Canning Basin where it has new untested plays and a potential giant oil prospect, yet their most recent well was in 1996.

Summary of Recommendations

Recommendation 2.1: As a matter of urgency, given the importance of greenfields exploration to the sustainability of the minerals industry, the Chief Government Geologist's Conference and ABS reach agreement on the definition of greenfields exploration.

Recommendation 2.2: The Commonwealth acknowledges that the declines are more than just cyclical and related to commodity price cycles—rather there are fundamental changes in the attitude of corporate entities and investors away from high risk and slow returns associated with the exploration sector.

Recommendation 2.3: The Commonwealth acknowledges that the Foreign Acquisitions and Takeovers Act 1975 implementation policy needs to be reviewed to include the mineral and petroleum resources industry as a key strategic industry along with the media, banks and real estate sectors of the economy.

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Term of Reference 3

Impediments to accessing capital, particularly by small companies

Taxation, research and development, and politics

This topic always raises considerable debate and, inevitably, always will. Some key points of particular interest include the following:

- From 1985–99, Canada offered deductibility of exploration expenses of 133%. In October 2000, Canadian federal and provincial governments introduced the "super flow-through shares", a 15% non-refundable tax credit, to be awarded in addition to the existing 100% deduction of eligible exploration expenditure from the federal portion of corporate taxes. This system strongly benefits high-risk junior companies (Wolfe, 2002);
- Tariff protection provides no benefits to the mining industry, as it is primarily an exporting industry, and thus tariffs impose high input costs. The breakdown of tariff barriers would aid the industry;
- Both mining and agriculture are regionally based, and contribute significantly to the Australian balance of payments. Farming has a raft of special tax concessions available, such as for olives, nuts and truffles, yet the potential earnings of such products is not significant (Close, 2002);
- In 1985, the Australian government introduced tax concessions of 150% for R&D, which resulted in an immediate increase in investment, from 0.5% to 0.8% of GDP. At the time, Australia had a ratio of business expenditure on R&D to GDP which was very low by international standards; the Australian ratio had been declining during most of the 1970s in contrast with the majority of the OECD countries; and the sector was dominated by the government sector (outside higher education) (Lattimore, 1997);
- The rate of growth of R&D expenditure was one of the most vigorous, but the international ranking of business R&D to GDP has not significantly changed, in part due to the low starting base in Australia (Lattimore, 1997);
- Relatively few firms have undertaken or are undertaking R&D, and only 3500 companies reported R&D expenditure in 1994–95. This equated to 1% of non-farm private sector enterprises, and the work was mainly concentrated in small and medium sized firms (Lattimore, 1997). That is, the main R&D component is not undertaken by the major companies;
- In 1995–96, the R&D concession was reduced to 125%, and business investment in R&D sharply declined and continued to decline (Berridge, 1998). Government reclassified the concession in part due to escalating costs associated with "other" expenses, such as overheads, interest payments and consumables (Lattimore, 1997);

- The government ensured that mineral prospecting and exploration were specifically excluded, apparently to ensure that there was a scientific or technological basis to the eligible R&D deduction (Lattimore, 1997);
- The CSIRO predicts that R&D spending could help cut titanium production costs by about 50%, leading to a big increase in the potential value of the known titanium resources — an increase to A$300 billion from the 2001 valuation of A$13 billion (MM Publications, 2001);
- Mining-specific software developed by Australian companies is used by 70% of the world's mines for resource evaluation, mine design, and operations planning (Australian Institute of Geoscientists, 2001);
- The mining industry is the largest source of private R&D investment in Australia (Australian Institute of Geoscientists, 2001);
- Australia is one of very few resource investment destinations with an unattractive effective-life depreciation policy. Other countries offer a much more attractive tax regime, and Australia's position is considered uncompetitive (Chamber of Minerals and Energy of Western Australia, 2002).

Recommendation: In the case where the resources sector provides funds for exploration-related research within CSIRO, universities and CRC's, the Commonwealth Government should provide a 150% tax write-off of funds to companies with taxable income, or should match $ for $ funds committed by a company that does not have a taxable income.

Media and market perceptions

The failure of local investors to see value in Australia's major mineral producers may be due to a combination of factors, including:

- The sustained media focus on a weak US$ gold price;
- Changes in the strategies of investment funds;
- The negative portrayal of "hedging";
- The Asian economic crisis;
- Gold sales by central banks;
- Weak commodity prices;
- Previously very high cash costs of Australian gold and base metal production;
- Technological stock bubble;
- Entrenched management at junior companies;
- Bre-X;
- Kyoto protocol.

Further noteworthy points on these topics follow.

Gold price

Since mid-1999, the gold price in Australian dollar terms has trended generally upwards, and current prices are around 50% higher than in 1999. This marked increase has not been reflected in the attractiveness of Australian gold stocks to the Australian public, investment funds, and media, but is reflected in the interest shown by foreign companies.

Investment funds

The gold sector in 2001 comprised 1% of the ASX All Ordinaries Index, whereas in 1994, it was 7% (Brook and Alexander, 2001). This results in a much lower profile for the gold sector, and increasing irrelevance of the Australian gold sector to investment fund managers. Smaller gold companies are ignored partly due to their size (i.e., low market capitalisation) and partly due to the low levels of funds available for investment in the market. A number of fund managers have been 'burnt' by having a large, but untradeable position in a small resources company, and having to exit such a position at short notice at considerable cost. Thus, current fund performance is based on getting big investment calls right, and quarterly reporting. The overall result is stricter investment criteria being utilised by fund managers and investment houses (Brooke and Alexander, 2001).

Other pertinent points relevant to investment funds and the mining sector include the following:

- Investment criteria include market indices (such as the Dow Jones Index or TSE 300) being used as benchmarks for determining sector weights in fund portfolios. The weight of the metals, minerals and gold sectors decreased in aggregate from 20% in 1996 to only 5.5% in 2000 (Bogden, 2001);
- The result is that investors then need very little new mining equity, if any, to maintain their market weight in mining stocks;
- The aggregate capitalisation of the world's non-ferrous mining industry stocks is less than the individual capitalisation of stocks such as General Electric and Microsoft;
- There is on-going rationalisation of big investment portfolios through investment fund mergers, which results in fewer analysts available to research and review the number of small companies;
- Small mining companies are consistently lacking the ability to attract investment re-ratings from brokers, even with exploration success;
- In the period 1985–2000, an investment in US Government Bonds would have returned 7.3%, in comparison with an average return for Western World resource companies of 4.8%. In other words, a high-risk high-volatility sector was outperformed in that period by an essentially risk-free investment (Parry, 2001);
- For five years, 1995–2000, gold funds were down 3.5% on average (on an annualised basis). During that time, diversified U.S. stock funds were up 9.3% on average (Tompor, 2002);

- Gold has a long history of short-lived runs and long downturns. In 1993, the average gold fund was up 81%, but gold was down 47% in 1997, down 10% in 1998, and down 17% in 2000.

Hedging

Hedging by producers of the metal price(s) or currency has been a popular topic of discussion over the last two years, and there is the perception that many companies became involved in transactions they did not fully understand. Some relevant points on this topic are as follows:

- The mining industry is virtually polarised between those producers that hedge and those that do not, and the longer the low $US gold price prevails, the more temptation there is for companies to hedge, particularly in light of the favourable contango;
- Gold is frequently used as an inflation hedge, but when inflation is low, companies using gold hedging are penalised (Tompor, 2002);
- Imprudent hedging sent some companies, such as Ashanti Gold and Cambior Mining into receivership, whereas others suffered and are suffering severe financial hardship.

Asian economic crisis

The economies of some of Australia's closest neighbours are driven by the mining of gold and other minerals. For example, more than two-thirds of PNG's export income in 1999 was derived from the mining sector, and mineral investment represented more than 90% of new investment flows in 1994–96. The downturn in mineral investment expenditure exacerbated the economic crisis in the region (MM Publications, 2001).

Central bank sales of gold

Coordinated central bank selling of gold commenced in 1999, under the Washington Agreement of 29 September 1999, and gold sales are ongoing. A total of 784 tonnes was thought to have been sold by the banks in 2000–01 (Murenbeeld, 2001), and these sales tend to act as a cap on the $US gold price.

Commodity prices

The long-term decline in metal prices has been a major contributor to low rates of return from both mining itself and investment in mining stocks. Metal prices have shown long-term declines of 2–4% per annum in real terms (Jaques and Huleatt, 2002). In addition, there has been a significant decline since September 1997 in commodity prices, particularly base metals, in both real and actual terms (Bogden, 2001).

Production costs

In general, cash costs are most important to companies when commodity prices are low, and companies need to focus on short-term survival. Longer-term survival of the company is more dependent on the total cost of production.

In 1996, Australia's weighted average industry cash costs of gold production were the second highest in the world, estimated at US$282 per ounce. By May 1997, Australia was the most expensive gold producer, overtaking South Africa, with an average cash cost of US$294 per ounce.

Nickel producers in Australia are working hard to reduce cash and fully allocated costs. The companies have been successful in that cash costs are declining. However, interest charges, depreciation, depletion and amortization costs remain fairly constant. Since 1990, there has been a margin squeeze in comparison to the LME nickel price. Although major productivity gains have been realised, this trend cannot be continued into the future (Ranieri, 2001).

It is not probable that there will be a paradigm shift downward in cost terms in the nickel industry through the utilisation of Pressure Acid Leach (PAL) technology. In fact, there may be no competitive advantage after high initial capital expenditure and sustained capital costs are factored in (Ranieri, 2001).

Technology stock bubble

Due to a long capital drought, the chance of raising further capital through altering strategies to embrace the dot-com boom became extremely attractive to the struggling exploration juniors. Some companies managed a five-fold increase in share price, as well as further capital injections. Of a total of 270 exploration companies on the ASX board in 1997, only 80 remained committed to exploration in 2000 (Gonnella, 2002).

Of 100 companies that joined the dot-com bandwagon, or even just indicated they would join, their combined market capitalisation moved from A$1.1 billion in December 1999 to a peak of A$3.1 billion in March 2000, but returned to A$1 billion by February 2001 (Brooke and Alexander, 2001);

The flood of capital out of dot-com and technology stocks did not flow into the gold sector, and the majority of the funds still remain to be invested.

Company management

Several points are relevant to the role or contribution from company management:

- There can be problems with entrenched management attitudes of some juniors, where the "my shares are more undervalued than your shares" attitude can keep deals from being struck;
- There is the perception that juniors need to combine with two or three other juniors to create the critical mass to attract investor and analyst attention and finance (Bogden, 2001);

- 2001 was the first year since 1996 that the reporting of abnormal losses was reduced. The perception was, with the numbers of losses, that the industry as a whole was not reporting bad accounting or management practices (MM Publications, 2002).

Location, location, location

Australia topped a survey as the premier place to invest in resources in 2001 and 2002, based on sovereign risk, land access, "green tape", land claims, "red tape", social risk, infrastructure, civil risk, natural disasters and labour relations (Resource Stocks, 2002)

Insurance companies now have policies that are non-cancellable for up to 15 years, so the more stable a country, the more likely an operation is to have full insurance cover (Resource Stocks, 2002).

Bre-X

There is a legacy of the Bre-X salting scandal of 1997, which saw large outflows of fund investments from Canadian juniors initially, and which then spread globally (Brooke and Alexander, 2001).

Kyoto

Australia's response to the greenhouse issue is critical to a number of major projects, such as the alumina and magnesium refineries (Chamber of Minerals and Energy of Western Australia, 2002)

Has access to capital changed? – for better or for worse?

Resources sector exploration in Australia has generally been financed in two distinct ways. Small exploration-focused companies have used equity funding raised on sharemarkets. Larger companies, in particular, have utilised funds drawn from internal cash flow.

While this overall approach to exploration finance has been stable through time, it is sometimes claimed that companies, in particular smaller companies, face significant difficulty in funding exploration through formal capital markets.

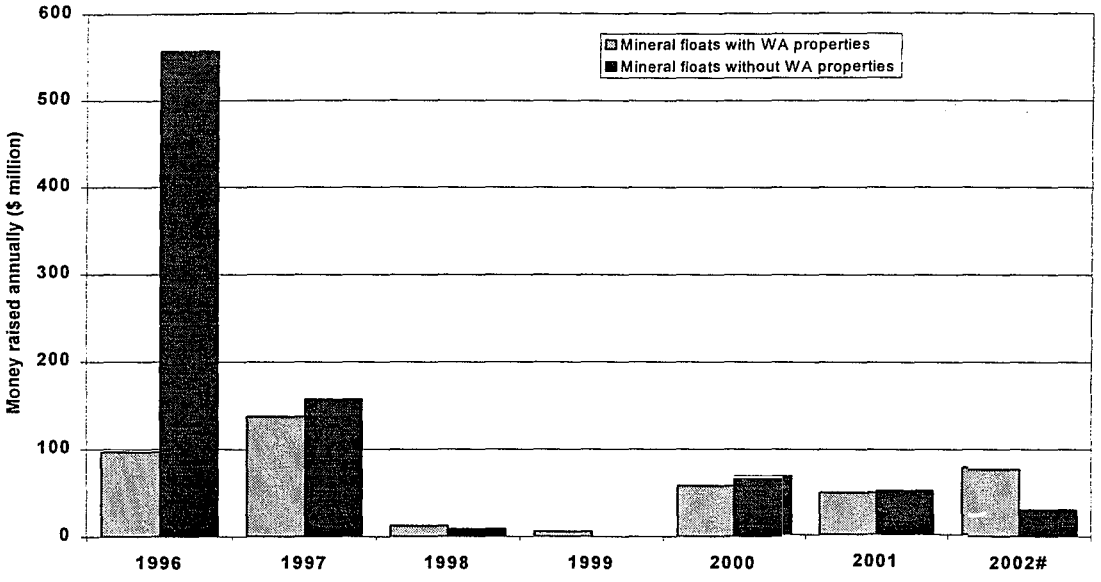
- In a recent article, the Australian Bureau of Statistics (2002) claims that one of the factors determining recent low levels of exploration expenditure is, "the availability and placement of venture capital (which is subject to a variety of influences, including in more recent years, central bank gold sales and the emergence of "dot.com" investment opportunities, as well as general economic influences". [The latter influences include interest and exchange rate movements and commodity prices developments].
- The Chamber of Minerals and Energy of Western Australia noted in its 1999 publication *Bedrock of the Economy 1999* that, "smaller companies ... report difficulties in accessing capital for exploration". In the 2001 edition of that

publication the Chamber cited exploration as one of the "very real challenges" facing the resources sector and noted that, "exploration levels in Western Australia have fallen significantly in the last several years to levels where the State's known resources are likely to contract". It cited access to finance as a factor affecting exploration and the downturn, noting that, "larger companies have generally cutback expenditure significantly and equity funding is now at very low levels".

  - On a more positive note, the Chamber noted that, "It is, however, noteworthy that the Australian Gold Council's Explorers' Index saw a number of floats during 2000 as compared to none in 1999 and, if this reflects a change in market sentiment, this would be a positive development".

- The decline in financing activity has been a global phenomenon. As Jaques and Huleatt (2002) note, "There has been a dramatic fall in mining-related capital raising and the number of new floats since 1997 in all the major centres for mining finance. For example, new mining equity raising on the Toronto Stock Exchange fell from over $C6.5 billion in 1996 to a mere $C500 million in 2000 (Bogden, 2001). They go on to note, "The dramatic decline in the activity of junior companies since 1997 coincides with the collapse in their ability to raise finance". In their view the decline has structural elements, "the evidence....indicates that the present downturn in Australian exploration differs from previous downturns as is it accompanied by significant structural change in the industry, notably consolidation as a consequence of globalisation; unprecedented competition for capital *(emphasis added)*; land access issues; a change in gold's former strategic position as a store of wealth, and a loss in confidence in exploration as a profitable economic activity".

Figure 3.1 illustrates that in recent years, equity floats in the Australian mineral resources sector have reached very low levels in recent years.



Source: Department of Minerals and Petroleum Resources estimates.
Half year total.
Note: Total in 1996 'without WA properties' affected by two exceptionally large floats.

Figure 3.1: Mineral floats with/without WA properties 1996-2002

How is "lack of access to capital" appropriately defined?

Before getting into the issue of whether a government policy response is required to reports of difficulties accessing finance for exploration, it is useful to define what a lack of access to capital means in general terms.

Features of the problem of a lack of access to capital often cited by business include:

- Inability to obtain borrowed or equity funds though firms are willing and, in their own opinion, able to meet lender or investor requirements.
- Higher interest rates expected by lenders or higher equity return expectations.
- Excessive collateral requirements imposed on borrowers and/or unwillingness to provide unsecured lending.

There is some empirical evidence on the issue of small business access to finance in Australia. Lattimore, Madge, Martin and Mills (1998), in a Productivity Commission Staff Research Paper, noted that evidence suggests that small business do in fact pay a premium for bank lending in the form of higher interest rates relative to larger companies. The authors also noted that there is ambiguous evidence on whether firms are unable to finance projects they felt would meet investor requirements and cited evidence that only a relatively small share of small firms "considered that they were constrained by *suppliers* of finance".

In terms of equity finance, Lattimore et al (1998) reported that Ernst and Young identified some evidence that small firms in 1997 were finding it difficult to find financiers willing to provide funds on terms the firms felt acceptable.

There is limited empirical evidence relating specifically to exploration finance.

Why might access to finance be restricted?

To the extent that the empirical and anecdotal evidence suggests a problem, it is necessary to ascertain why there might be a disinclination for financiers to provide finance.

Suppliers of finance may be **rationally**, from a strictly private viewpoint at least, restricting access to finance to certain activities such as exploration.

- It could be rational for lenders or financiers to restrict finance to certain activities and require higher returns and collateral requirements on their investment if the activities to be financed are at higher risk of default or failure;
- Exploration projects may be perceived as fitting into this case for two main reasons;
    - In a longer-term sense, there are the inherent uncertainties associated with resources exploration and the potentially long lead times between discovery and cash flows to provide returns to financiers. In the case where exploration finds are not immediately 'sold' to larger mining entities, for example, further and often costly evaluation and investment are needed before the decision is made to develop a deposit. Depending on the characteristics of the deposit, a few years to

decades might elapse between its discovery and opening of the mine. While this time elapses revenue is minimal and costs build up;

- In a shorter-term sense, exploration activities and the finance to fund them may be in short supply because of cyclical factors. In recent times these have included weaker commodity prices and profitability in the sector, more attractive options in other sectors in particular in IT during the tech sector and 'dot.com' 'bubble' and lower discovery rates. These factors have affected exploration globally with the local industry holding up relatively well;

- In this type of scenario, and where a firm experiences difficulties when seeking finance, from the firm's perspective this could be perceived as a lack of access to capital; from an investor's perspective it may be seen as prudent commercial practice.

Another factor affecting access to capital for exploration may be that, in a significant number of cases, the level of finance sought is relatively small. The associated ratio of project assessment/review/administration costs to the size of (and thus return on) financing may be very high. It would be rational for financiers to require higher administration charges and/or interest rates or possibly restrict finance to small-scale activities.

In a narrow sense there is little obvious wisdom in suggesting that the behaviour of private financiers, acting rationally for reasons of risk and uncertainty or cost in restricting finance to activities such as exploration, should require an adjustment in government policy.

However, while it is probably true that policy designed to lift exploration finance out of a slump due to short-term factors such as weak commodity prices or the attractions for financiers of unsustainable technology bubbles, there are other circumstances where there is justification for policy action. Specifically, where there are market or other economic failures that distort prices or access to finance that may lead to inadequate investment in higher risk-higher return projects – a potentially socially and economically sub-optimal outcome.

Factors which might cause such failures include:

- Lack of 'investment readiness' whereby firms are not in a position to meet the reporting and governance requirements required by investors. This might include for example, explorers not being able to communicate effectively the potential marketisation of any discoveries they might make and consequent future revenues they would accrue. A similar problem might occur in the case of R&D and information technology projects.

- Information asymmetries. The most obvious example here is the lack of knowledge that financiers face when confronted with requests for funding for projects that have potentially long and highly uncertain lead times between the project and subsequent cash flow and other returns. In some cases, this lack of knowledge reflects the nature of the project; in the case of exploration the uncertainty of discovery of economic deposits and, in terms of R&D, the necessity to tightly hold project relevant information to avoid competitors 'free riding' on technical breakthroughs.

- Limited opportunities for risk pooling by small firms.

Is there a role for Government policy to address the case where economically and socially beneficial but high risk –high return activities such as exploration cannot find

finance due to problems such as investment unreadiness, information asymmetry and lack of risk pooling opportunities?

High risk and high return projects in areas such as exploration, R&D, and information technology fit into these categories of market failure and thus there is the potential for Government policy to play a role in improving the level of finance directed to these activities.

- In terms of investment readiness, there may be a role for government to play in raising awareness in smaller exploration companies. This might occur in relation to; improving systems for presenting information to potential investors, preparing business development plans, and highlighting different avenues for accessing and the range of types of equity finance.
- The role for government in offsetting information asymmetries may be limited because of the costs associated with gaining and analysing detailed information on specific exploration activities. In Western Australia's case, the Geological Survey Division (GSWA) of the Department of Mineral and Petroleum Resources is an example of the type of approach that can be used to enhance information flows on exploration potential. GSWA has as its mission the development of regional geoscientific, resources and related policy information systems by acquiring, enhancing, archiving and disseminating data to promote the potential for successful mineral and petroleum resource exploration in Western Australia
- With respect to government playing a role as a risk-pooler for exploration activities, there is some potential for useful government assistance. Where there are high-risk high-return exploration (and R&D and IT development) projects which will bring social and economic benefits it could be argued that society as a whole has the capacity to pool risk more effectively than existing financial and corporate institutions.
    - This type of assistance may take the form of loan schemes like the UK Loan Guarantee Scheme, tax concessions or, as in the case of Canada where similar difficulties existed in capital raising by the exploration sector, the introduction of tax incentives including a tax credit 'flow-through shares' scheme.

Junior company disadvantage in exploration — is a flow through share scheme an answer?

Introduction

Under the existing Australian tax system, small junior explorers face a higher cost of capital than large firms do. A large company with substantial cash flows is able to deduct exploration expenditure against profit made elsewhere and so gain a tax credit. In contrast, a small company that might have raised capital on the stockmarket specifically to carry out exploration and so has no cashflow against which it can book the exploration expense. The small company therefore faces a higher cost of capital than the large firm does.

This submission examines the extent to which small Australian exploration firms indeed do face a higher cost of capital than their larger counterparts and quantifies any such disadvantage.

Whether the apparent anomaly is worth correcting is then considered. That is, in the absence of Government intervention, is there likely to be an under-investment in exploration in Australia?

Finally, a number of different alternatives available to the Commonwealth Government to increase exploration expenditure are presented. In particular, a flow-through-share (FTS) scheme, similar to the Canadian system, is examined in the Australian context as a mechanism to address this anomaly.

The Disadvantage Faced by Junior Explorers

Exploration and the Australian Taxation System

Exploration expenditure, like research and development, may be immediately deducted against income for taxation purposes under the Australian taxation system (specifically Section 122J of the Income Tax Assessment Act 1936). The alternative would be to capitalise exploration expenditure in the same way as investment in plant and equipment.

The exploration industry comprises basically two types of firms. The first are the large (often-diversified) resource companies that have substantial cashflows. These companies are immediately able to deduct exploration expenditure against revenue generated elsewhere, gaining a tax credit.

The second are the small or junior explorers. These companies typically raise money through a sharemarket float to undertake exploration. As they have no immediate cashflow, they are unable to take advantage of the tax deductibility of exploration and face a higher cost of capital compared with the larger companies.

The Scale of the Disadvantage

At first glance, the ability of larger firms to deduct exploration expenditure against other income would seem to give larger firms a significant advantage in terms of a lower cost of capital.

To examine this hypothesis, consider two firms interested in undertaking exploration for the purposes of finding a mineral deposit. Both firms wish to raise capital through the retail sharemarket to undertake the exploration and so have no debt finance. The exploration will cost $1,000 and the outcome is uncertain, but both companies face equal risk. Traditionally, it is generally accepted that smaller companies face higher risk but greater potential return than large companies simply because the large company can generally afford a larger program. Investors can equalise risk in this case by diversifying their investment across a number of smaller companies.. The first company is a small startup exploration firm, which has no

cashflow from other sectors to which exploration expenditure can be applied for tax purposes. Therefore, it obviously pays no dividends to its shareholders.

The second company is a large diversified resources company with considerable cashflows in other projects, and so can deduct exploration expenditure for company tax purposes at the company tax rate of 30%. This firm pays dividends to its shareholders to which an imputation credit is attached.

Assume that any return generated by each company from the exploration program is capitalised. This mimics the fairly common situation where if a small exploration company discovers a resource, then it will be taken over by a larger player. For the large firm, it simply means that the income from any future discovery is incorporated into its share price.

This section considers the return to investors after company tax, but before income and capital gains tax which equally affect each companies' returns. Assume that all activity (capital raising, exploration and discovery) takes place in a single period.

For the small company without cashflow, the return it must generate relative to the rate of return demanded by investors is:

$$ri = rc$$

where ri is the post-company tax but pre-income tax and capital gains tax (CGT) expected rate of return required by investors before they will commit capital to the project.

The cost of funds to the company is equal to the investors required rate of return. The cost of funds is the rate of return a company must generate on shareholders' funds to satisfy shareholders. A company's cost of capital is the cost of funds multiplied by the cost of capital goods. If investors demand a 20% rate of return, then the company must generate 20% on its capital invested.

Alternatively, for a large company with significant cashflows, the required rate of return on capital can be written as:

$$ri = rc/(1-T*(1-\gamma)); \text{ or}$$

$$rc = ri*(1-T*(1-\gamma))$$

where T is the corporate tax rate and γ is a "franking factor", which represents the proportion of company tax paid that can be passed on to shareholders in the form of a franking credit.

If the corporate tax rate is 30% and the franking factor is 50%, then the rate of return a company must obtain on its capital is only 85% of that demanded by the company's shareholders. If shareholders demand a 20% return over the life of the project, the company only has to generate 17% return on the cost of exploration. This assumes that the tax credit is passed back to shareholders.

That is, the cost of funds, and therefore the cost of capital, is higher for a small exploration company with no cashflow compared to a large company with substantial cashflows from other activities.

Does the Anomaly Justify Government Intervention?

Government intervention is only justified if the signals faced by investors are somehow distorted so that the decisions they make are less than the social optimal. This is the "market failure" argument, and implies that, left to its own devices, the market will fail to provide enough exploration.

The superiority of one form of company over another isn't necessarily a problem. In many industries one form of company is clearly preferable to another. For example, large economies of scale mean that small-scale car manufacturing is very rare.

In theory, all companies in the industry could move to the optimal formation. That is, would there be a problem if the entire exploration industry came under the umbrella of large (perhaps diversified) resource companies generating large profits?

The simple answer is yes, there is a problem, as the large scale resource companies are unlikely to provide the socially optimal amount of exploration activity.

Exploration is an inherently risky activity, with perhaps one in 200 drilling sites leading to a commercial deposit, although high risk is in itself not an indicator of any failure of the market.

There might be some problem however, because, with junior exploration companies struggling to attract financing, the sector with the capital (the large-caps) is presently highly risk averse and is likely to remain so in the foreseeable future.

Since about 1999, in response to a number of years of poor profitability and large asset write-offs, large companies have been extremely focussed on short-term profits, and have been very disciplined with capital allocation. Two quotes from the 1999 BHP Annual Review highlight this trend:

We are moving away from a culture centred on scale, growth and a preference for owning and operating assets, to one where the central focus is shareholder value. We want to increase earnings per share rather than just grow the company in absolute terms. What matters to us are measures such as efficiency, return on investment and value creation.

Above all, capital will be tested against the ultimate alternative – share buy-back.

The refocussing of priorities has bought spectacular results. Figure 3.2 shows the profits of the Australian mining sector as measured by the ABS against exploration expenditure.

A period of record profitability has coincided with a period of rapidly declining exploration expenditure. While other factors, notably the low level of the Australian dollar, have been at play over this period, the reduction in exploration expenditure has contributed to rising profits.

Exploration is an easy target in a period of cost reduction. Under Australian taxation law, expenditure on exploration can be immediately deducted against income in the year in which it occurs and so a reduction leads to a short-term increase in profit.

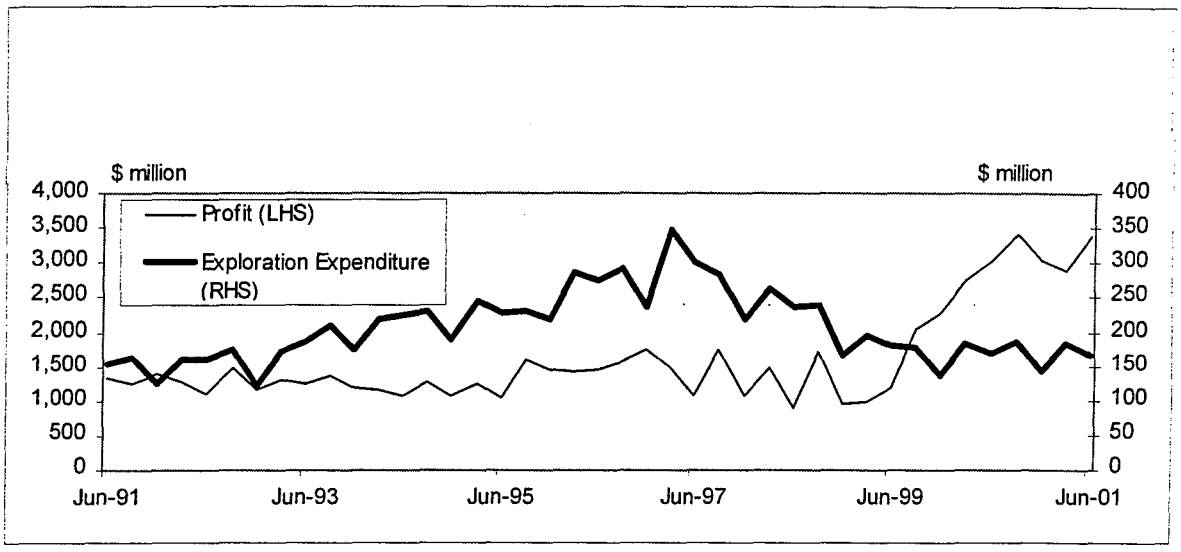


Figure 3.2: Profits of Australian mining companies versus exploration expenditure– (Source ABS Cat No. 8412.0 and ABS Cat. No. 5651.0)

Additionally, the costs of reducing exploration (in terms of reduced mineral discoveries) are in the future, so, in the short-term, a reduction in exploration is essentially costless.

During the downturn in mining stocks in the late 1990s, new resources could be acquired at reasonable cost by taking over companies who had a confirmed resource. Even if they were costly, the costs and returns from these resources were relatively certain, and the payoffs relative quick and free from native title and environmental hurdles.

The problem is that, while in the short-term profits are increased, the industry may not be discovering the resources needed to support it in the longer term.

The large-cap companies are unlikely to dramatically increase exploration expenditure in the near future. As mentioned above, they are now very risk averse and subject to strict discipline by shareholders.

Additionally, many are so large that the returns offered by an average exploration program may not enhance the value of these large companies by a substantial amount in percentage change terms. They will prefer to take over the few "mega" deposits found by the small to mid-cap sector or diversify into resource processing.

That then leaves the small-cap sector of junior explorers to undertake exploration – the very sector subject to a cost of capital disadvantage.

Additionally, the number of small companies able to be taken over is declining. Between 1997 and 2001, the number of gold mining companies in Australia fell from 86 to 35, while the number of mines fell from 137 to 62. There are now fewer small players in the industry than five years ago.

Eventually, when small companies become scarce enough, the price signals will emerge for this sector to become attractive to investors again. The anomaly in the tax system described above, however, means that the cost of capital will restrict exploration to below socially optimal levels.

Other Reasons Why the Market May Fail to Provide Sufficient Exploration

In addition to the small company problem outlined above, some characteristics of exploration, or the regulatory process underlying exploration, mean that the market might under-invest in the discovery of mineral resources. These factors are the public good nature of exploration and delays in the native title process.

Exploration is at its core a knowledge generation process. It involves generating knowledge of the geology of the Australian continent. The benefits of exploration do not automatically accrue to those undertaking the exploration.

The Western Australian mineral tenement system confers a property right associated with the knowledge generated from exploration. A private benefit is generated and explorers are therefore able to gain a return from their endeavours.

Explorers, however, do not necessarily gain all of the benefits from their endeavours. In Western Australia, explorers must submit data to the Geological Survey of Western Australia (GSWA), which, after a tenement is dropped, is available to future explorers in the form of pre-competitive data. These data are in additional to the exploration directly undertaken by the GSWA. Future explorers can either use the data to evaluate land given up by the original explorer, or infer the potential geology of adjoining areas. The existence of the GSWA (and other State geological surveys) is a form of Government assistance to the exploration sector.

Frequently, later-day explorers are able to rely on information generated by their predecessors. In many areas of the Western Australian Goldfields, past exploration was restricted to relatively shallow depths, but later day prospectors have been able to use information generated during shallow exploration to enhance their deeper-drilling programs using new technology.

The land containing the Telfer gold deposit in Western Australia was explored in the past, but samples were only analysed for copper. In the 1990s, examination of the previous exploration data provided to the GSWA pointed towards the presence of gold and an ultimately successful discovery.

Also, the discovery of new technologies or changes in commodity prices over time can render previously uneconomic deposits profitable. In this case, earlier exploration data can be used to determine viability.

In the past, the market has still provided considerable exploration expenditure. In today's world of greater financial discipline, private costs are carefully equated with private benefits, leading to a level of exploration below what is sustainable to the industry.

The second reason why the Government may wish to intervene is that the advent of native title has lengthened the amount of time between a company deciding to undertake exploration and the opening of a productive mine.

Settling native title claims is now an accepted part of undertaking exploration or starting a mine. At the present time, however, the native title process is still in its formative stages. While the process is likely to shorten as time goes on, at present, in many cases, the native title process has driven a wedge between the time required for a profitable project and that that is achievable.

The timeframe between exploration and mining is critical in determining the present value of a project. The longer between when a company begins raising capital to explore for a resource and when any potential resource can be commercialised (no matter a what stage any delay occurs), the less likely are companies to undertake exploration.

This is one of the reasons for the decline in exploration and the rise in takeover activity in the sector. While buying an existing resource might be expensive, the cash flows are relatively certain and the timeframe to a return is much shorter.

This process may inflict severe, perhaps irreversible, damage to the mining industry, which is bearing most of the cost of native title. There may be a temporary under-investment in exploration (or a greater under-investment than would have been the case previously).

There may be a case, therefore, for short-term assistance to the mining industry while the native title process is resolved. A temporary subsidy to the industry may return the industry to a position where exploration is a competitive alternative to buying an existing resource.

In this circumstance, any assistance must be temporary. If the current timeframe is permanent, then the industry must be allowed to adjust to the new situation. If this is the case, eventually the number of existing resources that can be taken over will diminish and exploration will again be competitive. There will be fewer resources than before the advent of native title that can meet the standard required to be profitable under the new longer commercialisation phase.

Avenues to Boost Exploration Expenditure

If the Commonwealth Government wishes to increase the level of exploration activity, then a number of alternatives are available. Specifically:

- the Government could undertake exploration directly;
- the Government could subsidise companies undertaking exploration by direct grant/bounty; or
- the Government could introduce a flow-through-share scheme for companies undertaking exploration.

These possible solutions are examined below.

Government exploration

The various State Governments undertake exploration through their geological surveys, but this tends to be in the provision of basic geoscientific information rather than in the discovery of commercial deposits.

To address this Australia-wide problem, the Commonwealth Government could undertake applied exploration to supplement the private sector.

Government could effectively assume the role of the small exploration companies, boosting exploration levels to optimal amounts and alleviating the market failure.

When Government discovers a deposit, it could auction the mineral rights to mining companies. This would be attractive to the larger mining companies as much of the risk of any project would be much reduced.

There might be some tension between the Government and the private sector in terms of which sector might take up a particular lease, but this would be minimised if the Government concentrated on greenfields areas presently of little interest to the private sector (and where the under-investment in exploration is likely to be the greatest).

The cost of the scheme would be limited to the amount deemed necessary by the Government of the day, and not open-ended like many other forms of assistance.

Industry, however, has not been open to the idea of Government expanding its role from basic geoscientific information. In particular, there is a view in industry that Government is relatively inefficient. In its submission to the 1991 Productivity Commission review of exploration expenditure, Western Mining Corporation said that Government exploration is "subject to high degrees of political risk; public sector incentives are inadequate; and the public sector is subject to sanctions not imposed on the private sphere".

Exploration bounty

A second method of boosting exploration expenditure would be for the Government to provide a bounty to private exploration companies. The Government could "top-up" private sector exploration by and additional say 20 or 30 cents for very dollar of expenditure.

This would have the advantage over the previous option in that the private sector would still be undertaking all applied exploration so, if the bounty is appropriate in size to give the industry the correct incentive, would encourage a more efficient outcome.

The major disadvantage of a bounty would be that the cost to Government is unbounded, and all current exploration would attract the bounty. While a company size limit could be imposed to limit the bounty to small firms, the larger companies would find ways around this limit by creating wholly owned specialist exploration companies.

Flow-through-share scheme

In 1983, the Canadian Government introduced a FTS scheme to alleviate the disadvantage faced by small specialist exploration companies with no cashflow compared to their larger counterparts.

Under the Canadian FTS system, a registered company is able to issue FTSs to private investors, who then are able to gain a tax deduction for their investment at their respective marginal tax rates. The investment must be directed towards exploration activity for the tax deduction to apply and the company renounces all claims to the exploration expenditure for

company income tax purposes. Exploration FTSs are similar to the investment schemes afforded to investors in timber plantations or olive groves in Australia.

The "quid pro quo" for investors is that CGT is applied to the entire value of the shares when sold, rather than the increase in value of the share. The CGT base value is zero so, conceivably, investors could be liable for a CGT bill even if the value of the shares fall.

Tax avoidance problems have been encountered under the Canadian system. The practice of warehousing, where a company claims expenses for tax purposes that it should have renounced under a FTS agreement, has been a problem at various times. This was particularly the case if the exploration expenditure occurred in the early part of the financial year while the FTSs were issued towards the end of the year (which was often the case as this is the time individuals are usually interested in personal tax minimisation).

Many large Canadian companies practiced the procedure of stacking tax credits. Stacking occurs when a large company offloads its exploration program to a small wholly owned subsidiary that issues FTSs. The personal tax credit is then passed from the subsidiary the original company. The parent company also issues FTSs for the same expenditure, effectively "double-dipping" the system.

There is often a divergence in the time horizons of investors and explorers, with investors wanting exploration to take place within the coming financial year while the exploration company might wish to undertake an exploration program spread over several years. As a consequence, some money was effectively wasted, as it had to be spent more quickly than was sensible.

The FTS scheme could be introduced into the Australian taxation system as a mechanism to increase exploration expenditure. A full analysis of such a scheme under the Australian taxation system is required before such a scheme could be implemented, including a full costing of the revenue consequences.

The design of any such system needs to be carefully considered. This is because the Canadian taxation system is substantially different from that operating in Australia in that the rates of corporate and personal income tax are quite similar and only partial dividend imputation is allowed.

In Australia, the highest marginal personal income tax rate (including Medicare levy) is 48.5% compared to the company tax rate of 30%, so the introduction of tax credits of up to 48.5% leaves open the possibility of substantial arbitrage of exploration expenditure. Companies that are currently undertaking exploration would face a powerful incentive to shift the funding of their exploration programs to FTS schemes, leading to a substantial taxation revenue loss on existing exploration expenditure. The level of the tax credit, therefore, needs to be carefully considered.

Recommendation: The Commonwealth should assess alternative efficient tax/subsidy mechanisms for their potential to lift exploration expenditure in Australia.

In particular, it should assess the effects of introducing a "flow-through-share scheme". A key element of this assessment should examine the introduction of such a scheme for "greenfields" exploration in designated regions of Australia.

On determining the most effective policy instruments and approval following this assessment, they should be enacted as soon as possible.

Conclusion

Small-cap or junior exploration companies with no cashflow face a higher cost of capital than their larger (often-diversified) counterparts who generate substantial profits from other activities. This is likely to lead to a less than optimal amount of exploration being undertaken by the private sector as large companies are reluctant to commit to sizeable exploration programs.

Government intervention is therefore justified if the imbalance can be rectified in a reasonably cost-effective manner.

A promising mechanism to serve this purpose is a flow-through-share scheme, similar to that operating in Canada.

Summary of Recommendations

Recommendation 3.1: In the case where the resources sector provides funds for exploration-related research within CSIRO, universities and CRC's, the Commonwealth Government should provide a 150% tax write-off of funds to companies with taxable income, or should match $ for $ funds committed by a company that does not have a taxable income.

Recommendation 3.2: The Commonwealth should assess alternative efficient tax/subsidy mechanisms for their potential to lift exploration expenditure in Australia.

In particular, it should assess the effects of introducing a "flow-through-share scheme". A key element of this assessment should examine the introduction of such a scheme for "greenfields" exploration in designated regions of Australia.

On determining the most effective policy instruments and approval following this assessment, they should be enacted as soon as possible.

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Terms of Reference 4 & 7 relating to:

Access to Land, including Native Title and Cultural and Heritage Issues/ Relationships with Indigenous Communities

State Context

The introduction of the Commonwealth Native Title Act 1994 (NTA) in 1995 has resulted in delays in the grant of exploration and mining titles over most of Western Australia and the build-up of a very large backlog of title applications under the State's Mining Act 1978.

These delays in obtaining title and the additional costs and complexity of the native title processes have created negative perceptions in the industry about its ability to gain access to land for exploration and mining purposes in a reasonable timeframe and at reasonable cost. This has led to a number of the smaller and more entrepreneurial exploration companies shifting the focus of their activities to areas which do not have native title issues and to overseas countries where access to prospective areas can be more easily obtained.

The negative impact of native title procedures has been clearly identified by all levels of the industry in submissions to a number of the reviews undertaken by the State Government. In particular the work of the Technical Taskforce on Mineral Tenements and Land Title Applications, facilitated by the National Native Title Tribunal (NNTT) member Mr Bardy McFarlane in 2001, has identified the scope of the problems being faced and the underlying reasons for the backlog in title applications. Reports arising out of these reviews are annexed to this submission.

The Taskforce made a number of recommendations to address the problems. These recommendations have largely been endorsed by the Government and they are now being implemented. It will, however, take some time to fully implement the recommended changes as they will require legislative amendments and the development of heritage protocols.

The State Government approach to native title processes is based on applying the Commonwealth NTA procedures, including, where necessary, the NNTT mediation and arbitration roles. The Technical Taskforce recommendations are aimed at improving the overall efficiency of the processes and maximising the number of exploration titles (Exploration Licences and Prospecting Licences) that can be granted under the expedited procedure provisions of the NTA thereby avoiding the lengthy delays associated with the Right to Negotiate process.

A key element of these changes will be the development of standardised heritage survey protocols that can be applied to exploration activities on titles granted under the expedited procedure.

The current Government has indicated that it will not attempt to develop State alternative native title regimes as was attempted by the previous Government. This decision has implications for the Commonwealth Government as it will need to ensure that its NNTT is adequately resourced to deal with the very considerable work load that is and will be generated by the large numbers of exploration and mining titles that are required to sustain the industry in this State.

Recommendation: The Commonwealth increase funding of the NNTT in order to deal in a timely manner with the large number of mineral and petroleum titles required by WA to ensure sustainability of its resources industry.

The State Government has also undertaken a review of the Native title claim process in Western Australia. This review, which was carried out by Paul Wand and Chris Athanasiou in 2001, has made a range of recommendations aimed at speeding up the resolution of the large number of outstanding claims in Western Australia. The Government's objective is to resolve as many claims as possible through the non-litigious mediation processes that will lead to consent determinations.

The early resolution of claims is important as it will create far more certainty for the exploration and mining industry. Companies will know who the correct native title holders for a particular area are. This in turn will make negotiations much easier as they will not be required to negotiate with multiple claim groups over the same area. Negotiations will also be assisted through the formation of Prescribed Native Title Bodies Corporate to represent and act on behalf of native title holders.

Again, there are implications for the Commonwealth in ensuring that adequate resources are provided to the Native Title Representative Bodies to enable them to prepare connection reports and represent claimants in the mediation process with the State and other interest holders. Adequate financial assistance from the Commonwealth to ensure that native title holders can establish functional Prescribed Native Title Bodies Corporate following claim determination will also become increasingly important. The Commonwealth will also need to ensure that the NNTT has adequate resources to fulfill its role in the claim mediation process under the NTA.

Recommendation: The Commonwealth ensure that adequate resourcing is available to Native Title Representative Bodies, and to establish Native Title Bodies Corporate to allow them to be actively represented in the development of the State's resources.

There are many factors that influence where companies and individuals choose to spend their exploration dollars. Workable and cost effective native title processes will be essential if additional exploration expenditure is to be attracted to Western Australia. The State Government has initiated wide-ranging changes to policies, procedures and legislation to address the issues and provide simpler, more certain and cost effective native title process in Western Australia. Assistance will be required from the Commonwealth Government to ensure that the NNTT, the Representative Bodies it has established and emerging Prescribed Native Title Bodies Corporate have the resources necessary to keep pace with the changes being made at the State level.

Aboriginal heritage issues

The submissions from industry groups to the Technical Taskforce on Mineral Tenements and Land Title Applications, the Review of the Western Australian Project Development Approvals System and the Ministerial Inquiry to Identify Strategies to Increase Resources Exploration in Western Australia have identified a number of problems with Aboriginal heritage survey processes. The problems identified result in delays to title approvals and work programs, excessive costs and the duplication of surveys. The overlap between State and Commonwealth heritage protection legislation has also been identified as a problem area.

The State Government has accepted the recommendations of the Technical Taskforce that a Heritage Protection Working Group should be formed to address heritage issues that arise in the context of the NTA and the *Mining Act 1978*. The initial task of this working group will be the development of protocols that can be applied to heritage surveys for exploration purposes. The Taskforce did, however, recognise major inadequacies in the State's *Aboriginal Heritage Act 1972* (AHA) and its interaction with the NTA and Mining Act processes. The Taskforce has therefore suggested that a complete overhaul of the current system is required. It has proposed that once the Heritage Protection Working Group has completed its initial work in respect of exploration heritage protocols it should proceed with a more general review of heritage protection and management issues.

The Commonwealth has undertaken a review of its *Aboriginal and Torres Strait Islander Heritage Protection Act* and prepared new legislation which ran into difficulties in the Senate. One of the desirable features of this new legislation was provision for accreditation of suitable State regimes which would remove the problems that have arisen in the past because of the overlap between the State and Commonwealth legislation.

The adoption of Commonwealth legislation that would enable the accreditation of compliant State legislative regimes would assist the industry as there would be certainty that having complied with the State process they would not be subject to a separate Commonwealth process. Resolution of the impasse over the proposed Commonwealth legislation would greatly assist the State in reviewing its own legislation and preparing new legislation that could be accredited by the Commonwealth.

Recommendation: The Commonwealth should-

a) use its best endeavours to enact revised heritages legislation that could be used to accredit compliant State legislation.

b) in co-operation with the States, agree where possible on Australia-wide heritage protocols.

Indigenous Protected Areas (IPAs)

The State Government and the mining industry have concerns that the declaration of IPA's will introduce an additional level of referrals and approvals, which will discourage exploration.

The Indigenous Protected Areas program is part of the Commonwealth's National Reserve System program, an initiative under the Natural Heritage Trust. Indigenous owners can voluntarily declare their land, or land in which they have an interest through lease hold, reserves and determined native title as an IPA for the purpose of promoting biodiversity and cultural resource conservation on these lands. The land is then managed in accord with internationally recognised protected area International Union for Conservation of Nature (IUCN) conservation standards.

There are concerns that although the establishment of IPA's is a Commonwealth policy and it is not governed by any legislation, the perception of the wider community may view the IPA declaration as being like a national park with restricted or no access. One of the requirements of the creation of an IPA requires a control on land-use activities that may affect the natural or cultural values. This management approach may result in restricting access.

Further, the declaration of IPA's with management conservation categories under IUCN standards may be determined as a strict nature reserve or national park under IUCN categories I and III and not category VI managed resource protected area, which provides for multiple use. It will be important that where there is mineral or petroleum prospectivity IUCN category VI is the adopted management option.

In regard to pastoral leases in WA, Aboriginal groups and corporations own approximately 50 pastoral leases and the Aboriginal Lands Trust manages a number of Aboriginal reserves. If these pastoral leases or part of the leases and reserves are declared as IPA's there will be changes in management of the areas, which have potential to alienate other uses including exploration and development over a large area of the State.

Recommendation: The Commonwealth review its policy on Indigenous Protected Areas with a view to ensuring that reasonable access for resource exploration and development is not impeded.

Recommendation: The Commonwealth ensure that the International Union for Conservation of Nature (IUCN) is the adopted conservation management option for IPA's.

Relationships with Indigenous Communities

In many parts of Western Australia the exploration industry (as distinct from resource productive) is a significant economic activity that provides employment and purchases services from local communities.

Over the last decade or so the industry has made very significant efforts to develop improved relationships with Aboriginal communities in the areas within which it operates.

The conduct of heritage clearance surveys is a significant economic activity for many of the older traditional owners. It is also an important social activity as it is an acknowledgement of their special relationship with their country and provides them with opportunities to visit and spend time in their country. Some companies employ community members to work with their exploration teams and engage indigenous enterprises to undertake aspects of the work such as drill hole capping, rehabilitation work and general contracting.

There is also a significant amount of "in kind" assistance provided to indigenous communities by exploration companies. A number of community water bores have been established by exploration drill rigs. Exploration companies have been involved in providing emergency assistance to remote communities through the provision of aircraft and helicopters for evacuation, and repairs to plant and equipment. There are also many cases where accommodation units and other equipment has been provided to communities when it is no longer required by the company. The development of access roads and airstrips by exploration companies have also provided greatly improved access for many remote communities.

Most companies now realise that they need to build strong relationships with the indigenous communities in their area of operations. A good relationship established during the exploration phase will make it much easier for companies to negotiate agreements that will enable them to develop mining operations.

Many of the larger exploration companies now include cultural awareness training for their exploration personnel. These training programs are an important way of helping both the community and the company personnel to better understand each other.

As mentioned earlier in this section, the State Government has taken a very constructive approach to reviewing land access, native title, cultural and heritage issues relating to exploration and has endorsed most of the recommendations of the Technical Taskforce facilitated by Mr Bardy McFarlane of the NNTT. In implementing these recommendations, the State has attempted to promote a focus on positive consultation processes and the protection of heritage, cultural and common law rights of Aboriginal people.

Already there are a number of creative partnerships between the indigenous communities and resources developers within the State.

The State is currently drafting a State Sustainability Strategy which is likely to contain recommendations relating to the achievement of sustainability in indigenous communities.

Overall the State's approach to mineral and petroleum resources development is to promote the opportunity for Government, Resources Developers and Indigenous Communities to develop mutually beneficial sustainable partnerships.

Summary of Recommendations

Recommendation 4.1: The Commonwealth increase funding of the NNTT in order to deal in a timely manner with the large number of mineral and petroleum titles required by WA to ensure sustainability of its resources industry.

Recommendation 4.2: The Commonwealth ensure that adequate resourcing is available to Native Title Representative Bodies, and to establish Native Title Bodies Corporate to allow them to be actively represented in the development of the State's resources.

Recommendation 4.3: The Commonwealth should-

a) use its best endeavours to enact revised heritages legislation that could be used to accredit compliant State legislation.

b) in co-operation with the States, agree where possible on Australia-wide heritage protocols.

Recommendation 4.4: The Commonwealth review its policy on Indigenous Protected Areas with a view to ensuring that reasonable access for resource exploration and development is not impeded.

Recommendation 4.5: The Commonwealth ensure that the International Union for Conservation of Nature (IUCN) is the adopted conservation management option for IPA's

Term of Reference 5

Environmental and other approval processes

Relevance of the Western Australian Review of the Project Development Approvals System to the Prosser Inquiry

Background

In September 2001, the Western Australian Minister for State Development announced the establishment of an independent committee to review the approvals process for major projects. Following wide consultation with stakeholders, the Committee submitted a Final Report (also known as the "Keating Report") to Government, outlining its findings and recommendations to streamline the decision-making process.

The Final Report was released in May 2002 for a period of public comment. Comments from public submissions and government approvals agencies are being collated, and will be considered by the Ministerial Steering Committee that has been established to oversee the review process. A progressive implementation programme will follow for those decisions supported by the Steering Committee and endorsed by State Cabinet.

Purpose and Scope of the Review

The objective of the Review of the Project Development Approvals System was to develop a system of government decision making that is coordinated and integrated, clear and unambiguous, that is balanced between community and developer needs, and that will lead to Western Australian being the global location of choice for project investment.

The terms of reference for the Review stated that the scope could include projects in any sector of investment that falls broadly within the State Development portfolio, and specified that, with respect to the resources sector, exploration was to be included in this scope.

Whilst the bulk of the Review's discussion relates to project development approvals, certain sections pertain to mineral and petroleum exploration processes and approvals. The description of relevant State and Commonwealth legislation and processes are contained in Chapter 4 and Appendix 4 of the Report. Discussion and recommendations pertaining to minerals and petroleum exploration and approvals (annexed) are included in Chapter 5 (Sections 5.3 and 5.4). Information and recommendations relating to other approval processes, such as native title or environmental assessment, are generally provided in the

context of development projects, but may also have indirect relevance to exploration activity. A copy of the Report has been annexed.

Findings of the Keating Report Relevant to Minerals Exploration

- The Western Australian mining legislation appears to operate well in a technical sense, and that the processes for obtaining mineral and exploration titles are well set out and well documented;
- Recognition of native title rights has made the process of granting access to land more difficult, and has created greater uncertainty and delay in the issuing of exploration and mining tenements;
- Following the Baxter Case reference, there is increasing pressure to introduce environmental assessment into the process for grant of land tenure at the mining lease application stage, rather than the Notice of Intent (NOI) stage, as is presently the case under current administrative arrangements. The timing of environmental assessment could affect exploration activities in situations where exploration licence holders need to apply for mining leases to complete exploration activities, but do not have a project to put forward for proper environmental assessment. This need is caused by the Mining Act 1978, which has no provision to extend a Prospecting Licence, and no guarantee that extension to Exploration Licences will be granted.

Recommendations Relevant to Minerals Exploration

The recommendations contained in the Keating Report that are most pertinent to, and have potential for some impact on, minerals exploration are outlined below:

Recommendation 25

The Mining Act should be amended to absorb retention licences into exploration and prospecting licences. Following those amendments, mining leases should only be able to be applied for where the application is accompanied by a proposal for mining that includes a mining plan and is capable of being assessed by the EPA, unless the exploration title was granted before the amendments.

This recommendation could contribute to a reduction in the backlog of title applications within MPR, as exploration licence holders would not be required to convert to mining leases as frequently as present. The absorption of retention licences into exploration licences would avoid the need to trigger native title processes with the application for an RL. Additionally, if rental fees under the combined RL/EL are unaltered, the cost to industry of retaining land for exploration would be reduced.

Recommendation 26

The existing process for granting mining leases should continue as an interim measure. However, there should be a public notification of any NOI submitted for a new mining operation, with the public having the opportunity to refer the NOI to, and appeal the level of environmental assessment set by, the EPA.

Recommendation 26 and 27 relates to interim arrangements, contingent on the implementation of recommendation 25. However, it serves to significantly delay the impact of recommendation 25.

Recommendation 30

Non-confidential data on Aboriginal sites should be examined for practicality of inclusion in the Tengraph system operated by MPR and, if practical, included in the system.

This recommendation would improve the availability/accessibility of existing information on Aboriginal heritage sites.

Recommendation 51

The government should build on the progress made by the Western Australian Land Information System (WALIS) and in consultation with proponents and stakeholders, invest in the development of a major projects information system as a one-stop-shop approach that links the databases referred to above and ensure consistency and accessibility of those databases. Given the size of the task, priority should be given to those locations that are the subject of most major development activity or prospectivity.

A first step of the exploration cycle for a new tenement holder is a data search and compilation. The output from Geological Survey and Statutory Operations reports is already available to the public and well developed, however, this recommendation may be of benefit to future exploration activities if data sets through government are integrated and presented with a common user interface, as well as an extension of data availability.

Findings of the Keating Report Relevant to Petroleum Exploration

- As with mining, petroleum legislation operates well in a technical sense, but difficulties have been experienced in handling native title. Significant delays occur in award of onshore exploration permits as the native title process is not started by the Department of Mineral and Petroleum Resources until the bidder for an area has been selected. For offshore areas, claimants or holders of native title have procedural rights under the Native Title Act, and these must be complied with before title can be granted;
- The Review outlines areas of misalignment of priorities and processes in cross-jurisdictional areas between the State and Commonwealth (Keating, Chapter 4);
- The complexity of petroleum legislation is highlighted;
- Access to land, efficient and effective acreage release and basic information necessary for this to occur are addressed by the Review and recommendations made. These are particularly of relevance to petroleum exploration;
- The continuing role of the Department of Mineral and Petroleum Resources as a one-stop-shop within government is recommended.

Recommendations Relevant to Petroleum Exploration

The recommendations contained in the Keating Report that are most pertinent to, and have potential for some impact on, petroleum exploration are outlined below:

Recommendation 32

A comprehensive guide to the petroleum legislation that clearly sets out the requirements, in an integrated fashion across the various pieces of legislation, should be available in user-friendly electronic form. Where guidelines or standards are available and accepted by the regulators, these should also be included.

This recommendation is designed to provide developers with improved information on petroleum processes within government and an integrated guide to the various pieces of petroleum legislation.

Recommendation 34

As requested by industry, government should provide additional information as part of the acreage release process. This should go beyond the technical information presently provided and include information relating to approvals, baseline environmental information, native title matters and Aboriginal heritage sites.

Building on the recommendations to increase data capture, assimilation, coordination and transfer of information from within government, this recommendation suggests that petroleum acreage release packages should include a variety of basic and baseline land information. This should allow bidders to better identify issues in gaining access for their exploration programmes.

Recommendation 35

Actual or potential native title parties should be identified before blocks are released for bid and a contact point identified. Consultation processes should be used to develop protocols to cover exploration and development activity on relevant lands, preferably before release of acreage, but certainly before selection of the successful bidder.

As an addition to recommendation 34, in respect to native title, it is recommended that early stage consultation takes place between Government and native title parties, with a view to protocols being established before acreage release takes place.

Recommendation 36

Where Commonwealth permits are involved, MPR and the Department of Industry, Tourism and Resources (DITR) should work to a known time schedule to assess, offer and award exploration permits and the processes should be consistent between the State and Commonwealth offshore areas.

This recommendation is to provide improved coordination between the State and Commonwealth in the evaluation of exploration permit awards.

Recommendation 39

Multiple and added layers of environmental approvals for exploration and development in the marine sector should be avoided. This could be achieved by approving exploration programs rather than individual wells and by involving all relevant agencies in the process (eg. CALM and the Marine Parks Reserves Authority, as well as the Department of Environment and Water Catchment Protection (DEWCP), EPA & Environment Australia).	*The recommendation attempts to provide for broad environmental clearances over marine areas, perhaps akin to strategic and outcome based conditions, for exploration programmes, rather than multiple clearances related to each individual activity.*

Recommendation 42

The industry and MPR are encouraged to agree on the changes required to the State offshore petroleum legislation to ensure that there is a proper match restored between the State and Commonwealth and that this match is maintained in any future changes to legislation.	*This recommendation is intended to restore compatibility between State and Commonwealth offshore legislation, thus providing consistency of rules for proponents.*

Conclusion

The majority of the Keating Report recommendations relating to exploration activity are aimed at improving State approvals mechanisms, processes and legislation. It should be noted, however, that significant delays can occur in the handling of petroleum exploration permits due to the misalignment of priorities and approval processes between State and Commonwealth jurisdictions.

Recommendation 5.1: Following endorsement of the Keating Report by the WA Government, the Commonwealth embrace relevant actions and particularly:

a) in co-operation with the States, work towards streamlining of environmental approvals for both exploration and development projects

b) where Commonwealth permits are involved, the Western Australian Department of Mineral and Petroleum Resources and the Department of Industry, Tourism and Resources (DITR) should work to a known time schedule to assess, offer and award exploration permits, and the processes should be consistent between the State and Commonwealth offshore areas.

Recommendation 5.2: The Commonwealth support the principles and objectives of sustainability as outlined in the draft State Sustainability Strategy.

Term of Reference 6

Public Provision of Geoscientific Data

The public provision of geoscientific data is acknowledged as a key mechanism of raising investors' perceptions of the prospectivity of an area and is essential in attracting and maintaining exploration expenditure in Australia.

In terms of the provision of pre-competitive data, Australia is fast slipping behind other nations that also have good prospectivity (e.g. Namibia, Brazil).

Attractors for resources exploration

There are a number of factors that govern exploration companies' decisions to engage in mineral or petroleum exploration in a particular area. These include:

- The prevailing political regime, comprising both the perceived "sovereign risk" (to do with political stability and the risk of "arbitrary" or "populist" legislative changes to ownership of assets) and what is sometimes called "country risk" (of lawlessness, restriction of movement, and the soundness of basic infrastructure);
- The legislative regime, including access to land (in a reasonable time frame), security of tenure, "convertibility" of tenure (the guarantee that an exploration licence can be converted to a production licence if a deposit is discovered) and restrictions on ownership;
- The fiscal regime, including aspects such as taxes (federal, state and local), royalty payments, and repatriation of profits.

These political, legislative and fiscal (PLF) aspects are often the deciding factors when a company is considering making an exploration investment in a particular country or region. By their nature, these factors are difficult to change (particularly the political factors governing sovereign and country risk) as there are many interrelated aspects that will have impacts throughout the economy.

However, even with the best global PLF factors, companies will not engage in a new exploration venture (or maintain an existing venture) if it is of the opinion that a region has poor prospectivity.

Prospectivity

Prospectivity may be defined as the perception of the likelihood of finding an ore deposit or petroleum (oil or gas) field. It is the fundamental criterion for resource exploration attraction: a company that does not believe that a resource can be discovered will not invest regardless of the PLF regimes prevailing (other than for money laundering or "sting/scam" operations).

The presence or absence of an undiscovered mineral or petroleum discovery is "fixed" in the sense that it is either there or not there. However, an explorer's perception of the likelihood of finding an undiscovered deposits (the prospectivity) can be changed by a number of mechanisms.

The primary mechanism for changes in perception of prospectivity is the news of new discoveries. Unfortunately, new discoveries do not occur without exploration and exploration will not occur without the perception of prospectivity.

Fortunately, there are two, interrelated secondary mechanisms, that are relatively easy to implement and for relatively little cost. These are:

- Pre-competitive geoscientific information;
- Research.

Pre-competitive geoscientific information

Low-cost, easy access to publicly provided pre-competitive geoscience information can, for a relatively modest outlay by government, have a dramatic impact on raising an explorer's perceptions of prospectivity.

New, regional geological, geophysical, geospectral and geochemical maps, data and analyses will highlight aspects of a region that were previously unknown, thus stimulating opportunities for new discoveries.

At a more detailed level, exploration maps, data, reports and analyses from previous explorers, when archived and catalogued in a way that allows easy access, enables explorers to test new ideas without necessarily having first to acquire the basic data.

By comparing geoscience signatures of known resource deposits and prospective areas, explorers are able to extrapolate their ideas into new areas that may have similar signatures (at both regional and local scales).

Thus, pre-competitive information has a double impact as an attractor for exploration investment:

- It can directly improve an explorer's perception of prospectivity; and

- Improving the efficiency of exploration activities as multiple explorers do not have to duplicate others efforts and can divert their funds into direct exploration surveys and drilling.

Research

Research into new technology and new conceptual models for resource deposition will also stimulate exploration in two ways.

Firstly, new technology enables better and more efficient geoscience data acquisition, analysis and dissemination, reducing the cost (to government and to the industry).

When applied to widely available pre-competitive information, particularly new data, research projects may lead to the development of new concepts that can be re-applied to existing data, thus amplifying the effect of the information.

Recommendation: The Commonwealth increase funding for geoscience research in universities and CRCs.

Cost-benefit

The cost of providing subsidised (for low cost to user) data and research to the mineral and petroleum resources sector is low relative to the benefits (financial, economic and social) received by the Australian community from employment and government revenues.

The processes for generating and disseminating pre-competitive information and for research are well known and can be readily applied, requiring only the application of funds.

However, federal funding for pre-competitive data via Geoscience Australia has been severely reduced over many years despite clear evidence that the growth of the exploration sector in the past shows a strong correlation with the Australian Bureau of Mineral Resources' (the original form of Geoscience Australia) programs to provide geological and geophysical maps across Australia.

Clearly, the various States cannot carry the responsibility of funding these programs alone, particularly considering the significant benefits that are returned to the Commonwealth. WA, with the largest area and the predominant segment of Australian resource sector, is particularly poorly funded for the provision of pre-competitive data and research (both relative to other states and in an absolute sense).

The way forward

An independent investigation into the appropriate level of funding for the Geological Survey of Western Australia (GSWA), the Western Australian agency that has the mandate for the provision of pre-competitive geoscience information, was recently commissioned by the Western Australian Government. The 'Fardon report' (Task Force to review the programs and funding of Geological Survey of Western Australia, chaired by Dr Ross Fardon) has made a strong case for substantial increases in funding for the provision of new geological,

geophysical and geochemical data acquisition programs in Western Australia. A copy of the report is annexed to this submission; the rationale put forward for investment in Western Australia is applicable to the rest of the nation as well.

The injection of federal funding into Australian pre-competitive information and research would have significant potential benefits. This could be done through Geoscience Australia working cooperatively with the States, all of which (and Western Australia in particular) have developed excellent working relationships. Geoscience Australia has widely recognised strengths in geoscience data acquisition, processing, and interpretation.

Channelling funds via Geoscience Australia into Western Australia would have considerable leverage because of Western Australia's already pre-eminent position in the Australian resources sector in the eyes of both domestic and international investors.

With its highly effective and efficient infrastructure and staff, GSWA may be the most productive of State Surveys in terms of the volume of high-quality output. Thus it is well placed to assist Geoscience Australia in implementing projects with minimal delay and would provide an optimum starting point for the injection of new Commonwealth funding in the provision of pre-competitive geoscientific information.

In undertaking projects, both State geological surveys and Geoscience Australia should focus on parts of the work program that match their respective competitive advantages. Geoscience Australia has advanced skills in airborne geophysical data collection, image, processing, and has world-class laboratory facilities for geochemical and isotopic studies. On the other hand, State geological survey organisations have well developed field-based geoscience mapping skills. Both are necessary for effective, modern geological surveys.

The Commonwealth receives significant benefits by way of taxes associated with the resources sector. As Western Australia is the largest State, and provides the greatest contribution to these taxation payments, it is timely for the Commonwealth to contribute more to pre-competitive geoscience information gathering in W.A.

Recommendation: The Commonwealth increase funding to Geoscience Australia in order to:

a) undertake modern airborne and ground-based geophysical surveys and high-technology laboratory-based studies in greenfields and frontier areas in order to kick-start new exploration investment

b) build seamless geoscience and mineral deposit databases available free of charge to investors via the internet.

Specialised promotion of petroleum information

Recognising issues that member companies are facing, as well as longer term declining onshore exploration, APPEA proposed processes for the release and award of new exploration acreage that could potentially resolve many of these issues. The proposal was called the Accelerated Exploration process. The Department of Mineral and Petroleum Resources is

testing the approach with a specific area gazettal for three application areas in the eastern Canning Basin, which were released at the APPEA Conference in April 2002. The Department has included pre-competitive data and interpretations on compact discs (CD), which contain, in addition to usual details about applying for areas:

- Information about land access, particularly Native Title and Aboriginal Heritage. This includes a letter of endorsement from the Ngaanyatjarra Land Council indicating that it is in favour of responsible exploration and production;
- A report on the hydrocarbon potential of the area. A number of large leads and prospects have been identified based on re-interpreted seismic data;
- Base-case economics for oil development.

During the year, the Department of Mineral and Petroleum Resources promoted the exploration potential of the State (onshore and offshore) at the APPEA Conference in Adelaide, and in Houston at the American Association of Petroleum Geologists (AAPG) Annual Meeting and the North American Prospect Expo (NAPE). The aim is to attract new players, particularly North American independents who are a target market for onshore exploration. Based on feedback from potential investors that ready exploration targets would be attractive, the Department of Mineral and Petroleum Resources, in conjunction with industry, has continued to publish the farm-out booklet, 'Western Australian Petroleum Opportunities'. The booklet has been distributed around the world and has assisted in raising the profile of Western Australia onshore and State waters areas. Finally, the Department of Mineral and Petroleum Resources has endeavoured to facilitate current exploration activity through efficient administration and working to continuously improve legislation and processes.

Importantly, for longer term sustainability, the Government funded a five-year programme of Petroleum Exploration Initiatives that has gathered pre-competitive geoscience information on frontier onshore sedimentary basins, including the Perth, Southern Carnarvon, Canning and Officer Basins, which through to 2001–2002 had a total budget of $24 million. The programme is funded for the foreseeable future at $3.5 million per year. Results of the basin studies programme are continuing to emerge as the Geological Survey Division assembles and distributes the information, as hard copy and as digital data and reports.

The Department of Mineral and Petroleum Resources has made petroleum data more accessible to the worldwide petroleum industry. An upgrade has been completed to the Department's Western Australian Petroleum Information Management System (WAPIMS) database to a more robust platform, which allows the interrogation of open-file petroleum data through a spatial web-based system. The database contains information on petroleum titles, wells, geophysical surveys and other exploration reports submitted to the Department by petroleum explorers. This means that a geologist in Houston, for example, can look via the internet at well logs from Western Australia.

Summary of Recommendations

Recommendation 6.1: The Commonwealth increase funding for geoscience research in universities and CRCs.

Recommendation 6.2: The Commonwealth increase funding to Geoscience Australia in order to:

a) undertake modern airborne and ground-based geophysical surveys and high-technology laboratory-based studies in greenfields and frontier areas in order to kick-start new exploration investment

b) build seamless geoscience and mineral deposit databases available free of charge to investors via the internet.

Term of Reference 8

Contributions to Regional Development

The resources sector makes a highly significant contribution to the development of the State economy. With much of the activity of the sector carried out in the regions of WA it follows that development of the sector implies economic development in the regions in which it operates.

The State's natural resources, the resources sector's efficiency in developing them and its global leadership in technological and scientific development, are key areas of Western Australia's comparative advantage. It is the resource sector's key role in the State's comparative advantage that underlines its importance.

For optimal economic development, it is important for Western Australia to make the most of its comparative advantages. In relation to the resources sector, this means developing our comparative advantages in natural resource industries and the service and technology industries that support them. It means adding value to the basic resources we have in abundance through downstream processing.

Should an inadequate level of exploration activity take place in WA, a potential consequent decline in the resources sector risks a significant negative impact on State and regional development in Western Australia.

Infrastructure- key to developing Western Australia's resources endowment

The following sections highlight the contributions of the mineral and petroleum industries to the State's economy and in particular to the economies of regional Western Australia. Within these following sections there are many details of the infrastructure that has been developed or is required to support this major sector of the State's economy. In particular the regional mineral province studies which have been undertaken between the Commonwealth and the State provide an essential link between the mineral potential and the infrastructure requirement to ensure sustainable development.

Exploration as the first phase in the discovery and development of resources in regional Western Australia requires significant infrastructure to give contemporary Australia a comparative first world advantage over other competing nations.

At the turn of the century the Western Australian Government developed a water pipeline from Perth to Coolgardie/Kalgoorlie to sustain the exploration, discovery and development of the State's eastern goldfields region.

In the 1960's the State in conjunction with the private sector provided incentives through reduced royalties and rentals to iron ore, alumina and nickel companies to encourage the development of private towns, airports, railways and ports.

The town of Karratha, the largest new town in Australia since World War II, is a direct result of the Western Australian Government providing significant infrastructure to support the Pilbara iron ore developments and subsequently the North West Shelf petroleum industries.

In the 1980's the State also underwrote the initial development of the North West Shelf project at considerable risk through a take or pay contract of some $7 billion together with the development of the Dampier to Bunbury gas pipeline at a cost of $1 billion.

All of this infrastructure development in regional Western Australia has been at considerable economic risk to this State.

Recommendation: The Commonwealth acknowledges the enormous direct economic risk and cost shouldered by the people of Western Australia to encourage the private sector to invest in exploration, discovery and development of the State's mineral and petroleum resources endowment.

The recent visit by the Grants Commission to Western Australia and particular to the Burrup Peninsula in the Pilbara emphasise the substantial infrastructure funds required not only to support the export of our national gas endowment as LNG, but also to add value through further processing of our mineral and petroleum resources endowment. The recent LNG to China contract and the additional royalties to the State further underline the anomalies in the Grants Commission formulas for funding the State. The LNG to China contract is a "no gain to the State to fund further infrastructure".

Recommendation: The Commonwealth acknowledges that the Grants Commission methodology needs review to ensure that disincentives to development are removed. In particular:

a) The State's funding of regional infrastructure to support a globally competitive mineral and petroleum industry is fully reflected.

b) All costs faced by the private sector in developing mineral resources are taken into account in measuring States' capacity to raise royalties.

c) Costs of States' regional subsidies for power, water and transport are fully reflected.

d) The costs of developing and maintaining the State road network to support economic activity are fully reflected.

The Western Australian Resources Sector in Broad Terms

Western Australia's resource industries form the foundation that underpins the State economy.

- The sector is the largest single contributor to Gross State Product, around 23% in 2000-01;
- WA's largely export-oriented economy is heavily reliant on the resources sector as a source of exports. Exports from WA's mineral and energy sector exports were estimated at $22 billion in 2001 making up around 70 % of the State's exports. Strong growth in export values in alumina, iron ore, petroleum, gold and LNG were the key drivers of exports over the year;
- Total direct employment in the minerals and petroleum sectors in 2001 was approximately 42,000 persons with indirect employment estimated at 126,000 persons. Accordingly, the total contribution of the resources sector to State employment in 2001 was estimated to be around 168,000 persons (about 18 % of the total WA labour force);
- Economic research carried out by the Economic Research Centre of the University of Western Australia (Clements and Johnson, 1999) indicated that 55 % of all the jobs created in WA in the 1990's resulted from resources industry expansion;
- The Department of Mineral and Petroleum Resources' statistics show that even though revenue growth has moderated recently, the total value of sales in the resource sector has nevertheless increased to record levels. After a dramatic 51 % record increase in the value of sales in 2000, the Western Australian mineral and petroleum industry consolidated those gains with relatively moderate growth of 5.6 % in 2001 to reach $27.2 billion;
- Despite overall slower growth of the Western Australian mineral and petroleum industry in 2001, it is noteworthy that compared to the value of mineral and petroleum production ten years ago, the current level is over 2.2 times that amount. This is a solid average annual growth rate of 8.4 % per annum and represents a doubling of the value of production every nine years, far outstripping growth of the economy in general;
- Business investment in WA is highly dependent on activity in the State's resources sector, with around 56 % of the State's investment being accounted for by the sector in 2001. This compares to only 41 % in 2000.

Importance of the mineral sector in regional WA

As the Western Australian Treasury (2002) noted, "Unfortunately, quality data on regional Western Australia are not available.....(though)...some inferences can be drawn from the available data.." The data are also often dated. It is, therefore, difficult to fully illustrate the impact of the resources sector on the regions.

However, the Department of Local Government and Regional Development has collated some data that give a feel for this impact. Much of the analysis in the Section is drawn from that Department's data (www.dlg.wa.gov.au, and various Regional Economic Perspectives published in 2001).

As Table 8.1 illustrates, the key regions in terms of size of mining sector activity are clearly Goldfields-Esperance, Peel, the Mid-West and the Pilbara. The South West has also

developed significant capacity in terms of minerals processing. Figure 8.1 shows the location of regions within Western Australia.

Table 8.1 shows mining employment being concentrated in the regions of Goldfields-Esperance, Mid-West, Peel, the Pilbara and the South West. Regional mining employment makes up over 60 % of employment in the sector, with the Perth metro area accounting for 38 %. The significant share of mining employment in the Perth metro area, in comparison to its share of output of 0.1 % reflects in part the impact of fly in-fly-out employment which means that regional mines can operate with less economic impact in the region in which the mine is located. It also partly reflects the growth of Perth-based mining services companies over recent years.

Table 8.1: Mineral production and employment in WA's regions 1990–00

Region	*Value of mineral production ($ millions)*	*Proportion of State total %*	*Direct employment*
Gascoyne	70.8	0.3	150
Goldfields – Esperance	3026.2	14.2	5,816
Great Southern	2.9		127
Kimberley	891.1	4.2	247
Mid West	1,648.5	7.8	1,637
Peel	2,761.5	13.0	1,352
Pilbara	11,717.3	55.1	5,044
South West	614.1	2.9	1,900
Wheatbelt	509.0	2.4	881
Sum of Regions	**21,241.5**	**99.9**	**17,189**
Perth metro	17.2	0.1	10,836
Not specified	7.8		356
WA State Total	**21,266.5**	**100.0**	**28,381**

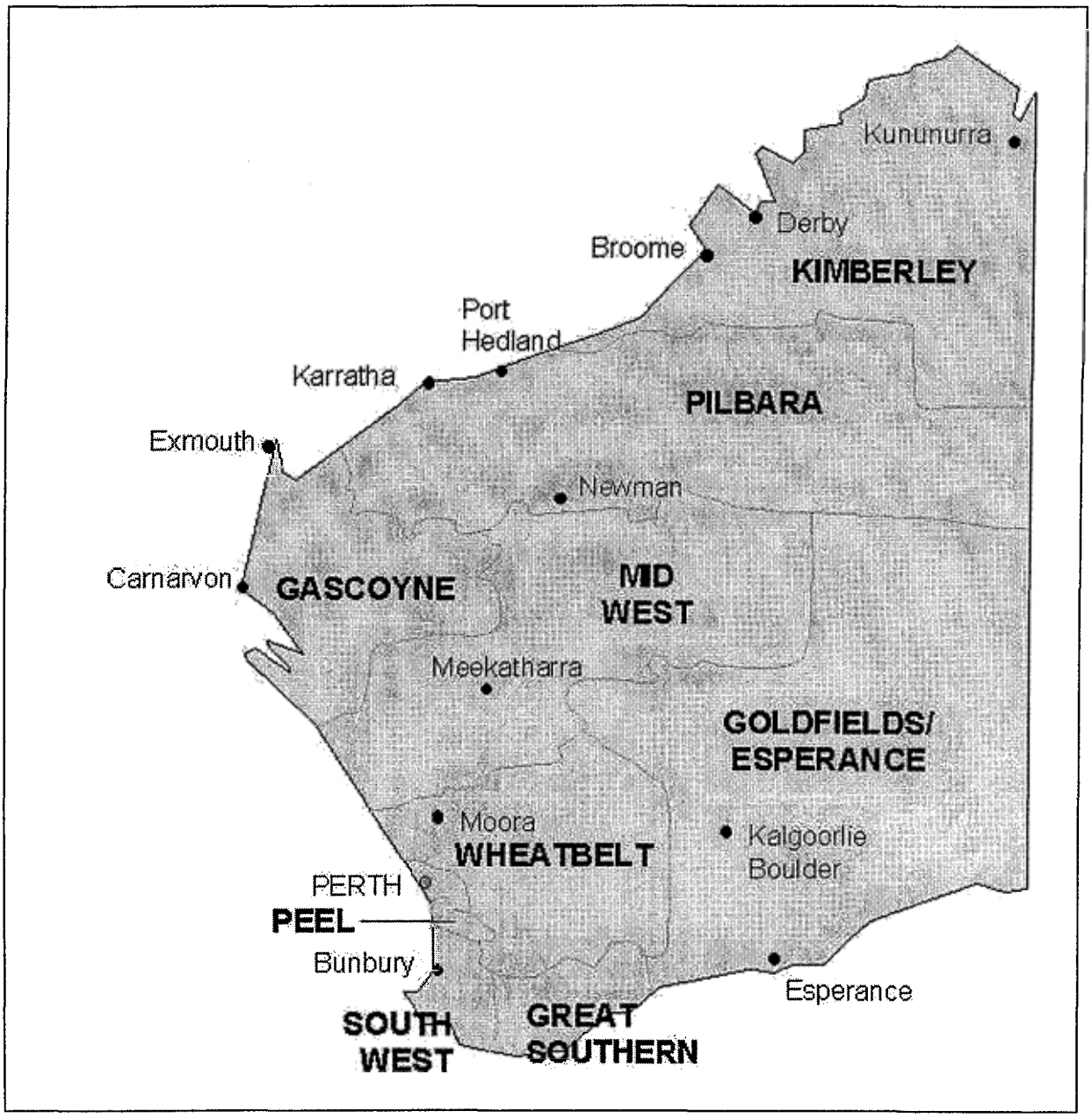

Figure 8.1 Map showing regions of Western Australia

The increase in fly-in-fly-out (FIFO) employment naturally reduces the regional development impact of the resources sector. One factor contributing to this is the weakness inherent in the operation of the zone allowance rebate system. One element of the system's weakness is that the real value of the rebate has been eroded. The second element is that the rebate is available to FIFO personnel and thus there is no incentive for regional location.

While particular regions are the focus of mining activity in the State, most regions are significantly affected by resources sector activity.

Recommendation: The Commonwealth should review the zone allowance rebate system so that it more effectively compensates for the disadvantages of living in areas remote from major cities.

The Kimberley

While the Kimberley has a relatively small share of the State's mining activity, minerals and petroleum activity is important for the regional economy. On average over the period 1997-98 to 1999-00, minerals and petroleum accounted for over 46 % of the production/turnover of the eight largest industries in the region. Mineral and petroleum production was valued at $891 million in 1999-00, representing 4.1 % of the State's total.

Mining accounted for around 4.8 % of the region's employment in 1996, having experienced an annual average decline of 3.6 % a year since 1991.

The Pilbara

Reflecting its predominance in the State's resources sector – over 55 % of State production/turnover, the Pilbara is dominated by the iron ore and petroleum industries.

The resources sector, as a whole accounted for well over 90 % of production/turnover in the region on average over the three year period 1997-98 to 1999-00.

The 1990s has seen a rationalisation of the mining labour force in the Pilbara due to international competitive pressures and technological change. Over the period 1991 to 1996, direct employment in the sector has fallen by an average rate of 5.6 % a year. However, the expansion of mining activity, as a move to value adding in the industry has occurred, is expected to see higher employment opportunities in the region.

Illustrating its key importance in the region, the mining sector in 1996 accounted for around 27 % of the region's workforce.

The Gascoyne

Mining accounted for around 14 % of the Gascoyne region's production/turnover on average over the period 1997-98 to 1999-00. While it is a small component of the State's mining sector, however, it has grown by 3.6 % since 1998-99.

The mining sector labour force has continued to contract, with employment declining at an annual average rate of 16.8 % over the period 1991 to 1996.

The Mid-West

The mining sector is a dominant force in the Mid-West region, based on gold, mineral sands, zinc, petroleum products and natural gas. The sector accounted for nearly 50 % of production/turnover in the region over the three year period 1997-98 to 1999-00.

Employment in the Mid West is changing from being driven by primary industry (agriculture, fishing, and mining) towards greater employment opportunities in mineral processing, manufacturing, construction and service industries.

Goldfields-Esperance

Extraction and processing of mineral resources predominates in providing the Goldfields-Esperance region with economic development, accounting for over 61 % of production/turnover over the period 1997-98 to 1999-00. Gold is the major resources sector at 43 % of production in the region with nickel the other major resources industry at 18 %.

Employment has grown steadily in the Goldfields-Esperance region over the past decade.

The mining sector remains a key employer accounting for 22 % of total regional employment in 1996. The provision of services to mining and their employees also provide employment opportunities in other sectors.

Wheatbelt

The mining sector plays an important role in the Wheatbelt economy and accounted for 14.1 percent of regional production/turnover in the period 1997-98 to 1999-00 with gold and heavy mineral sands the key outputs.

Employment in the resources sector in the Wheatbelt has grown over the period 1991 to 1996, rising by an annual average rate of 6.4 %.

Peel

The Peel region is a diverse economy based on mining and mineral processing, with major bauxite and gold mining and processing operations. The sector accounted for over 65 % of production/turnover in the period 1997-98 to 1999-00.

Mining employment has grown modestly in the Peel region over 1991 to 1996.

South-West

The South West is a highly diverse regional economy with significant mineral deposits as well as hardwood forests, manufacturing, agriculture retail and tourism. Mineral extraction, processing and manufacturing together account for the largest share of the regional economy. Mining includes the extraction of coal, mineral sands tantalum and tin, while processing focuses on the production of aluminium and synthetic rutile. Mineral manufacturing focuses on production of titanium dioxide and silicon.

Great Southern

Mining has a fairly limited impact on the Great Southern, which focuses on agriculture, construction, tourism and manufacturing.

Importance of the petroleum sector in regional WA

In addition to projects already underway, which include the fourth LNG Train and the second Trunkline on the North West Shelf with a capital cost of $2.4 billion, several other gas and oil projects are planned including:

- 12 upstream oil and gas projects involving $5.8 billion in capital expenditure; and
- 10 downstream value-added gas projects involving $10.7 billion in capital expenditure.

These projects will benefit Western Australians through:

- increased revenue for Government;
- increased employment, with approximately 9000 direct new jobs during construction and 1300 direct new permanent jobs;
- further indirect employment when multipliers are applied;
- regional development; and
- increased infrastructure.

The most important revenue source for the State from these projects comes from royalties on petroleum production. Petroleum royalties for 2000 01 amounted to $500 million. Royalty revenues are projected to decline as existing production declines. Figure 8.1 illustrates crude and condensate production forecasts to the year 2010. Some of the new projects will increase production from royalty areas, although the majority will be in Commonwealth waters outside State royalty areas. The best opportunity for maintaining royalty revenues is from onshore and State waters areas.

Other State revenues are accrued from taxes including payroll tax and stamp duty.

A study by APPEA in 1999 indicated that the petroleum industry directly employs about 2000 people in the State and 19 350 in total (including indirect employment through the multiplier effect). A study of the North West Shelf Project by the Economic Research Centre, completed in 1994, estimated net employment from that project to be more than 105 000 people in Western Australia throughout its operating phase. New projects (as shown in Table 8.3) would be expected to add over 9000 jobs during construction and 1400 permanent positions (not including indirect employment through the multiplier effect).

The growth of the town of Karratha is a good case study to illustrate the impact of these projects on regional development. The APPEA study indicated that since 1971, the population of Karratha has increased by nearly 450%. The greatest increase (4098 people) occurred between 1976 and 1981. The population also grew rapidly between 1986 and 1991 (1792 people) due in particular to the onset of the second phase of the North West Shelf Gas Project.

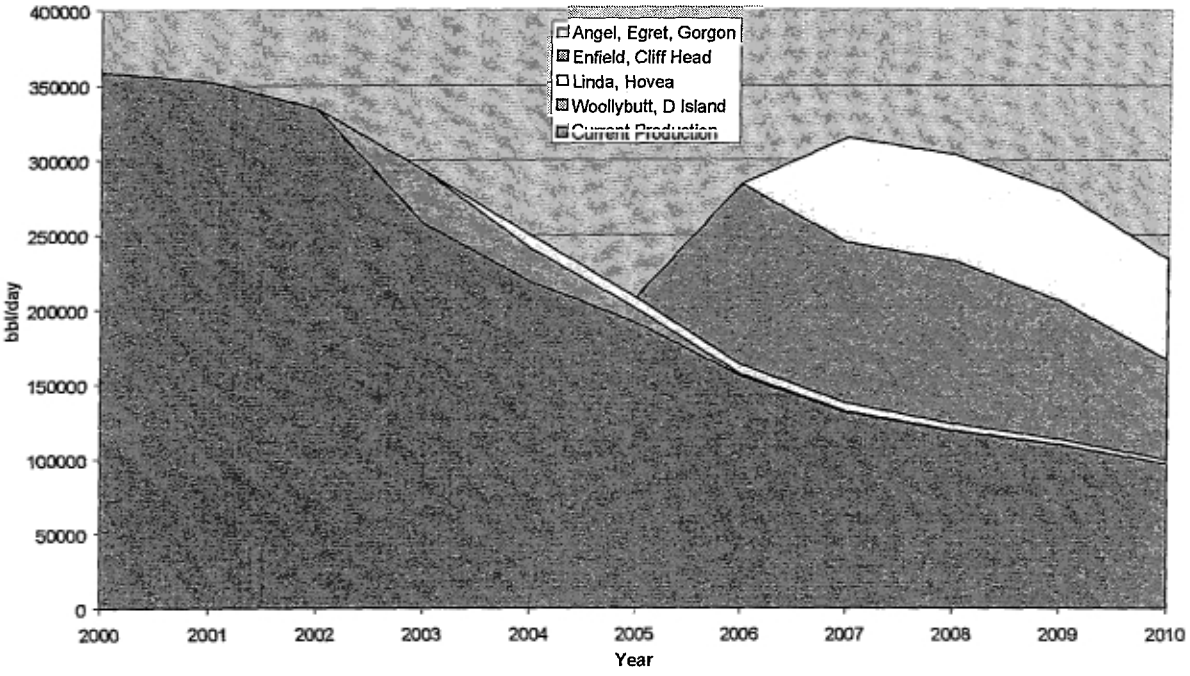

Figure 8.2 Liquid hydrocarbon production forecast for Western Australia to 2010

Growth in the retail sector in the Shire of Roebourne since 1979–80 has also been substantial. The number of retail establishments increased by 31%, and employment in the retail sector by 130%, with most of that increase occurring between 1985–86 and 1990–91. Turnover has tripled and the most significant variation has been the floor space taken by retail establishments, which actually decreased between 1979–80 and 1985–86 by 40% and then increased by nearly 320% between 1985–86 and 1991–92. Not surprisingly, the peaks and troughs in the retail industry mirrored the activity of the mining and petroleum industries in the region, as did housing and construction approvals.

Additionally petroleum companies have been substantial investors in townsite facilities. At the time of the APPEA report in 1999, the North West Shelf Joint Venture owned 676 houses or units in Karratha, had a substantial townsite office and marine service facility at King Bay, and the processing plant on the Burrup Peninsula. The company also owned and

managed a cultural facility at the Tambrey Centre. A number of petroleum companies also operate supply bases or warehouses out of Dampier and Karratha. The Woodside supply base on the Burrup Peninsula and the Woodside-constructed Dampier public wharf both provide port facilities for general cargo as well as supply bases for offshore petroleum operations.

The North West Shelf Joint Venture has invested over $60 million in Karratha townsite facilities. This infrastructure supports Woodside personnel located in the town, but it also provides facilities for other users. The general town infrastructure provided in Karratha includes:

- contributions to hospitals, schools, water supplies and the caravan park — $32.5 million;
- community facilities, including the airport, landscaping of ovals, day and child care centres, sporting facilities, a cultural centre, boat ramps, a community centre, theatres and library — $14 million; and
- roads and a public wharf — $17 million.

Recommendation: The Commonwealth acknowledges that the regional development of Western Australia is dependent on the prospectivity of our mineral and petroleum resources and of ensuring a globally competitive mineral and petroleum industry in regional areas for future national benefits with a strong local focus.

Regional Minerals Studies

The Regional Minerals Program was established in August 1996 by the Federal Government to encourage a coordinated regional approach to minerals development.

It involves a partnership between the Commonwealth and State Governments and industry to:

- provide an overview of the mineral resources and the potential for mineral and processing development in selected regions;
- assess the infrastructure and government services of a region and develop proposals to overcome impediments; and
- facilitate a coordinated approach to the regional minerals developments.
- fund studies to identify infrastructure requirements and options to remove regional impediments to the economic development of mineral industries. It particularly encourages enhanced levels of exploration, mining and processing activity. The studies make recommendations on ways to reduce costs to industry, encourage valued added processing and create employment in regional Australia

A number of Regional Minerals Studies have been undertaken in Western Australia covering the Central Pilbara, Mid West and Southern Cross – Esperance areas. A study of the East Kimberley – Tanami area is currently underway. Of these studies, two have particularly focussed on the needs of the exploration industry.

The Southern Cross – Esperance Study (August 2000) found the area to be highly prospective for a range of minerals and has significant potential for further mineral and downstream processing development over the next 10–15 years. However, while highly prospective, the area remains underexplored, due to limited geoscientific information, land access constraints over a significant portion of the area, and limitations imposed by a lack of proper road infrastructure in the more remote central parts of the study area.

The Study identified a need for infrastructure improvements for the mineral development potential of the area to be realised. Improvements are required to cater for existing and new mining projects, to facilitate better access to the area for further mineral exploration and to encourage the growth of existing communities.

The East Kimberley – Tanami Regional Minerals Study was established with the aim of promoting increased interest in the area by mineral explorers/developers and maximising the local benefits derived from any future mineral developments.

Preliminary findings include:

- large parts of the East Kimberley – Tanami area are highly prospective for minerals, particularly gold, platinum group minerals, nickel, lead-zinc, tantalum and diamonds. The Tanami area has been identified as the most prospective area for gold after the Golden Mile.

- the area is under explored relative to its prospectivity and relative to the adjacent Tanami area in the Northern Territory. The principals reasons for this are:

- the lack of precompetitive exploration data provided by the State Government;

- its remoteness, difficulty of access and high exploration costs; and access difficulties to Aboriginal lands.

Exploration activity has increased markedly during the past two years in areas of obvious mineral potential, but not in areas where the mineral potential is less certain.

This study is due to be completed in August 2002 and will be making recommendations addressing these key findings.

Regional Minerals Studies have provided valuable input into the planning and development of various resource regions in Western Australia. Where regions are highly prospective, such as the Southern Cross-Esperence and East Kimberley-Tanami, but remain under explored, due to limited geoscientific information, land access constraints and limitations imposed by a lack of proper infrastructure, there is a need for both enhanced information and infrastructure improvements for the mineral development potential to be realised.

Recommendation: The Commonwealth increase the funding available under the Regional Minerals Studies Program to better resource implementation of findings regarding the need for better geoscience information, infrastructure, and investigation of land access arrangements.

Conclusions

It is clear that the State economy relies to a significant degree on growth and ongoing development in the resources sector. It provides many of the comparative advantages that underpin the success of the WA economy in raising standards of living. While the sector is not uniformly important across all the regions of the State, for many it is a significant element, both in terms of its output and in terms of employment. The ongoing strength of the resources sector is of vital importance for the WA economy and sustained development in the regions of the State. Adequate levels of exploration underpin this strength. A sustained deterioration in exploration expenditure would have significant consequence for the regions and the State economy as a whole.

Summary of Recommendations

Recommendation 8.1: The Commonwealth acknowledges the enormous direct economic risk and cost shouldered by the people of Western Australia to encourage the private sector to invest in exploration, discovery and development of the State's mineral and petroleum resources endowment.

Recommendation 8.2: The Commonwealth acknowledges that the regional development of Western Australia is dependent on the prospectivity of our mineral and petroleum resources and of ensuring a globally competitive mineral and petroleum industry in regional areas for future national benefits with a strong local focus.

Recommendation 8.3: The Commonwealth acknowledges that:

a) ***Western Australia contributes substantially more in taxes and other revenues to the Commonwealth than it receives back in Commonwealth expenditures (including grants, services and personal benefits).***

b) ***Not only do tax and royalty revenues from Western Australia directly contribute to the welfare of other States, but the economic activity and foreign exchange generated by the State's export sector contributes significantly towards sustaining jobs and income for the rest of Australia.***

c) ***To sustain Western Australia's substantial contribution to the federation, the Commonwealth needs to provide a greater overall level of assistance to the State through revenue or expenditure measures.***

Recommendation 8.4: The Commonwealth acknowledges that the Grants Commission methodology needs review to ensure that disincentives to development are removed. In particular:

a) ***The State's funding of regional infrastructure to support a globally competitive mineral and petroleum industry is fully reflected.***

b) ***All costs faced by the private sector in developing mineral resources are taken into account in measuring States' capacity to raise royalties.***

c) Costs of States' regional subsidies for power, water and transport are fully reflected.

d) The costs of developing and maintaining the State road network to support economic activity are fully reflected.

e) The costs of expanding social infrastructure to support economic growth are fully reflected.

Recommendation 8.5: The Commonwealth should review the zone allowance rebate system so that it more effectively compensates for the disadvantages of living in areas remote from major cities.

Recommendation 8.6: The Commonwealth increase the funding available under the Regional Mineral Study Program to better resource implementation of findings regarding the need for better geoscience information, infrastructure, and investigation of land access arrangements.

References

Clements, K.W., and Johnson, P.L., 1999. Minerals and regional employment in Western Australia: Economic Research Centre, Department of Economics, The University of Western Australia.

Department of Treasury and Finance, 2002. Regional economic conditions in Western Australia: Economic Research Articles, Western Australia Department of Treasury and Finance, Perth.

Included with submission no. 84 were the following attachments which have been taken as Exhibits 26 - 29:

Attachment 1. Wand, P and Athanasiou, C. September 2001. **Review of the Native Title Claim Process in Western Australia, Report to the Government of Western Australia**. 141p. (Exhibit 26)

Attachment 2. Government of Western Australia, Technical Taskforce on Mineral Tenements and Land Title Applications November 2001. **Final Report.** 290p. (Exhibit 27)

Attachment 3. Government of Western Australia, April 2002. **Review of the Project Development Approvals System Final Report**, 268p. (Exhibit 28)

Attachment 4. Fardon, R et al., October 2000.**Task Force to Review the Programs and Funding of Geological Survey of Western Australia, Report**, multiple pages. (Exhibit 29)