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FOREWORD



L C Ranford
DIRECTOR GENERAL

A handwritten signature in dark ink that reads "Lee Ranford". The signature is written in a cursive style with a period at the end.

Western Australia's mineral and petroleum industry experienced a healthy 8.6% growth rate in 1997, with value of production exceeding \$17 billion. This is more than twice the value of production in 1987, measured in dollars of the day, and represents a growth rate of about 9% per annum. The resources sector continues to be the backbone of the Western Australian economy with the value of production from this sector accounting for around 30%, directly and indirectly, of State Gross Product; about 70% of the State's exports; and 65% of private new capital expenditure. Petroleum again experienced solid growth of almost 10% and has consolidated its position as the leading resource in Western Australia. Only gold and crude oil experienced a decrease in value of production in 1997.

With these figures in mind it is understandable that Western Australia continues to be most concerned about the effect of the Native Title Act 1993 on industry access to the State's mineral and energy resources. In 1997 the Commonwealth Government introduced a Bill to Parliament to amend the Native Title Act by clarifying and streamlining the native title process. Although the Senate declined to pass a form of the Bill that was acceptable to the Government, it is hoped that as a nation we can find a way to resolve the issues of native title for the benefit of all Australians. Another issue of crucial concern to all involved in the resources industry is safety. It is an oft repeated truism that mining and petroleum production are risky activities, however this should not in any way lead to a complacent attitude like 'accidents will happen'. Every injury and death has a cause and the Government, industry and unions are working together to reduce those causes. To this end the current State Government is committed to encouraging the integration of work place safety into industry culture. Equally, the Government places a high priority on, and is committed to, promoting best practice environmental management.

Of all the commodity sectors, the gold industry experienced a most dramatic time in 1997 with the significant decrease in its US dollar price. The potential negative impact of this price fall was off-set to some extent by the depreciation of the Australian dollar and the use of hedging contracts by major gold producers. Nonetheless it has resulted in some rationalisation of the gold industry which should lead to increased efficiency and competitiveness.

In the final months of 1997 the beginnings of the Asian crisis, as it is known, started to impact on other economies. There has been concern about the implications of this disturbance for Western Australia's commodity exports. This edition of the Digest addresses this concern and concludes that the adverse impact on the State's resources sector is likely to be constrained. It should be noted that this projection is based on the expectation that world institutions are successful in implementing plans to restore stability. Qualifying this is the unpredictable nature of world markets.

The matters referred to above are described in some detail in this Digest. The information and statistics were assembled by the Department with assistance from the Australian Bureau of Statistics, Australian Bureau of Agricultural and Resource Economics and resource companies. I thank these organisations for their cooperation and help.

1. ECONOMIC AND SOCIAL ENVIRONMENT

1.1 World Economy Review

Economic performance mixed.

The world economy grew strongly in 1997 at an estimated 3.8%. However economic performance was mixed. The US economy grew by 3.8% and Western Europe by 2.5% whereas the Japanese economy grew by only 1.2%.

The outlook for Asia is crucial in assessing world economic growth prospects. The Australian Bureau of Agriculture and Resource Economics (ABARE) forecasts that world economic growth will decline to 3.0% in 1998 and then strengthen to 3.5% in 1999 as economic activity in Asia begins to recover.

Other economic analysts argue that the recent financial instability in Asia will not cause a world recession since Europe and North America are likely to grow above trend and these countries make up 60% of the world economy.

Chronology of recent financial upheaval in Asia.

South East Asian economies entered a period of financial upheaval after the Thai baht was floated in July 1997. Over the period of June to December 1997 the baht depreciated 90% in US dollar terms. This was followed by further sharp declines in the foreign exchange, property and equity markets. These events revealed major financial problems in the South East Asian countries including unsustainable banking and corporate debt, the absence of sound prudential supervision and the lack of corporate transparency. These problems in addition to excess investment, over-production, and current account deficits led to the market perception that the economies in the region were fundamentally unsustainable. In response investors lost confidence, withdrew funds and share markets collapsed across the South East Asian region.

Initially the crisis was limited to the South East Asian economies and commentators argued that Australia need not be too concerned since our major export markets (South Korea, Japan and China) were unaffected. However it has become evident that Korea has suffered a similar fate largely independent of events in South East Asia. South Korea's financial troubles can be attributed to irresponsible borrowing and lending by large corporations and banks in South Korea itself.

Economic policies for recovery.

The financial crisis suffered by Asian countries has forced their governments to address the structural imbalances in these economies. In particular, the need for financial assistance from the international community, through the International Monetary Fund (IMF), has forced Thailand, Indonesia and South Korea to negotiate structural adjustment programs, many of which are now being implemented. The reforms on which the financial assistance packages are based include: active monetary and fiscal policies; deregulation measures; and reductions in tariff and non-tariff barriers to trade.

The recent financial upheavals in many Asian countries are expected to result in a significant slowdown of economic growth in the Asian region. Economic growth in Asia (excluding Japan) is assumed to average 3.8% in 1998, before recovering to 5.5% in 1999 (ABARE). These growth assumptions are markedly lower than the estimated 6.5% in 1997 and 7.8% in 1996.

Japan experienced slow economic growth in the 1990s.

Overall the Japanese economy has grown little in the 1990s and in the past year Japan has entered a period of renewed uncertainty experiencing a series of destabilising events including sharp fiscal contraction, financial market

instability and the collapse of several financial organisations. These events have resulted in a loss of private sector confidence which is evident in weak private sector activity. Japanese household consumption is at the lowest level in more than 28 years and the recent liquidity problem in Japan's financial sector is constraining private sector investment. Net exports have been buoyant, but the recent sharp depreciation of exchange rates in South Korea and major South East Asian countries (namely Thailand, Indonesia, Malaysia and the Philippines) is likely to decrease demand for Japan's exports to this region. These Asian countries were the destinations for around 20% of total exports from Japan in 1996. They also compete with Japan in other markets.

*Moody's downgrades
Japan's credit rating.*

Early April 1998 saw the news of a record 10 trillion yen (\$120 billion) in bad loan losses, a Bank of Japan's survey confirming a broad-based recession, the Chairman of Sony Corp., Mr Norio Ohga, warning that the Japanese economy was close to collapse and the outlook for Japan's sovereign credit downgraded from stable to negative by Moody's Investors Service. The Japanese Prime Minister, Mr Ryutaro Hashimoto responded that since Japan has no external debt and is the world's biggest creditor nation, the economy was not about to collapse.

Clearly, confidence needs to be restored in Japan's financial sector. The Government needs to address the problems in this area by protecting depositors, merging or closing weak financial institutions and avoiding a 'credit squeeze'. Stimulatory measures are needed to boost economic activity. Given that interest rates are low, and unlikely to be reduced further, monetary stimulus is not a viable option. The Japanese Government is therefore reliant on budgetary expansion to stimulate domestic demand, in addition to financial reforms, to restore private sector confidence in the economy.

*Japan under pressure to
implement appropriate
financial and economic
policy.*

At the Asian Europe Summit Meeting (ASEM) in London in early April 1998 the Japanese Government was subject to pressure from other ASEM members to provide a stimulatory policy package for the Japanese economy. The Japanese Prime Minister, Mr Hashimoto, announced to ASEM a new economic stimulus package including tax cuts, increased public sector spending and measures to stabilise the financial system. The policy package also included increased lending by government financial institutions to help counteract the impact of the credit tightening imposed by the Japanese banks. However, it was noted that the proposed fiscal stimulus was likely to contain only half the headline figure originally announced and, therefore, not enough to stimulate domestic demand. In addition, the increased lending by government financial institutions may be directed predominantly at rolling over existing debt.

*Outlook for Japan -
unclear.*

The short term outlook for Japan remains uncertain, with the main risk being that the current financial upheaval in South Korea and South East Asia could have a further negative impact on business and consumer confidence, leading to a greater slowdown in Japanese private consumption and investment spending. Partially offsetting this subdued domestic outlook, the external sector is expected to support moderate growth in 1998, underpinned by continued growth in the non-Asian economies, which account for around 60% of Japanese exports. Economic forecasters believe in general that Japan will show between 0 to 1% growth in 1998 compared with an estimated 1.2% in 1997 and 3.9% in 1996. However, it has been reported that OECD economists are to downgrade forecasts for the Japanese economy from minus 0.1% in 1998 to minus 0.3%.

Rate of economic growth in China to slow in the short term.

A further risk to growth in the East Asian region and to Western Australia's growth is that China will experience similar financial problems to other parts of East Asia. As the world's seventh-largest economy, the impact of any financial crisis in China is likely to be significantly larger than the impact of the crisis in South Korea, Indonesia and Thailand. China had a competitive edge until recently because of the large currency devaluation in 1994. Its exports have boomed as a result and kept output growth strong. However, with the large depreciations in the currencies of South Korea and South East Asian countries, China has lost international competitiveness. The recent financial instability in South Korea and South East Asia has also had the effect of reducing China's exports to these regions. This reduction in demand, together with the loss of international competitiveness, is likely to result in slower growth for China.

Devaluation of the Chinese currency would maintain international competitiveness but be damaging to foreign investment, which relies on exchange rate stability. The market will not force China to depreciate its currency, unlike other Asian countries, because China has capital controls preventing free movement of funds. In addition the Chinese government is adamant that it will not devalue the currency.

Appropriate financial and economic policy.

In order to maintain investor confidence, the Chinese Government is implementing reforms to its own financial system, has lowered interest rates and recently announced plans to drop quotas on lending by state-run commercial banks. The Chinese Government has also cut tax on exports, is planning to boost infrastructure spending and has recognised the need for reforms to State owned enterprises in order to increase efficiency and competitiveness. In the medium term these measures should underpin relatively solid economic growth in China. However, in the short term reform of state owned enterprises is likely to result in significant job losses which will have a negative impact on the growth rate. Despite these potential problems the Chinese economy is expected to grow by 8.5% in 1998, the highest rate of all Asian countries.

Economic outlook for the Asian region uncertain.

It is too early to be certain about the outlook for the Asian economies given the possibility of political and social problems in Indonesia, a deepening Japanese recession, or a spread of instability into China. The length of recessions will vary given different problems and responses in different countries. Thailand has the fallout from the collapse in asset prices, while Indonesia has severe structural problems. South Korea is probably best placed because it has excess capacity in export industries which should boom due to the low exchange rate. Even so, severe debt problems mean at best recovery is not likely until 1999.

Some recovery in the financial sector but real economic adjustment still to come.

After the sharp falls in 1997 Asian sharemarkets and exchange rates have risen in 1998. Sharemarkets have rebounded in several countries (South Korea, Taiwan, Indonesia Thailand and Japan) since the end of 1997. Most Asian exchange rates have risen against the \$US since mid January 1998. The notable exception to this is Indonesia. However, even if financial markets are stabilising, the real economies will still suffer in a lagged reaction to high interest rates, financial failures, bank credit squeezes and low private sector confidence. Despite efforts of the IMF to assist Asia there is likely to be some slowing in

growth of these economies in the short term as domestic demand adjusts to the loss of wealth. In sum, although the worst may be over in the financial markets, (and this is not guaranteed), socially and politically painful real economic adjustments, namely increasing unemployment, are still ahead. However what is relevant from the perspective of Australia and Western Australia is that the fall in domestic demand in these countries is expected to be offset by stronger contributions from the external sector. This has been particularly noticeable with improvements in competitiveness resulting from currency depreciations in East Asian economies. There has already been a recovery in export growth in Thailand and South Korea since the onset of the crisis.

Important to avoid credit squeeze in Asia.

One of the major inhibiting factors to rapid recovery in the Asian economies would be the emergence of credit restrictions as major world financial institutions became wary of lending to business in Asia. If this were to happen the effect would be to restrict the ability of manufacturers to purchase raw materials, which would therefore have a direct impact on Western Australia's exports. This situation is not expected to eventuate since credit availability is being monitored by the IMF and the governments in the region. It is anticipated that corrective action would be taken if signs of such a credit squeeze should emerge.

United States economy remains robust.

The United States economy is into its seventh year of expansion. Economic growth further strengthened to 3.8% in 1997 up from 2.8% in 1996. Consumer spending, in particular retail and motor vehicle sales, remains strong as does business investment, while growth in new home sales is the strongest in over ten years. In addition, despite the appreciation of the dollar, exports remain robust. Despite this strong domestic demand and tightening labour market, inflationary pressures remained subdued, with the consumer price index increasing by 2.4% in 1997, the lowest rate of increase in the index since 1986.

Economic growth in the United States is expected to moderate gradually in the short term. Consensus forecasts indicate that the rate of economic growth is expected to fall from 3.8% in 1997 to 2.7% in 1998. Increased private consumption expenditure and business investment spending are likely to be the main factors contributing to growth. Net exports are expected to decline sharply in response to the strong appreciation of the US dollar over the past year. Even with a strong dollar and moderate growth, the inflation rate is expected to remain low. Consequently, monetary policy is expected to be stable in the short term.

Outlook for Western Australia's European major trading partners remains favourable.

ABARE forecasts that overall growth in Western Europe will average around 2.5% in 1998 and 2.7% in 1999, compared with an estimated 2.5% in 1997 and 1.5% in 1996. ABARE notes that the financial upheavals in Asia have been generally treated as a distant event in Western Europe. This reflects Western Europe's relatively small trade with Asia (around 9.0% of exports). However, the exposure of European (especially German) banks to some of the financially troubled Asian economies appears to be high. The consequence of this high debt exposure could be that Western European banks will be influenced by defaults in South Korea and South East Asia with resultant negative financial and economic effects in Western Europe. Nevertheless the outlook for Western Australia's European Major Trading Partners (MTPs) continues to be favourable. The United Kingdom economy continues to grow strongly, underpinned by

robust domestic demand. The resultant tight labour market conditions and emergence of inflationary pressures has led to an increase in interest rates. In response, economic growth is forecast to ease over 1998 and 1999 to around 2.2% and 2.1% respectively. In Germany the pattern of growth remains uneven, with continued domestic weakness offset by growth in the external sector.

Encouraging outlook for Eastern Europe.

There have been encouraging indications from some Eastern European countries, namely Poland and Hungary, that the process of structural economic reform is taking effect. The main indicator is that economic growth in Eastern Europe is forecast to strengthen to 3.5% in 1998 from an estimated 2.8% in 1997. Russia and the Ukraine have continued to underperform relative to expectations. Although there are signs that economic conditions in Russia may have stabilized, output in the Ukraine has declined further. This decline can be attributed to the lack of structural reforms in the Ukraine which is likely to affect economic activity adversely in the short term.

Overview of the Australian economy.

Australia's inflation rate slowed in 1997.

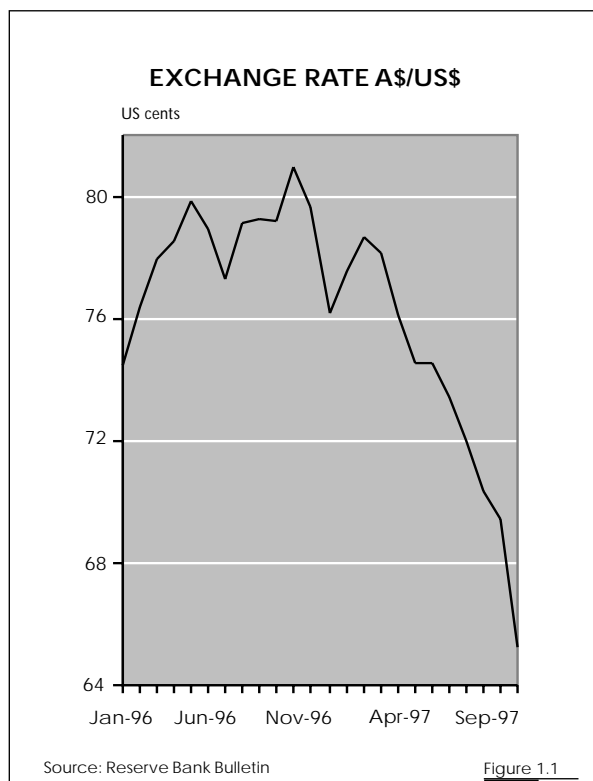
1.2 Review of the Western Australian and Australian Economy

Australian Gross Domestic Product (GDP) grew by 2.9% in real terms in 1997. Economic growth in Australia recorded an annual rate of 3.6% in the December quarter 1997, compared with 3.5% in the September quarter and 3.6% in the June quarter.

Australia's headline inflation rate has moderated markedly from its recent high in 1995. The consumer price index increased by 0.3% in 1997, compared with 2.6% in 1996 and 4.6% in 1995. Other price indices released recently indicate that inflationary pressures in Australia could increase from the recent very low levels. For example, import prices rose by 4.2% in the December quarter 1997, compared with 2.7% in the September quarter and a fall of 0.5% in the June quarter. ABARE expects the headline inflation rate in Australia to average around 0.7% in 1997-98 before increasing to 2.5% in 1998-99. The underlying rate of inflation (headline rate excluding the effect of mortgage interest and consumer credit charges), is assumed to average 2.0% in 1997-98 before increasing to 2.5% in 1998-99.

After remaining stable in 1995-96, short term interest rates declined gradually during 1996-97 as the official rate was reduced. Prime lending rates declined to 8.5% in mid-1997, compared with 9.3% in early 1997 and 10.8% in mid-1996. Given the current volatility in the Australian dollar and the outlook for continued low inflation, ABARE assumes that prime lending rates will remain around their current low levels in the short term, to average 8.5% in 1997-98 and 1998-99, compared with an average of 9.7% in 1996-97.

In response to the financial upheavals in Asia, the Australian dollar depreciated markedly against the US dollar in late 1997, before recovering partially in early 1998. On a trade weighted basis, the Australian dollar appreciated marginally over the same period due mainly to significantly weakened Asian currencies.



Despite the uncertainties in Asian markets, ABARE forecasts the value of Australian commodity exports will increase by 5.2% to \$64.0 billion in 1997-98, and will stay around that level in 1998-99. The increase in the value of commodities is largely the result of lower value of the Australian dollar.

Export earnings from the mineral resources sector are forecast to rise by 8.6% to \$39.8 billion in 1997-98. The lower exchange rate is cushioning the effect of lower US denominated prices on world markets. With world prices for most mineral resources forecast to decrease on average in the short term, the value of Australian minerals exports is forecast to rise less than 1% in 1998-99.

There has been increasing dependence of world growth on developments in Asia over the past ten years (1988-1997). Over that period the share of world income generated in Asia increased from 7% to 27%. The importance of Asia in general as an export destination for Australian commodity exports increased over the same period but not as dramatically as for South East Asia. For agriculture, the share of Australia's exports

going to South East Asia more than doubled between 1988-89 and 1996-97. The story for Australia's mineral exports is similar. Between 1988-89 and 1996-97 Asia increased its share of Australia's mineral exports by 9 percentage points. However, Australia's direct exposure to Japan declined (and exposure to South Korea and the rest of Asia increased dramatically).

It is only in the energy sector that there has been some minor variation in this pattern. Asia has become slightly less important as a destination for Australian energy exports, and Australia's overall exposure to Japan has decreased. Nevertheless, in 1996-97, 61% of Australia's energy exports went to Asia, accounting for \$8.5 billion out of a total \$13.9 billion of export earnings.

Given this increase in exposure to Asia it would be expected that economic downturns in Asian trading partners would adversely affect Australia's commodity exports and in turn economic growth. ABARE forecasts an increase in Australia's current account deficit, mainly reflecting lower exports as a result of the economic slowdown in Asia, and the effect on Australia's foreign debt of a weaker Australian dollar.

Economic analysts have mixed views on the effect of the Asian downturn on Australia's future growth.

ABARE forecasts Australian economic growth to increase from 2.7% in 1996-97 to 3.7% in 1997-98 before easing to 3% in 1998-99. This was below Commonwealth Treasury's budget forecasts which predicted that growth of 3.7% in 1997-98 would slow to 3.3% in 1998-99 as the fallout from Asia's economic crisis took hold in Australia. The latest quarterly business survey prepared by the National Australia Bank indicates that the Asian situation could slow Australia's GDP growth to 2.3% over next year. However, other commentators emphasise the offsetting effect of strong growth in domestic demand on Australia's output growth.

Western Australia's economic activity rebounded strongly in the second half of 1997 following a subdued first half.

The pace of growth in Western Australia's domestic economy strengthened substantially in the second half of 1997. The domestic economy grew by 3.3% in the year to September 1997, up from 1.1% in the year to June 1997. In trend terms, State Final Demand in Western Australia rose by 2.1% in the December quarter, the strongest rate of growth for all States. This performance was mainly a result of strong growth in private consumption, dwelling investment and business investment.

A gradual improvement in consumer spending over the first half of 1997 accelerated further in the second half. In 1997 overall private final consumption grew by 3.2% up from 2.4% in the year to the September quarter 1997.

As expected, business investment made a strong recovery in the September quarter due to expenditure on a number of large industrial projects. Business investment rose by 6.7% in the December quarter and contributed 1.2 percentage points to overall domestic growth. Non-residential investment rose by 9.7% while plant and equipment investment rose by 5.4% in the December quarter. In 1997 business investment rose by 6.2% and dwelling investment rose by a healthy 10.3%, the strongest annual rate since the year to March quarter 1995.

In 1997 public consumption and public capital spending grew by 4.6% and 22.0%, respectively. The large increase in capital expenditure in 1997 primarily reflected the Collie power station, the infill sewerage project, upgrading of the Dampier-to-Bunbury gas pipeline, and Westrail's locomotive replacement program.

An improvement in labour market conditions in the second half of 1997 followed the strengthening in domestic activity. Employment grew by around 1% per quarter in trend terms in the September and December quarters after declining in the June quarter. At the same time the unemployment rate fell from 7.2% in the June quarter to an average of 6.9% in the December quarter.

Growth in prices and incomes moderates.

Growth in wages, salaries and supplements was 2.9% in the December quarter, taking annual growth to 3.7% in 1997, down from 6.9% in 1996. Underlying inflation pressures remain moderate. The implicit price deflator for private final consumption expenditure (a broad measure of inflationary pressure) increased by only 0.3% in the December quarter taking the rate to 1.0% in 1997.

External sector still growing in 1997.

Despite recent problems in the Asian economies, the impetus to growth from the external sector continues. In nominal terms net exports grew by a strong 11.3% in 1997. Although exports to Asia as a whole continue to grow at a healthy pace, exports to Thailand, South Korea and Malaysia have fallen in recent months.

Strong growth in domestic activities expected in the short term.

Treasury's leading index of Western Australian economic activity, which draws together the information provided by various forward indicators of economic growth, suggests continued strong growth in domestic conditions over the near term. Growth in the leading index appears to have stabilised at around 10% per annum, which suggests an acceleration in domestic demand growth of around 5.0% to 6.0% in the near term.

There has been considerable speculation in the media about the future implications of the Asian financial instability and subsequent economic slowdown for Western Australia. State Treasury's assessment of the impact on the Western Australian economy from the Asian economic problems is that although the Asian economic instability will have some negative impact it is not expected to be catastrophic to the economy overall. While Treasury acknowledges that the East Asian economic problems will have some negative impact on Western Australia, particularly within the next 18 months, it recommends caution in interpretation of projections on future recovery since scenarios suggested by some commentators will be dramatically negative.

The implications for the Western Australian economy of East Asian economic instability.

The effects of the East Asian downturn on the Western Australian external sector are tempered by the fact that the State's exports are dominated by primary commodities which are inputs into the export industries of South East Asia. Thus the demand for these commodities is largely dependent on the level of activity in these export industries. This level of activity is likely to remain high since the main markets for East Asian exports (USA and Europe) are continuing to grow strongly and the depreciation of the East Asian currencies increases their international competitiveness.

Western Australia exports a diverse range of commodities and in addition the State is well placed to diversify into alternative export destinations. In particular the depreciation of the Australian dollar serves to enhance the competitiveness of Western Australia's exports of goods and services to Europe and the United States. Increasing demand from these markets is already evident and is expected to largely offset any fall in demand from Asia.

State Treasury estimates that the identifiable impact of recent events in Asia on Western Australia will be a reduction in growth in 1998-99 of around 1.0 percentage point. This reduction reflects downward revisions to both exports and investment. This is generally consistent with private sector and Commonwealth Treasury forecasts for Western Australia.

1.3 Economic Factors affecting the Mining Industry

Commodity prices mixed.

World commodity prices were mixed in 1997. Market concerns about gold stocks held and speculative gold sales by Central Banks contributed significantly to the average gold price falling by 14.7% to US\$331 per ounce in 1997.

In January 1998 gold was trading at less than US\$290 per ounce, its lowest level in eighteen years. The price has since recovered with gold, as of 30 April 1998, trading at around US\$315 per ounce which is significantly lower than its 1996 average price (US\$388 per ounce).

During 1997, nickel prices continued their downward trend, first apparent in the latter half of 1996. In 1997 average nickel prices fell by 8.1% to US\$6,924 per tonne. This weakened price reflected both increased availability of nickel and stainless steel scrap (a substitute for nickel), from Russia, and the uncertainty generated by the disruptions to financial markets in the Asian region.

WA competitiveness boosted by energy deregulation.

Western Australia's mining industry competitiveness continued to improve with the further deregulation of the energy market in 1997. This included from 1 January 1997, gas customers taking at least 500 TJ per annum through a single connection being able to contract directly with the gas supplier of their choice. In addition to the developments in the gas market, the State Government is phasing in access for large electricity producers and consumers to Western Power's high voltage electricity transmission and distribution systems. Open access is to be provided to large electricity consumers according to a schedule which commenced from 1 January 1997. Deregulation of access to Western Power's systems is expected to create competitive pressures between electricity generators which should ultimately lead to the supply of cheaper electricity, which in turn will provide a further boost to economic development.

More generally the State Government has adopted a market framework which is supportive of the State's mining industry. This has allowed private sector participation in infrastructure development (i.e. Goldfields Gas Pipeline, privatisation of the Dampier to Bunbury Gas Pipeline etc.).

Commonwealth Government targets the Diesel Fuel Rebate Scheme (DFRS) for revenue savings.

As a means to deal with DFRS's rising revenue cost, in October 1996 the Commonwealth Government proposed a number of amendments to the Scheme. The amendments, amongst others, will make diesel used in all vehicles under 3.5 tonnes which are suitable/capable for use on public roads ineligible for the rebate. The Bill was passed by the Commonwealth Parliament in late 1997.

In obtaining industry support to the DFRS changes the Commonwealth Government provided a commitment that it would not cap the cost of the scheme. Western Australia is already the State most affected by the proposed legislative changes to DFRS as its mining industry relies more on diesel fuel than other States. Any additional changes to DFRS, such as capping its future cost, would further impact on the international competitiveness of the State's resources sector.

Section 23 (pa) exemption from income tax for prospectors removed.

On August 25 1997 the Commonwealth Parliament passed an amendment which removed the exemption previously provided under paragraph 23 (pa) of the Income Tax Assessment Act 1936 to income derived by bona fide

prospectors from the sale, transfer or assignment of rights to mine for gold or any other prescribed metal or mineral. Removal of the exemption is being phased in over the period 19 August 1996 to 19 August 2001. Over this period only the increase in value of mining rights is taxable. The value accrued to 19 August 1996 remains exempt until 19 August 2001. After this date the exemption will be completely removed and total value taxable.

1997-98 Commonwealth Budget.

The 1997-98 Commonwealth Budget, brought down in May 1997, was essentially a "steady as you go - hands off" approach which, unlike the 1996-97 Budget, inflicted minimal additional pain on business and the community in general. The massive 1996-97 Budget cuts to Government expenditure and industry incentive schemes, such as the reduction in the premium rate of deduction for research and development expenditures from 150% to 125%, are now having full effect. The resultant increased revenue growth is the key factor to the Commonwealth's expected budgetary improvement for 1997-98 and return to surplus in 1998-99. It is expected that the 1998-99 Commonwealth Budget will again also inflict minimal additional pain on business and the community in general.

Commonwealth shifts budget deficit position to the State.

Recent experience suggests that the Commonwealth Government has continued its policy of shifting its budget deficit position onto the States and Territories. The breakdown of the 1998 March Premiers' Conference over health funding is indicative of the underlying difficulties in Commonwealth-State financial relations.

The Commonwealth has not imposed the same disciplines on its own expenditures as it has with the States. Over the past decade the Commonwealth's own purpose outlays have risen 28% in real per capita terms, while grants to all States have fallen 5% and grants to Western Australia have fallen by 17% on the same basis. In 1998-99 the Commonwealth is expected to return only 20% of its taxes as grants to the States and Territories, down from 34% in 1978-79.

Continued cuts to Western Australia's share of Commonwealth financial assistance grants could in future impact upon the State's ability to provide the requisite infrastructure necessary to foster the continued growth of its prosperous resources sector.

High Court rules States' business franchise fees unconstitutional.

On 5 August 1997 the High Court ruled in *NSW vs Hammond and Ha* that the NSW business franchise fees (BFFs) on tobacco were unconstitutional. The High Court essentially ruled that the tobacco BFFs was an excise and therefore, as Section 90 of the Constitution only allows the Commonwealth to levy an excise, State levied franchise fees were invalid. The High Court's decision affects all States and Territories. Solicitors General subsequently advised that the decision also meant that the validity of BFFs on fuel and liquor was doubtful. Consequently, all States agreed that there was little point in still trying to collect them.

The High Court's decision effectively created a \$600 million shortfall in Western Australia's budget. The revenue loss for all States totalled around \$5,000 million. To protect the States' income a safety net arrangement which had been agreed with the Commonwealth in case of an adverse finding by the High Court was triggered.

The Federal Government is to collect BFFs on behalf of the States. The major objective of the safety net arrangements is to leave each State in a revenue neutral position while keeping any price increases, particularly for fuel, at a minimum. This position arises because the Commonwealth must implement BFFs at a uniform national rate. Prior to the High Court's decision BFF rates varied amongst the States.

Commonwealth Government foreshadows major tax reform.

On a positive note the High Court's decision has provided the Commonwealth Government with a catalyst for a wide-ranging inquiry into tax reform. The inquiry will develop tax reform options that the Government can take to the Federal election, due at the latest in March 1999. The Prime Minister has indicated that the guiding principles for reform are to include consideration of a broad based indirect tax; reform of Commonwealth/State relations; reductions in personal income tax; and no increase in the overall tax burden.

A priority outcome for the States from the reform of Commonwealth/State financial relations will be to reduce the States' dependence on Commonwealth grants for their funding.

For Western Australia in particular the optimal outcome of the tax inquiry would be the adoption of an efficient and effective tax system that does not penalise the export sector. It has been estimated that Australia's existing indirect tax system (i.e. wholesale sales tax, diesel fuel excise etc.) imposes an additional cost of 5% (i.e. about \$3,800 million) on exporters.

State Government introduces a gold royalty.

The 1997/98 State Budget indicated that a gold royalty option was being examined but the final makeup of the royalty was still subject to industry consultation. After consulting with industry groups the final makeup of the royalty was decided by Cabinet and announced on 28 July 1997. The royalty will now commence from 1 July 1998 at a rate of 1.25%. The full royalty of 2.5% has also been delayed until 1 July 2000 and will be conditional on the gold price exceeding an average AS\$450 for the quarter. The royalty will be unconditional from 2005. These concessions are worth about \$56 million over the next three years, and up to \$160 million over the next 7 years. The State's gold royalty is also deductible for Federal company tax purposes. At nominal rates of 1.25% and 2.5% the effective rate of gold royalty translates to 0.8% and 1.6% respectively.

State outlook favourable.

The State's mining and petroleum industry is among the world's best practice and historically it has been able to adapt appropriately to changing world economic conditions. This resilience, based on historical precedence, should allow it to continue to grow.

1.4 Social and Political Factors affecting the Mining Industry

Native title delays remain a concern.

The major issue during 1997 was again native title and its impact on the mining and petroleum sectors. The Western Australian Government has had procedures consistent with the Federal Government's Native Title Act (NTA) since the High Court decision of 16 March 1995 found the State's Land (Titles and Traditional usage) Act 1993 to be inoperative.

In accordance with NTA procedures native title claims covering more than 82% of the State had been registered with the National Native Title Tribunal (NNTT) by the end of December 1997. The distribution of these claims is such that about 98% of all mineral title applications in Western Australia must now be processed via the future act regime of the NTA.

All title applications are advertised by the Department of Minerals and Energy (DME) and relevant parties notified. If the area is not subject to a registered native claim at the end of the two-month notification period the tenement is granted. In the period from 16 March 1995 to 31 December 1997 the Department of Minerals and Energy referred 10,346 applications to the NNTT in accordance with the NTA procedures. Of these 7,186 (69%) have been cleared for grant after a delay of about two to three months.

To 31 December, 1997 the impact of the NTA procedures has been to delay the grant of 90% of exploration titles by about three months. Objections to the NTA "expedited process" (sought for all exploration titles in Western Australia) were registered against 953 titles and objections withdrawn or dismissed in relation to 303 of these allowing grant after delays of five to six months.

The grant of an exploration and prospecting licence under the "expedited procedures" of the NTA is delayed.

In the case of prospecting, exploration and certain miscellaneous licences, the State seeks the "expedited procedure" which applies to acts which do not have a significant impact on native title interests. If an objection to the expedited procedure is made by a registered native title claimant and the objection is upheld by the National Native Title Tribunal (NNTT), then the matter must proceed in accordance with the right to negotiate procedure.

On 8 May 1997 the Federal Court (the Dann decision) upheld that the NNTT should consider the rights bestowed by the grant of a tenement, rather than the intended use of the tenement by the applicant, when making a decision as to whether the expedited procedure (or fast tracking) should apply. As a result of this, if a native title party objects to the expedited procedure applying to any exploration title then the full right to negotiate process will apply.

Right to negotiate procedure.

In the case of mining leases and general purpose leases, all applications over areas that are the subject of a registered native title claim must undergo the right to negotiate procedure. The right to negotiate procedure involves meetings of the various parties involved in negotiations related to the grant of tenements. These negotiations must be carried out in accordance with NTA procedures which require that negotiations carried out on behalf of the State be "in good faith" with a view to achieving an agreement with the tenement applicants and native title parties. Where no agreement results from negotiations within the prescribed six-month time frame, any of the parties may apply for a determination by the NNTT.

The delays experienced with mining leases have been much greater than the delays experienced with exploration licences. To 31 December 1997, 2,049 applications for mineral titles have become the subject of "normal" right to negotiate procedures under the NTA and these applications are the subject of 3,692 separate negotiation cases because there are multiple native title claims over some applications. To 31 December 1997, 245 agreements had been finalised involving 183 mining leases.

*Commonwealth
Government moves to
amend the NTA.*

In October 1996 the Prime Minister announced a number of proposed amendments to the Native Title Act 1993 in order to make it more workable. These amendments included provisions to subject all Native Title claims to a threshold test to determine legitimacy; allow once-only right to negotiate for mining companies and developers; and exclude exploration companies and prospectors from right to negotiate obligations.

On 28 April 1997 the Prime Minister announced a 10-point Wik plan strategy. This strategy aimed to address industry concerns arising from the High Court's December 1996 ruling that native title rights could co-exist with the rights of pastoralists on pastoral leases but where they were inconsistent the rights of the pastoralist would prevail. While the strategy does not extinguish native title on pastoral leases it attempts to define those pastoral activities which are viewed as being inconsistent with native title rights.

In September 1997 the Federal Government introduced the Native Title Bill 1997 into the Federal Parliament. The Bill incorporated the proposed October 1996 NTA amendments and the so called Wik 10-point strategy. In December 1997 the Commonwealth Senate made significant changes to the Native Title Bill. These were unacceptable to the Commonwealth Government. The Bill was reintroduced into the Senate in March 1998. The Senate did not pass the Bill with form and content acceptable to the Government. The Government can now resolve the impasse by having a double dissolution of Parliament. Industry is concerned that this may result in the next federal election being fought on "race issues" and this could be damaging to, among others, Australia's mining interests.

*Commonwealth
Government argues for
differential greenhouse
gas emissions.*

In July 1996, the Commonwealth Government stated its views on the need to balance environmental and development considerations at the Climate Change Convention in Geneva. The Federal Government adopted a stance of not signing any convention on climate change and greenhouse gas emissions which "unfairly" harmed Australia's economic welfare. In its formal submission to the United Nations, lodged on the 15 January 1997 deadline, the Commonwealth remained steadfast in its insistence that developed countries hardest hit by reduction measures should be allowed to emit higher levels of greenhouse gases.

*Outcome at Kyoto
acceptable to Australia.*

In December 1997 the greenhouse gas issue was discussed by world governments at Kyoto, Japan. Prior to the meeting Australian industry, particularly the petroleum sector, expressed concern that the adoption of uniform greenhouse gas emission targets would significantly impact on the Australian economy. However, from Australia's perspective the Kyoto outcome was satisfactory. While the agreement will lead to a 5.2% reduction in world greenhouse emissions below 1990 levels by 2012, Australia was one of three

countries permitted to increase emissions. Another significant concession granted to Australia at Kyoto is a special Clause in the Agreement allowing land use clearing (which releases carbon into the atmosphere) to be included in determining 1990 level baseline emissions, a less onerous move to cut emissions.

*1992 National
Greenhouse Response
Strategy to be revamped.*

Australia has, in the past, attempted to contribute in a fair and equitable way to the international response on greenhouse. In 1992 a National Greenhouse Response Strategy (NGRS) was adopted by Australian governments. Following a 1996 review of the strategy it was concluded that governments, stakeholders' groups and the community needed to do more to reduce Australia's greenhouse gas emissions and to prepare for the potential impacts of climate change.

In 1997 a discussion paper - *Future Directions for Australia's Greenhouse Strategy* - was released for public comment by the Intergovernmental Committee on Ecologically Sustainable Development. The paper provides possible actions across a range of industry sectors and sets out potential measures on community information and education with the aim of reducing greenhouse gas emissions. Action plans put forward as part of the NGRS have been given State Government endorsement.

*Commonwealth
Government adopts
multiple land use
policy.*

The Commonwealth Government has adopted a policy of multiple land use which will have an impact on the nature of the Regional Forest Agreements (RFAs) currently being negotiated with miners and the States. RFAs are aimed at producing a comprehensive forest reserve system intended to set aside 15% of pre-European forest cover for each forest type. The scheme, developed by the previous government, is an attempt to end continual political battles over which forests should be conserved and which can be logged. In reaching Western Australia's RFA, the Department of Minerals and Energy, in conjunction with the Bureau of Resource Sciences, completed a qualitative study of the mineral resource potential of Western Australia's south-west forest region. This study was released to the public in February 1998.

At the end of 1996, Federal Cabinet endorsed a plan to ensure that the RFAs under negotiation with the States do not result in banning mining in several areas where it is currently allowed. Federal Cabinet indicated it was prepared to allow mining and mineral exploration in "informal" forest reserves, but wished to ban such activities in specific "dedicated" reserves. It also indicated it wished to exclude areas with "high mineral potential" from the new reserves and it believed that any areas excised from the reserves for mining purposes should be replaced with "areas of equivalent conservation value". The assessment process is proceeding.

*Moves to streamline
environmental
approval.*

In November 1996 Federal Cabinet also approved simplification of the way in which environmental approval for a project is secured. The intention is to remove duplication and overlap from Federal and State environmental regimes, ensuring that projects satisfy a single set of regulations. The Federal Government is to have discretion over all projects of national significance for the environment or economy, but be removed from less important decisions. Details of these plans were negotiated with the States at a meeting of the Council of Australian Governments in late 1997. Drafts of amendments to Federal environment law are in the process of being prepared with stakeholder consultation.

WA Government gives legislative backing to its marine parks policy.

In 1997 the State Government's November 1994 policy on marine parks was given legislative backing by amendments to the Conservation and Land Management (CALM) Act, the Western Australian Petroleum Acts and the State Mining Act. Key elements of the marine management strategy include: the provision of clear access guidelines for petroleum explorers and developers in marine conservation reserves; a three-tiered approach to marine conservation reserve categories; and the establishment of a Marine Parks Authority in which marine conservation reserves will be vested under the CALM Act. An important aspect of this policy is that the Minister for the Environment must obtain the consent of the Minister for Mines before creating any marine reserve or management zone that would preclude petroleum exploration and development activities.

Management Agreement adopted for the Shark Bay World Heritage Area.

The Commonwealth/State Management Agreement for the Shark Bay World Heritage Area (SBWHA) was signed in September 1997. As a result, before any petroleum exploration proposals can be considered within the SBWHA, the EPA has to undertake a review of the environmental implications of such activities for consideration by the Federal Minister for the Environment and the World Heritage Area Ministerial Council.

Figure 1.2

LOCAL GOVERNMENT BOUNDARIES

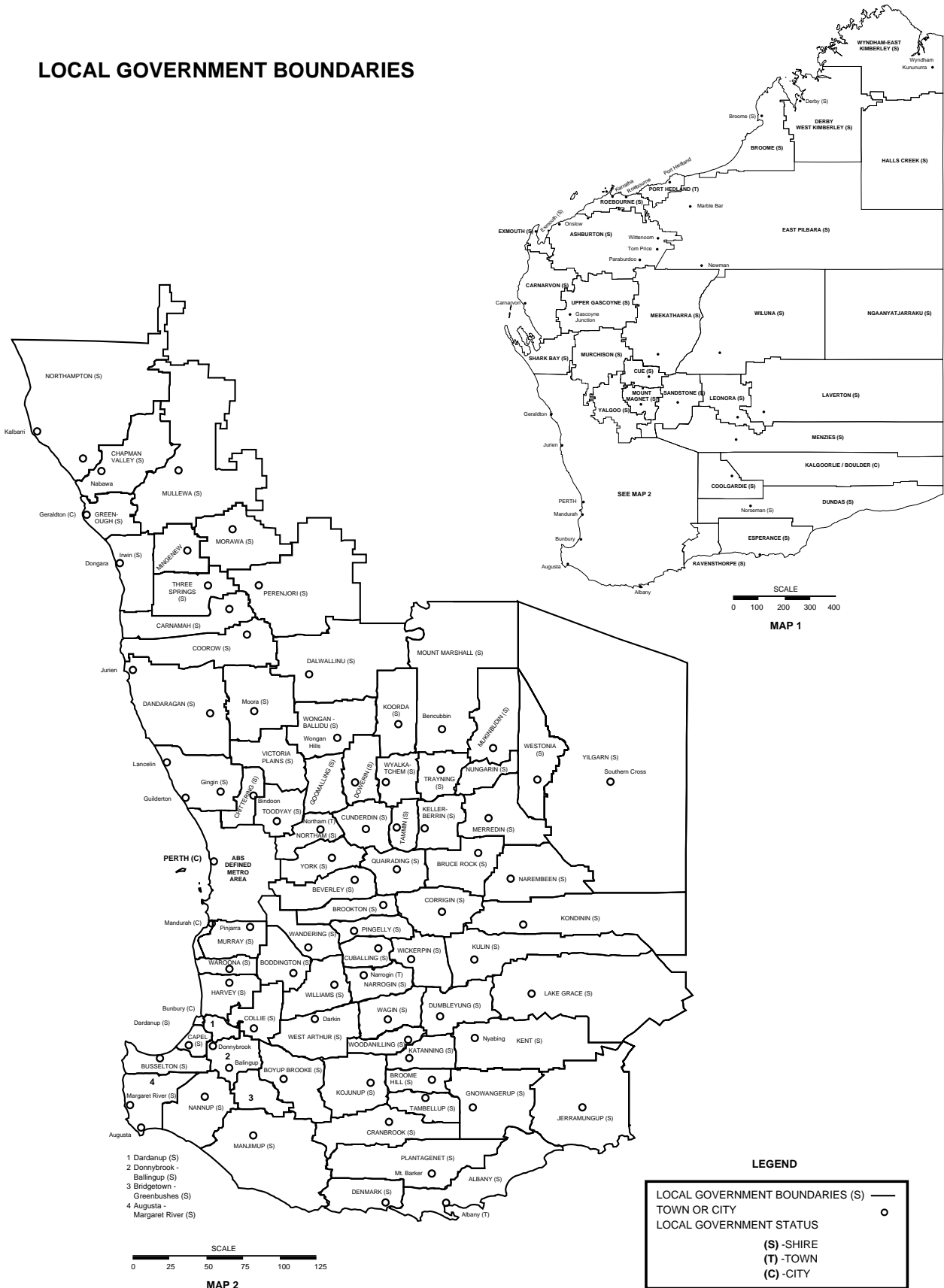


Figure 1.3

MAJOR MINERAL AND PETROLEUM PROJECTS IN WESTERN AUSTRALIA

WITH AN ANNUAL VALUE OF PRODUCTION IN EXCESS OF \$10 MILLION



2. REVIEW OF MAJOR MINERALS AND PETROLEUM IN WA

2.1 Overview and Outlook

The 1997 value of production from the Western Australian mining and petroleum industries exceeded \$17 billion.

There was strong growth for the iron ore and petroleum industries. Iron Ore, LNG and condensate together accounted for \$1.2 billion of the \$1.4 billion increase in total value of mineral and petroleum production. Iron ore production rose by 13.5% or 18 million tonnes to a record 151.7 million tonnes. Together with a price rise and a depreciation of the Australian dollar, the value of production soared by 24% (\$709 million) to over \$3.6 billion, regaining second position behind petroleum. The total value of petroleum production rose by 10% (\$464 million) to exceed \$5 billion for the first time (calendar year terms). The strong performance of condensate production up \$330 million, LNG up \$204 million, natural gas and LPG more than outweighed the \$239 million drop in crude oil.

Nickel and alumina continued to be strong performers and there were solid contributions from base metals and mineral sands. Alumina production increased by 3% and favourable exchange rates combined with this to raise the value of production by \$117 million to \$2.1 billion in 1997. Nickel production rose by 13% to 123,000 tonnes and despite weaker prices the value of production rose by \$102 million. Base metals value of production rose by nearly 50% to reach \$198 million on the back of strong growth in zinc and copper production and AS prices. Mineral sands performance was stronger (up an overall \$35 million). This good result came from increased upgraded ilmenite production and value (up 28% and 31% respectively) which was slightly offset by a drop in zircon production (down 21%). Salt was another quiet achiever, where a 900,000 tonne increase in production raised revenues by \$29 million to \$172 million.

Only gold, diamonds and crude oil experienced a decrease in value of production in 1997. Record gold production of 240 tonnes was not sufficient to compensate for the battered gold price and the value of production dropped by \$87 million. Crude oil production was heading for another excellent year

when an accident and fire on board the Griffin Venture floating production vessel caused a shutdown of operations. The ship had to be sent to Singapore for repairs and three months' production was lost. This was the cause of the drop in crude production of \$239 million.

In 1998-99 the value of the State's mineral and energy production is forecast to rise by 5.4% to \$18.4 billion. The rise is mainly attributed to mineral sands (up \$310 million), alumina (up \$160 million) and iron ore (up \$115 million). For iron ore and alumina the increased production value largely comes from higher prices. The value of the State's gold production is expected to fall by \$140 million (about 4.3%) in 1998/99, primarily due to lower production (down 10 tonnes). The value of the State's petroleum sector is expected to rise by 1.5% in 1998-99. This is despite a forecast 9.5% fall in crude oil production.

From 1998-99 onwards the world's production capacity across key commodity groups is expected to increase. As a result, prices of these key commodities are expected to fall in 1998-99. Nickel is particularly likely to be affected. In Western Australia alone three nickel mines (Murrin Murrin, Bulong and Cawse) are expected to be commissioned in 1998-99.

Market uncertainty associated with central bank sales will continue to dampen gold prices in 1998-99, with the average price forecast at US\$300 per ounce. On the other hand iron ore and alumina prices are expected to rise in 1998-99. Petroleum prices, in terms of US dollars, are expected to recover. The forecast for heavy mineral sands is mixed. The outlook for Australia's rutile, ilmenite and synthetic rutile industry is positive, however Australian zircon producers are expected to experience Australian dollar price falls in 1997-98 and 1998-99.

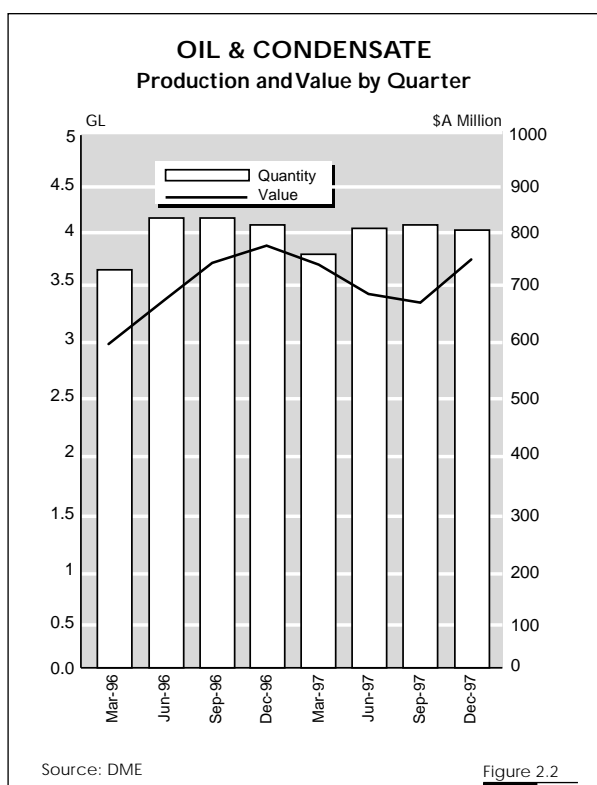
While it is true that the commodity price outlook is uncertain it needs to be recognised that significant parts of the industry are sheltered somewhat, via hedging contracts, from the recent downturn in commodity prices. The State's mineral and petroleum industries are also better placed to absorb lower commodity prices since production costs are favourable when compared to the rest of the world.

2.2 Petroleum

Petroleum remains the State's most valuable resource sector. In 1997 the value of production rose by around 10% to reach \$5.157 billion. This represented about 30% of Western Australia's value of mineral and petroleum production.

In 1997, the State exported \$3.326 billion worth of petroleum products, the major destinations being Japan (61%) and Taiwan (9%) (Figure 2.1).

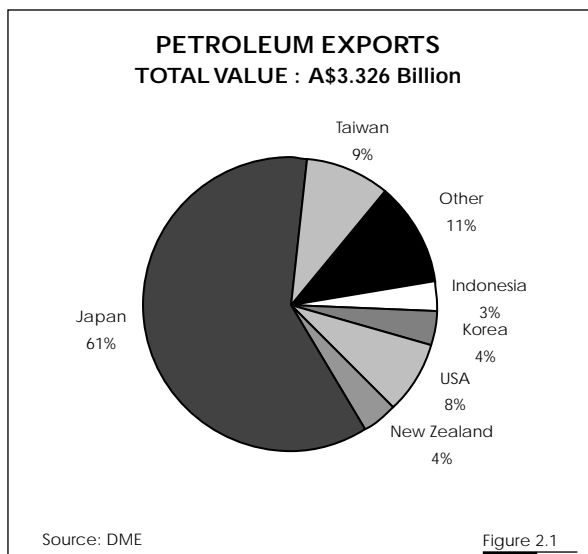
1997 Petroleum Industry Highlights



In 1997 the State accounted for approximately 50% of Australia's total crude oil and condensate production (Figure 2.3).

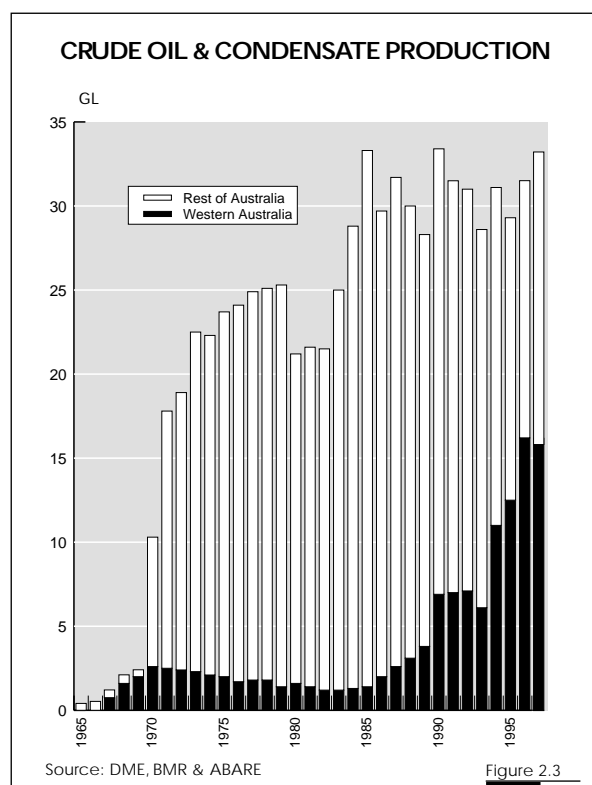
The shutdown of the Griffin project for repair had a major impact on the State's crude oil production which fell by 12% to \$1.72 billion. This fall was more than offset by the substantial rise in condensate production. In 1997 the value of the State's condensate production increased by 43% to \$1.103 billion.

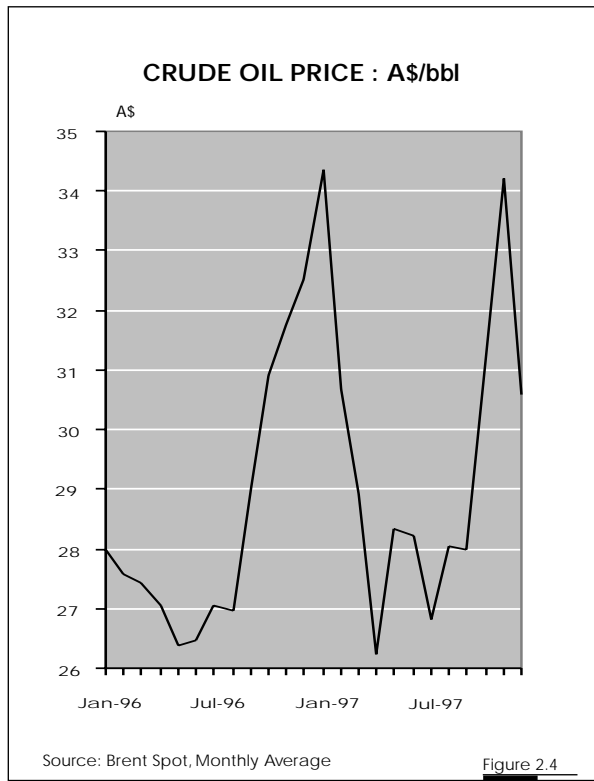
Oil prices trended downwards over 1997 due to slackening demand in Asia, a warmer European winter and increased non-OPEC oil production.



The fall in the oil price has not significantly impacted on the prices received by the State's LNG producers. Despite LNG production falling by 0.6% its value increased by 14.7% to \$1.595 billion in 1997.

Western Australia has become a significant player on international LNG markets. The State's LNG production accounts for around 10% of total world trade. Perth hosted the world's premier LNG conference in May 1998, a conference attended by the world's major LNG producers and buyers.





The value of natural gas production increased 15.5% in 1997 to \$572 million.

The \$610 million Wandoo oil field development was completed in early 1997. In addition to Wandoo A, the Wandoo B platform was commissioned in March 1997. It consists of a concrete gravity structure, constructed at Bunbury, capable of holding 400,000 barrels of oil. The field has estimated recoverable reserves of 40 million barrels.

Development of Apache Energy's Stag oilfield continued with commissioning expected in 1998. The field is planned to produce 27,000 barrels of oil per day, or about 15% of the State's oil production over the first 12 months.

The exploration programs of petroleum companies for the Timor Gap area in the far north west of the State are finally coming to fruition. The Bayu/Undan oil and gas field has been earmarked for development at a cost of between \$800 million to \$900 million. In addition, development of the North West Shelf Joint Venture (NWS) Laminaria oil and gas field is proceeding. This field contains around 200 million barrels of oil and will cost \$1 billion to develop. The expected Australian content for the development is 34% of project budget.

In May 1997 the Cornea partners announced a \$150 million program to fast track the appraisal of the Cornea field, located in the Browse Basin 400 km north of Derby. Discovered in December 1996 Cornea, ranks among the biggest Australian oil finds of recent years with initial resource estimate up to 2.6 billion barrels of oil. At the time of the May 1997 announcement the Cornea partners also expressed interest in neighbouring exploration permit areas.

World Petroleum Outlook

Despite oil prices falling below US\$13.00 per barrel in March 1998 they are expected to recover over 1998. Prices, however, will remain below the 1997 average of US\$22.00 per barrel.

The oil price is currently around US\$16.00 per barrel (April 30 1998). The April 1998 surge in the oil price was due to an OPEC cartel agreement that members would cut their oil production. Saudi Arabia, the world's largest exporter and most influential member, has agreed to cut back its own production by 3.5% in 1998. There still remains some concern, however, in international oil markets as to whether this agreement will hold. In the past OPEC members have produced and sold oil in excess of their aligned quotas.

According to ABARE, world crude oil consumption growth is expected to slow to 2.0% in 1998, down from 2.8% in 1997. Similarly world oil production growth is expected to slow to 2.0% in 1998, down from 2.9% in 1997.

In the longer term world oil production is expected to rise from 74.1 mbd in 1997 to 86.3 mbd in 2003. Over the corresponding period consumption is expected to grow from 73.8 mbd to 86.1 mbd.

Despite economic uncertainty hanging over the Asian market, Australian oil and gas exports are expected to increase in 1998-99. As Asia's economic growth improves, Australia's petroleum export growth is expected to gain momentum.

State Outlook

The State outlook for the petroleum sector is positive. Interest in the State's petroleum industry is growing among international oil and gas companies. This interest has been fuelled by the high discovery rate

of exploration drilling, in association with recent petroleum developments in this State (Wandoo, East Spar etc).

The State's reputation as a "land of opportunity" in oil and gas is also leading to various countries investigating petroleum development opportunities in this State. For example, Norway, through its Trade Centre (located in Fremantle), is overseeing a special project which aims to establish oil and gas related partnerships between the State and Norway. This venture follows an analysis by the Norwegian Government that Australia is amongst the leading areas of growth in the oil and gas industry and is a key area in the Asian region.

This represents a positive long term assessment for the State's petroleum sector and has been made despite the current crisis in Asia and the low world oil price. It should be noted that 10 years ago oil developments were thought not to be economic at current prices. However, oil technology developments since then have reduced unit costs considerably, improving the underlying viability of many of the State's existing and potential oil projects.

Of current concern is the likelihood that the State's crude oil production will fall in the medium term. The State's oil reserves need to be enhanced by either new oil discoveries or new oil projects coming on stream if the State is to maintain its crude oil independence. Nonetheless, the State's condensate, LPG, natural gas and LNG production is expected to increase for the foreseeable future. International market prospects for LNG as a fuel for power generation are favourable.

Forecasts provided by the Department of Resources Development (March 1998) suggest that LNG demand from North East Asia (NEA) (i.e. Japan, South Korea and Taiwan) is expected to rise from 59 million tonnes (or about 78% of world LNG trade) in 1996 to somewhere between 72 and 84 million tonnes in 2000. Thereafter NEA LNG demand is forecast to rise to between 84 and 106 million tonnes in 2010.

The North West Shelf expansion and proposed Gorgon development are of enormous importance to the Western Australian (and Australian) economy. They will involve investments of \$8 billion and \$9 billion respectively. The NWS Partners' proposal consists of constructing a second trunkline to the Burrup Peninsula and two extra processing trains. A decision

on whether to proceed with the development is expected in 1998.

Participants in the Gorgon project - Chevron, Texaco, Mobil and Shell - have already invested \$200 million on proving the Gorgon project's technical and economic viability. A decision on whether to proceed is expected by the end of 1998. The current Gorgon LNG plan is based on a staged development of two liquefaction trains, each capable of producing 3.5Mtpa. The first train is scheduled for late 2002.

The State and Commonwealth Government triggered the environmental process for the expansion of the North West (LNG) Project in January 1998. A joint State-Commonwealth environmental review is also underway for the Gorgon project, based on a stand alone project on the Burrup Peninsula.

Demand for natural gas, which at 278 petajoules represented 43% of the State's primary energy use in 1995-96, is forecast to more than double by 2009-10. Gas demand is expected to be driven by the resource processing and power generation sector.

Hopes for a \$1.5 billion petrochemical plant project, producing \$1 billion worth of products per year, in the Pilbara have increased. The North West Shelf participants have indicated that there will be sufficient ethane for the project after the year 2000. The Western Australian Department of Resources Development, North West Shelf Gas Pty Ltd and independent consultants undertook an evaluation of more than 40 registrations of interest. Of these submissions six companies, including BP Chemicals and ICI Australia, were selected for further evaluation.

It is expected that the preferred developer for the Pilbara Petrochemical Plant will be selected in 1998. Construction is expected to begin in 2000, with commissioning in 2003-04. If proceeded with, the project will become an important addition to Western Australia's petroleum capacity. The value of natural gas increases seven-fold if transformed to petrochemical products as against three-fold for LNG.

Local Content Issues in Petroleum Developments

In March 1998 there was considerable debate about petroleum projects. State concerns on local content issues gained prominence with reports that some of

the major oil and gas projects scheduled for construction are likely to have Western Australian and/or Australian content of less than 50%.

This view needs to be balanced against the high level of local content derived in the \$200 million East Spar project (75%); the \$450 million Goldfields Gas Pipeline Project (65%); and the \$2.8 billion LNG Phase 2 and \$930 million LNG Train 3 projects (around 65% each).

The State Government is addressing the local content issue. It has earmarked Jervoise Bay (located 13 km south of Fremantle) as a potential heavy industry site for, among other sectors, the oil and gas industry.

The key elements of the proposed Jervoise Bay Development are the creation of a Southern Harbour with deep water access with approximately 25 ha of harbour area set aside for the mooring and maintenance of floating plants (construction barges, drill rigs etc.) and the construction of a 350 metre wet berth to accommodate fit-out, repair and maintenance of large vessels and marine structures, such as FPSO tankers associated with the oil and gas industry.

Currently FPSO and other vessels working on the NWS are taken to Singapore and South East Asian ports for refit and maintenance because the State does not have the appropriate cranes and docking capabilities.

The Jervoise Bay project has gathered some momentum with the Commonwealth Government earmarking \$80 million to the proposed \$200 million development. State Government funding will total around \$60 million with the remainder expected to come from the private sector.

Currently the proposed Jervoise Bay development is undergoing environmental appraisal and if approved by the EPA it is hoped that it will be completed within the next five years.

2.3 Iron Ore

In 1997 the State's iron ore output increased by 13.5% to 151.7 million tonnes. Thanks to higher prices (and a lower AS) the value of production rose by 24% to \$3.633 billion (Figure 2.5 and 2.6).

This strong growth pushed the iron ore sector past gold, to regain its position as the State's second largest resource industry.

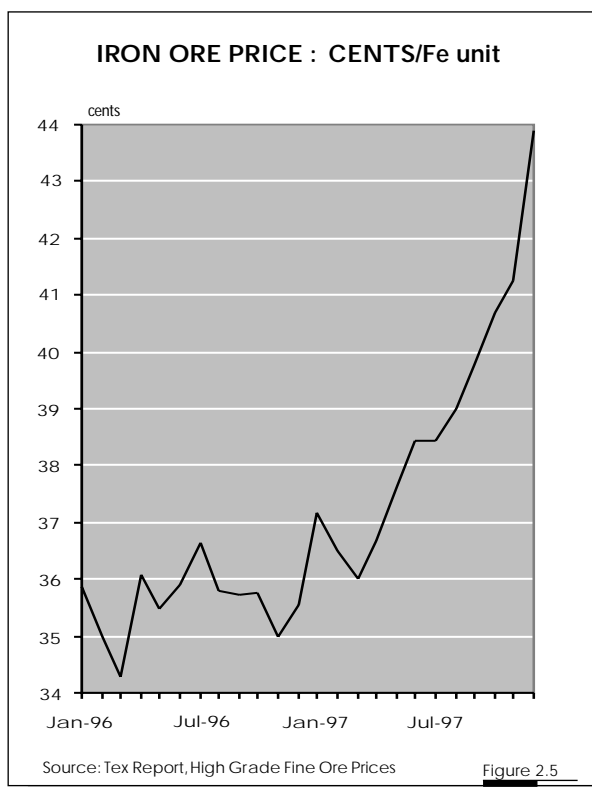
With production of 155 million tonnes Australia was the world's third largest producer in 1997. Western Australia is by far Australia's largest iron ore producer, accounting for 98% of its production in 1997 (Figure 2.7).

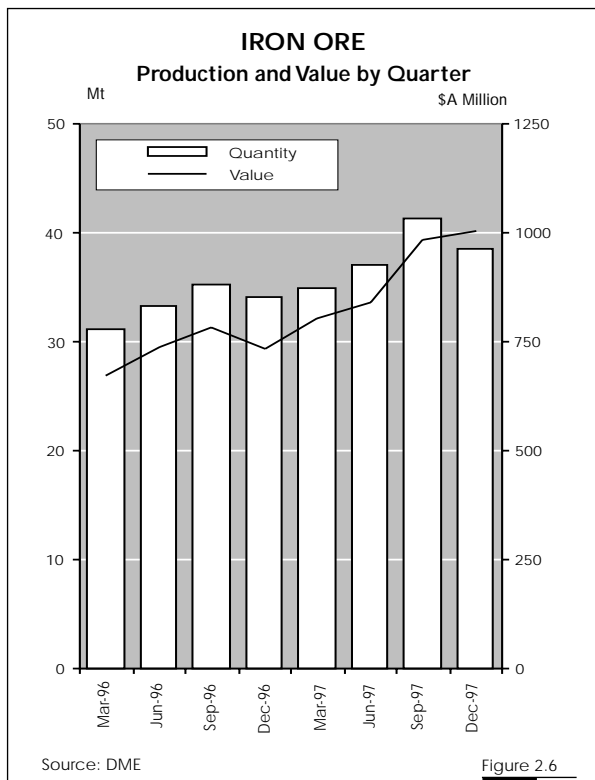
Exports from Western Australia totalled \$3.45 billion in 1997. The major export destinations were Japan (45%) and China (23%) (Figure 2.8).

1997 Iron Ore Industry Highlights

In 1997 world steel production increased by 5.9% to 795 million tonnes. The vigour of steel industries in China and Taiwan, now taking an increasingly important share of State export markets, has provided steady growth for the State's iron ore industry.

Indeed in 1997 China emerged as the world's second largest importer of iron ore, with imports having quadrupled since the early 1990's to almost 55 million tonnes in 1997.





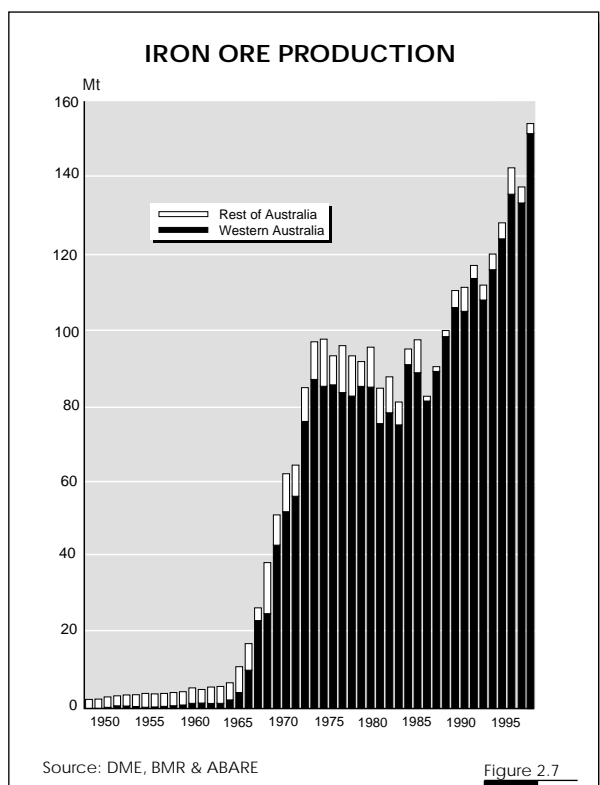
In 1997 Western Australian iron exports of around 144 million tonnes accounted for about 36% of the world's iron ore trade. Of the State's exports, 86% are destined for Asia, while the remainder go to Europe. While in the short term Asia's currency crisis is expected to impact adversely upon steel production,

and hence iron ore demand growth, the longer term outlook for the industry is positive.

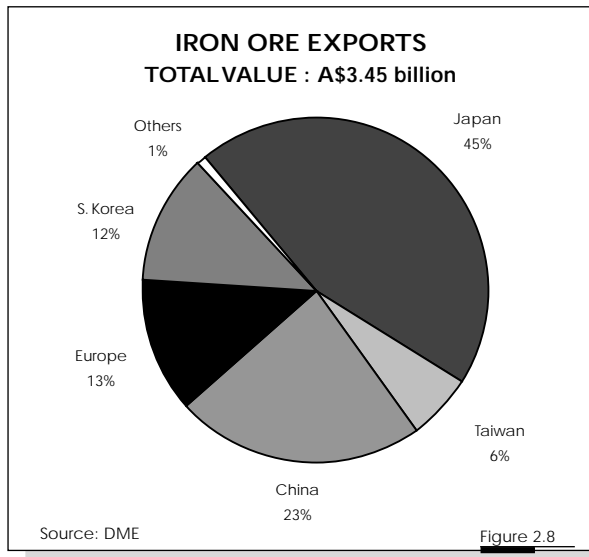
By 2005, the forecast demand for iron ore imports in Asia is expected to be 265 million tonnes, an increase of 60 million tonnes from 1997 levels. In addition, according to China Metals (1997), China's own iron ore production is expected to fall for the foreseeable future. China's iron ore production is forecast at 240 million tonnes in 2000, down from 262 million tonnes in 1995. With China's steel industry expected to grow, this loss in its own iron ore production will need to be made up by increased imports. This increase in imports is expected to be a third of the projected increase in trade.

Against this background, in September 1997 Hamersley Iron announced that it would develop the Yandicoogina iron ore mine in the Pilbara. The \$705 million project producing 15 million tonnes per annum of iron ore is expected to come on stream in early 1999. The main component of the project cost will be the mine itself plus an extension of the railway network. The existing railway runs from the port of Dampier to the Marandoo mine and will be extended 147 km to the Yandicoogina mine. Expansion of ore stockpiling and loading capacity is currently underway at Dampier Port.

A number of iron ore mining projects are now under consideration in Western Australia including:



- development of the West Angelas deposit, at a cost of \$1 billion, by Robe River which could produce up to 15 million tonnes per annum. A \$20 million feasibility study commenced in early 1997.
- development of BHP's Area C deposits, near its existing Newman operations. Area C has a major resource, and BHP has previously indicated that development would be in the league of a 4-5 million tonne a year operation, increasing to about 20 million tonnes as demand allowed. BHP is also likely to consider expanding its Yandi mine from its present 15 million tonnes to 35 million tonnes if iron ore demand strengthens.
- Hancock Resources \$450 million project aimed at developing the Hope Downs iron ore deposits. If it proceeds the project could be capable of producing up to 30 million tonnes of iron ore per year.



The growth in iron ore production is also underpinned by a number of proposed iron ore processing projects. Of these, only BHP's 2.5 million tonnes per annum DRI project has been committed. The project is Australia's first downstream iron ore processing facility and is expected to come on stream at the end of 1998 and to export around \$400 million of product. Iron ore processing projects currently under consideration include the:

- \$1.8 billion Mineralogy Project which will produce up to 4 million tonnes per annum of DRI. It also includes a separate 6 million tonne per annum export pellet plant.
- \$1.8 billion Australian United Steel Industry (AUSI) project consisting of a beneficiation, pellet plant and DRI plant to be established south of Cape Lambert capable of producing almost 4 million tonnes per annum of DRI.
- \$2.4 billion An Feng Kingstream Resources project involving a 2.4 million tonnes per annum steel mill located at Oakajee near Geraldton.
- \$900 million Mt Gibson DRI project. It is planned that iron ore will be mined at Mt Gibson and fed into a 2 million tonne per annum DRI facility located at either Moonyoonooka or Oakajee.
- \$1.49 billion Steel/DRI Compact Steel Project located at East Rockingham. The first stage will produce 1.37 million tonnes per annum of hot rolled coil and 0.12 million tonnes of DRI for export.

- Robe River's proposed re-opening of its 5 million tonnes per annum pellet plant at Cape Lambert. The project is expected to cost \$250 million.

The January 1998 round of iron ore price negotiations by Australian iron ore producers and Japanese steel manufacturers saw a favourable outcome for the year. They are effective from April 1997 to March 1998. Despite an uncertain 1998 outlook for iron ore demand in some major markets, negotiated US\$ prices for lump and fines rose by 2.94% and 2.82% respectively. This rise follows the 1996 price rise of 1.1% to 1.5% that was individually negotiated by the State's iron ore producers.

Outlook

The Asian crisis is expected to impact on world steel markets in 1998. As a result world steel production is expected to remain at its 1996 level of 795 million tonnes in 1997. As Asian economies improve in 1999, world steel production is forecast to increase by 1.9% to 811 million tonnes.

Australia's iron ore production is expected to increase by 2.0% in both 1997-98 and 1998-99. Australia's iron ore exports are forecast by ABARE to increase by 5.4% and 2.8% respectively over the corresponding period. Most of this export growth will be destined for China.

Over the longer term, as Asian economies recover, world steel production is forecast to rise to 860 million tonnes in 2003. Given Western Australia's prominence on international iron ore markets its iron ore production is expected to rise from 155 million tonnes in 1997 to 185 million tonnes in 2003. Australian iron ore exports, by volume, are expected to increase by around 2.7% per annum to around 170 million tonnes in 2003. Iron ore prices denominated in US\$ are also expected to trend upwards to 2003.

Western Australia is also well poised to supply the Asian market with its steel making inputs, including DRI. Deregulation of the State's gas market, technology improvements in the use of fine ore and a transport advantage over South American producers mean that the Pilbara is now competitive as a DRI producer for the Asian region.

2.4 Gold

Gold output continued to grow, increasing by a strong 8.6% to reach 240 tonnes in 1997. Despite tonnage increases the value of production fell by 2.5% to \$3.442 billion (Figure 2.9). This was chiefly due to low world gold prices which averaged US\$331 per ounce over 1997, about 14.7% down on the previous year.

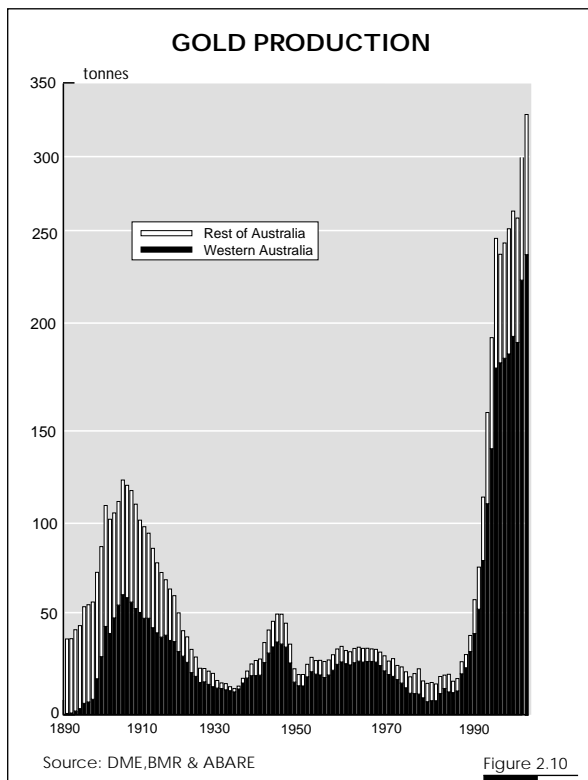
In 1997 gold prices were weighed down due to supplies and speculative activity relating to central bank sales. For Australian producers, weak US\$ global prices were partly compensated by the significant depreciation in the Australian currency over the year.

Western Australia continues to account for more than three quarters of Australia's total gold production (Figure 2.10).

In 1997 gold exports amounted to \$3.36 billion. South Korea (38%), Singapore (29%) and Hong Kong (15%) were the State's predominant gold export markets (Figure 2.11).

1997 Gold Industry Highlights

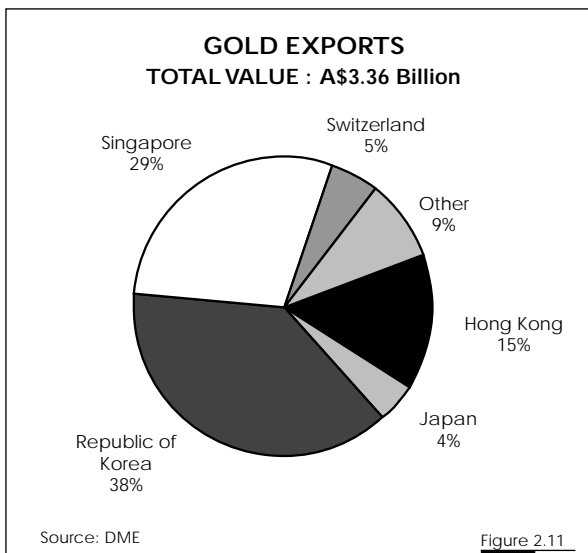
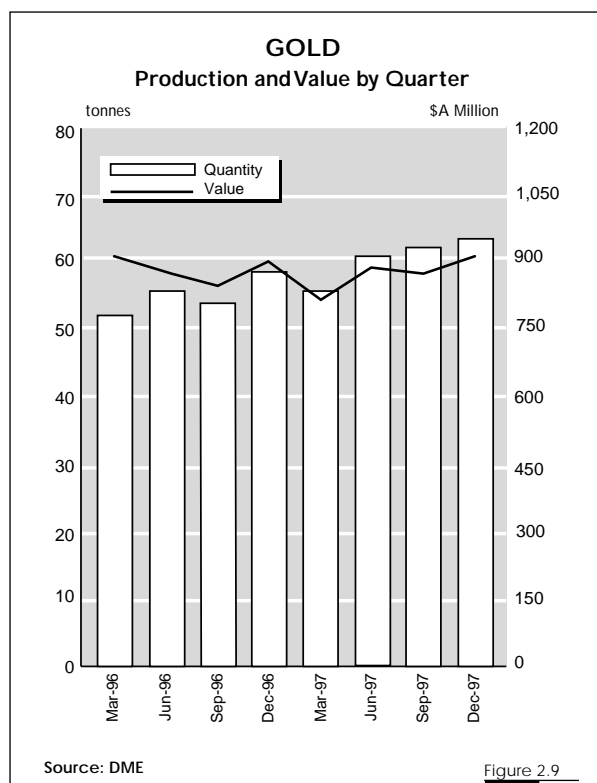
The 8.6% increase in gold production was largely attributed to large increases in existing mines, such as Golden Mile, Plutonic and Granny Smith, and from the first full year's output of new mines, such



as Two Boys. The year also saw production start from Sunrise Dam.

Were it not for the significant fall in the US\$ gold price over 1997 (discussed below) this increase in production would have been even greater. In 1997 a number of mines closed including Youanmi, Bullabulling, Orient Well, Tuckabianna, Mt Monger and Palm Springs.

Lower US\$ gold prices, have also lead to the deferment of decisions to commit to or proceed with State gold



investment expenditures. For example the proposed \$400 million expansion of the Boddington mine and \$160 million expansion of the St Ives mine have been deferred pending a return to a more favourable gold price.

The 13 biggest producing projects in Western Australia accounted for 52% of the State's gold production in 1997. The largest projects, with gold production worth over \$100 million in 1997 were:

- Golden Mile - Kalgoorlie - 26.2 tonnes;
- Granny Smith - 15.3 tonnes;
- Kambalda - St Ives - 14.3 tonnes;
- Telfer - 9.5 tonnes;
- Boddington - 9.4 tonnes;
- Plutonic - 8.5 tonnes; and
- Bronzewing - 7.7 tonnes.

The Reserve Bank's June 1997 announcement of the sale of 167 tonnes, which equated to around 7% of the world's 1997 gold supply, surprised international gold markets and contributed to the downward pressure on prices. There have been a number of other important factors contributing negatively to gold prices. The most notable of these have been gold sales by European Central Banks as part of a concerted campaign to meet the conditions underpinning European Monetary Union. The gold market has a perception that these sales will continue.

Adding to the uncertainty is the view of market analysts that other non-European Central Banks may begin to sell gold, a view strengthened by the sale of 125 tonnes of gold by Argentina's Central Bank in December 1997.

In December 1996 above-ground world gold stock held by the banking sector totalled 32,800 tonnes. Of this 39% (or 12,792 tonnes) is held by banks in the European Union while another 23% (7,544 tonnes) is held by USA banks. Adding the gold stocks (i.e. coin and gold bullion) held by private investors (24,100 tonnes in 1996) the amount of gold that can be supplied from stock was around 57,000 tonnes in December 1996. At the 1997 fabrication consumption rate of 3,750 tonnes, gold stocks held equate to about 15 years' supply.

Gold market uncertainty resulted in the gold price falling from an average of US\$388 per ounce in 1996

to an 18-year low of US\$280 per ounce in January 1998. In A\$ terms, however, the gold price remained relatively stable in 1997. This has been due to the significant depreciation in the A\$ over the year. Gold was trading at around \$450 per ounce for most of 1997.

US\$ price falls have underlined the importance to Australian producers of extensive gold hedging positions. Approximately 40% of Australia's annual mine production over the next 4 years has been sold forward, at a weighted average price of A\$614 an ounce. This compares with estimated 1997 weighted average Australian cash cost of A\$351 per ounce.

In response to the falling US\$ gold price, the Commonwealth Minister for Resources and Energy, Senator Parer, convened a roundtable discussion meeting of gold industry representatives in February 1998. The meeting discussed what assistance the Commonwealth Government could give the gold industry. The Government has yet to announce its package of assistance measures, if any, for the gold industry, however it has foreshadowed further roundtable meetings.

Despite the price turbulence on international gold markets the State's gold exploration expenditures increased by 15% to \$511 million in 1997.

World Gold Outlook

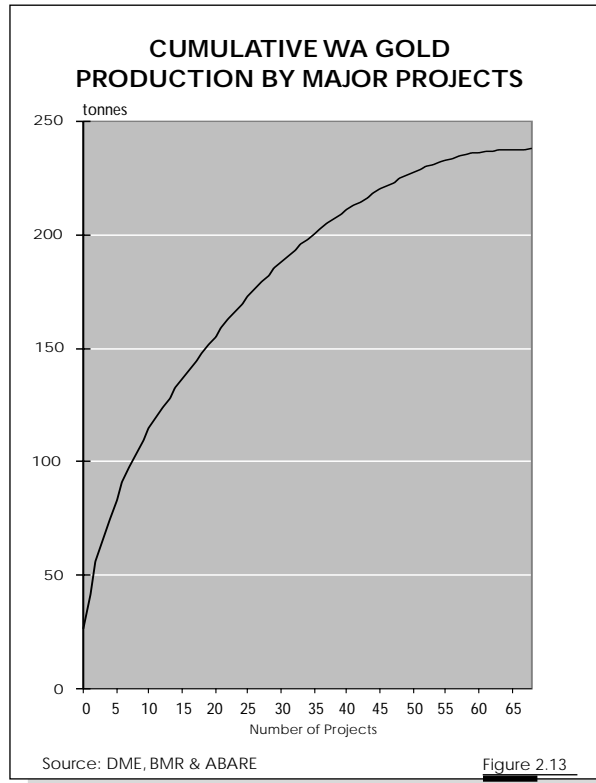
The manner in which European Banks manage the sale of their gold stocks will have significant repercussions on the gold price in forthcoming years. There is some speculation that they have formed a "pseudo" cartel and therefore will manage stock sales in a way that does not significantly impact on the gold price. This view has been reinforced by statements made by key European Union officials that gold will play a key role in the European Central Bank and that any disposals of excess reserves of individual central banks must have permission of the EU.

The likelihood of the European Central Bank managing the sale of European Union gold stocks was strengthened by the international market reaction to an October 1997 report commissioned by Switzerland's Financial Ministry. The report recommended the sale of 1,400 tonnes of gold over a 10-year period and contributed significantly to the downward pressure on world gold prices during the 1997 December quarter.

While it seems that more stringent criteria regarding gold selling will be adopted by European Union member countries, concern remains with non-European Union gold sales. Asia's response to the region's currency crisis is now fuelling gold market uncertainty. In the year to March 1998 around 200 tonnes of private investor gold holdings have been sold in South Korea as part of a nationalistic push by its private citizens to stabilise its currency.

According to ABARE in 1998 world gold production is expected to rise by 1.7% to 2,444 tonnes. Demand is forecast to rise by 7.0% to 4,012 tonnes. The supply/demand imbalance will be made up from the sale of stocks, including Central Bank sales. The price of gold is expected to fall by 12.4% to US\$290 per ounce in 1998. In A\$ terms the gold price is estimated to be \$445 per ounce in 1998.

ABARE has also provided long term gold forecasts to the year 2003. It predicts that over this period world gold production will grow by 1.1% per annum reaching 2,564 tonnes in 2003. Over the corresponding period demand is forecast to rise by 3.3% per annum reaching 4,566 tonnes in 2003. This significant expected excess demand augurs well for international gold markets being able to accommodate Central Bank gold sales.



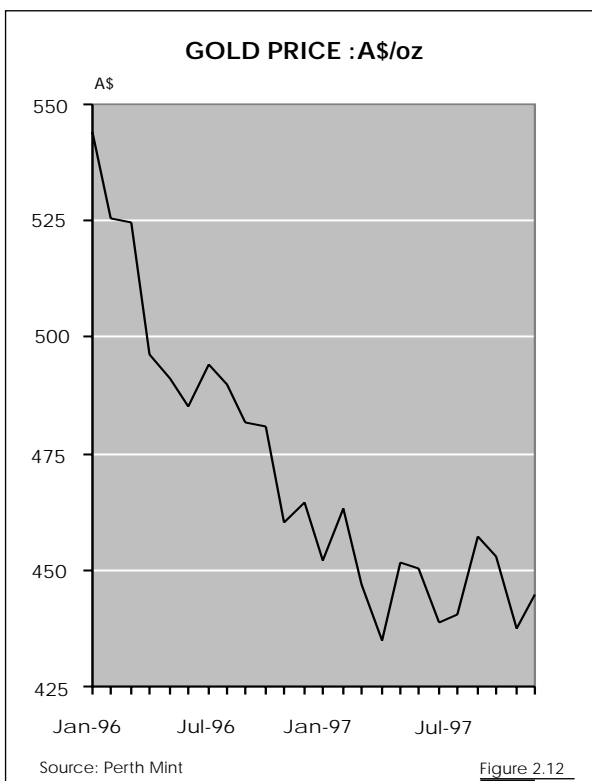
US\$ gold prices are forecast by ABARE to rise by a moderate 1.9% per annum reaching US\$325 per ounce in 2003. A\$ gold prices are forecast to range between \$430 per ounce to \$450 per ounce over the period to 2003. These forecasts are based on the premise that the AS/US\$ exchange rate will range between 0.68 cents and 0.73 cents to the year 2003.

These ABARE forecast are also based on expectations that world economic growth will moderate over the medium term to a more sustainable pace and crucially that Asia's current currency crisis is short term.

Since these ABARE forecasts were made, the gold price has increased by US\$20 per ounce to its 30 April 1998 level of US\$311 per ounce. In A\$ terms, due to the fall in the exchange rate to US\$0.65, gold was being traded at around \$470 per ounce, its highest level since November 1996.

Australian/Western Australian Gold Outlook

The changing world market trading environment for gold is likely in future to lead to further amalgamations within the Australian gold industry. By doing so the industry will be able to enjoy better economies of scale, hence lower production costs.



To date, the most significant amalgamation was between Normandy Mining and Great Central Mines. Under an August 1997 deal Normandy Mining would bankroll two separate takeover bids by Great Central Mines worth \$350 million (\$240 million for Eagle Mining and \$110 million for Wiluna Mines Ltd). In return, Normandy would acquire a 25% stake in Central Mines. Great Central's takeover bids of Eagle and Wiluna were successful and as a result the "amalgamated" company became one of the world's largest gold producers.

Australian gold production is forecast by ABARE (February 1998) to rise from 299 tonnes in 1997 to a peak of 321 tonnes in 1999. In essence ABARE is assuming that Australian gold producers are either operating under hedging contracts or are able to implement the appropriate strategies to combat the lower US\$ gold price thus maintaining mine viability.

Australian gold companies are beginning to mine higher grade ore so as to lower operating costs per unit of output. This ultimately means a shorter mine life. If this trend continues, and lower gold prices translate into lower (sustained) gold exploration activity, in the longer term Australian gold production will fall.

With the State accounting for more than three-quarters of Australia's current gold production the State's gold industry outlook remains positive. Despite the low US\$ gold price, world demand for gold will remain strong over the next six years. Were it not for Central Bank gold sales filling the large demand/mine production imbalance over ABARE's forecast period, US\$ gold prices would rise significantly to the year 2003.

Lower US\$ gold prices are likely to slow the State trend, apparent in recent years, of companies moving to underground mining. Underground mines have higher costs than comparable open cut operations. This does not mean that the trend will be reversed. In November 1997 Sons of Gwalia committed \$25 million to the underground development of its flagship mine at Leonora.

2.5 Alumina

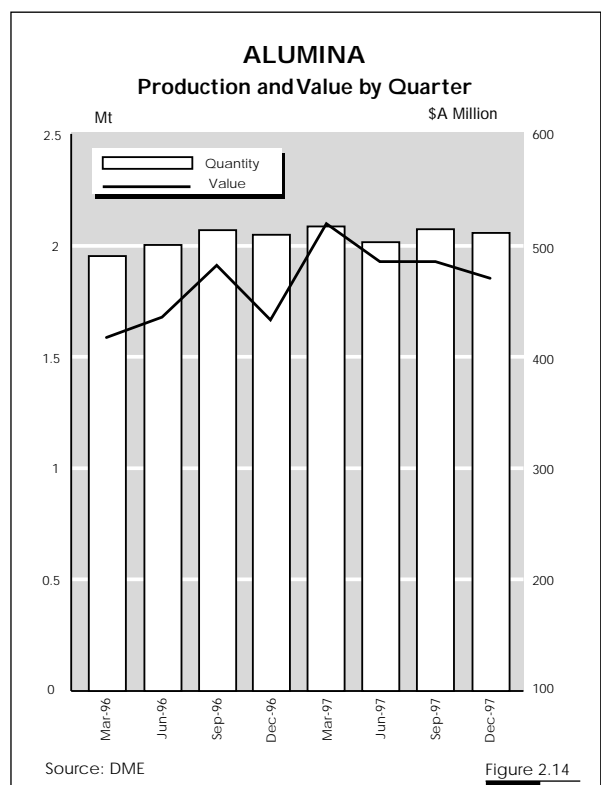
Western Australia's alumina output increased by around 3% to reach nearly 8.5 million tonnes. Overall the average monthly price, in Australian dollar terms, received by Australian producers in 1997 went up by 3.2% over the previous year. The total value of production therefore increased by 6% to reach just over \$2 billion (Figure 2.14).

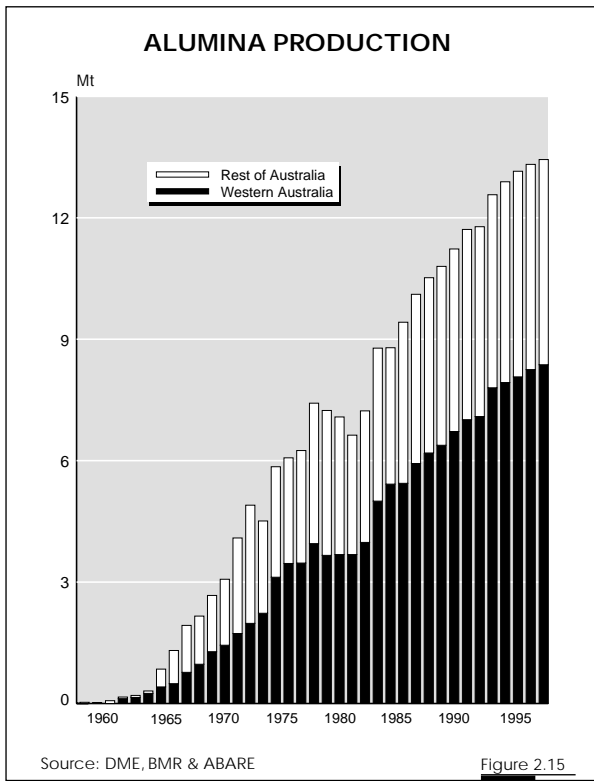
Western Australia produced 63.7% of Australia's alumina in 1997 (Figure 2.15).

Around 90% of the State's production was exported overseas. The USA (28%), South Africa (16%), Canada (16%) and Bahrain (12%) were the State's predominant alumina export markets (Figure 2.16).

1997 Alumina Industry Highlights

In 1997 world aluminium markets were relatively stable, compared to other mineral commodities, in spite of the Asian crisis and the downturn in the Japanese economy. World production and consumption increased by 3.3% and 4% respectively but more importantly aluminium stocks have been falling during 1997. Stocks fell to 5.4 weeks of consumption during 1997 as opposed to 7.9 weeks





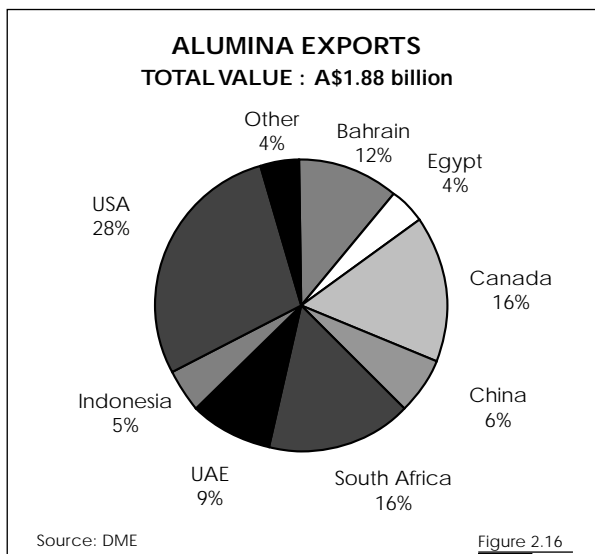
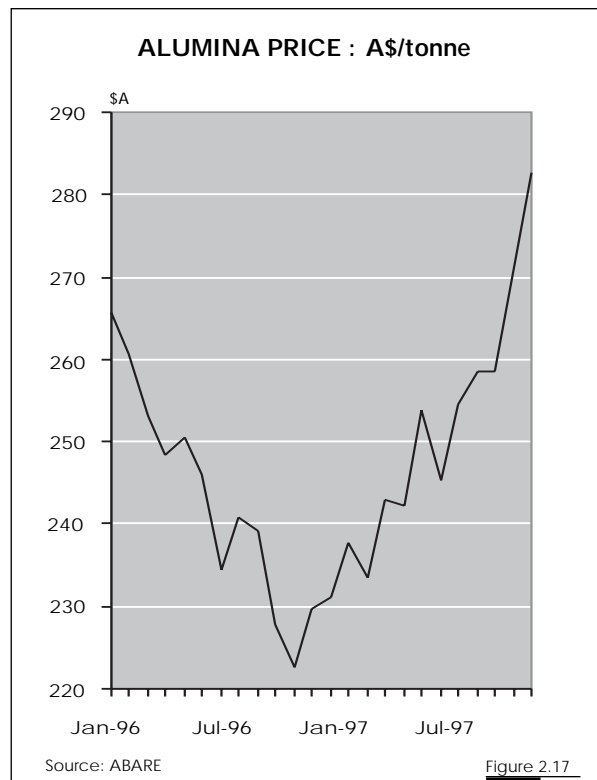
(Figure 2.17). The average spot price for alumina in 1997 was US\$214 a tonne, up by almost 23% from the average 1996 spot price of US\$174 a tonne. World production of alumina increased by approximately 3% in 1997 to 45 million tonnes. The strong growth expected in alumina production reflects increasing demand from aluminium smelters, as they increase metal output.

On the local scene, in September 1997 Worsley announced an \$800 million expansion of its refinery. The expansion will almost double the refinery's capacity to 3.1 million tonnes per year, up from 1.75 million tonnes per annum currently. Construction commenced late 1997 with completion targeted for the year 2000. The peak construction workforce is 1,000 persons with 150 employed once the project is operational. The Worsley expansion is the largest resource development project in the State's South West region for more than a decade.

in 1996. Nonetheless there remains speculation that not all aluminium stocks are accounted for.

The aluminium price increased by 6% to average US\$1,599 per tonne in 1997. However the annual 1997 average price hides the monthly fluctuations. The London Metal Exchange (LME) spot price fell from a high of US\$1,711 a tonne in August 1997 to US\$1,466 a tonne in February 1998.

In 1997, the alumina market was highlighted by upward pressure on the average world spot price



The State's other alumina producer, Alcoa is considering a proposed two stage \$970 million expansion of its Wagerup alumina refinery. The \$620 million first stage expansion would add 850,000 tonnes of output to its 25% share of the world alumina production capacity. If the expansion were to include the second stage this would almost double its current alumina output to 3.3 million tonnes per annum.

In another development, Alchem is working towards establishing Australia's first aluminium fluoride plant in Kwinana. A pre-feasibility study for processing alumina hydrate to produce 20,000 tonnes per annum of aluminium fluoride has been completed. It is expected that 75% of the final product will be sold on the domestic market. All environmental and statutory approvals have been granted.

Outlook

Overall, the consensus among forecasters is that in 1998 the world market for aluminium is expected to shift into surplus. The overwhelming explanation for this is production increases in addition to weak demand in Asia and Japan. Combined stocks are expected to increase by approximately 500,000 tonnes over the course of 1998, to reach a level of 2.76 million tonnes by the end of the year, which is equivalent to 6.6 weeks of consumption. The surplus state is expected to last until 1999.

As the market is expected to move into surplus in 1998, aluminium prices will probably remain subdued. The annual average LME spot price is forecast to fall by 6% to US\$1,505 a tonne in 1998.

World production of alumina is expected to climb again in 1998 by 6% to 47.7 million tonnes, and by 2.3% to 48.8 million tonnes in 1999. The increase in alumina production forecast is expected to be a result of both new and restarted capacity.

With the aluminium market continuing relatively subdued in 1998, world spot alumina prices are forecast by ABARE to fall by 8.4% to US\$196 per tonne in 1998.

ABARE expects a 2.7% rise to 13.6 million tonnes in Australian alumina production in 1997-98. Australian export earnings from alumina are forecast to increase by 15% in 1997-98 to just under \$3 billion. Higher export unit values for alumina are expected to offset lower export volumes caused by increased domestic consumption. Export earnings from both aluminium and alumina are forecast to remain steady in 1998-99, at almost \$5.85 billion. With Western Australia producing 63.7% of Australia's alumina production the outlook for the State's alumina industry is relatively positive.

During 1998, the expected fall in aluminium consumption in Asia is likely to be offset by continuing strong consumption growth in North America and Europe. As a result world consumption is forecast to grow by just 1% in 1998 to 21.8 million tonnes, before climbing more strongly in 1999, to 22.5 million tonnes.

Nonetheless, this assessment for 1998 needs to be treated cautiously. Weaker economic performance in Asia is expected to have a severe impact on aluminium consumption in the region in 1998. Even including China and India, consumption in Asia is still forecast to fall by 2.5% in 1998. One must also take into account the return to production of previously idle facilities during 1998. However, over 500,000 tonnes of capacity, mostly controlled by Alcoa, is still expected to remain idle during 1998. So there is the added question of just how quickly the idle facilities can be returned to production. The high cost nature of some of this capacity may prevent it from being restarted, but considerable potential still exists for additional production to come on stream relatively quickly.

To add to this, doubt has been cast over the future of the Alcoa-WMC alumina supply contract to China, worth \$3.75 billion over 30 years. The uncertainty arose from confirmation that China had dissolved its domestic nonferrous metals giant, China National Nonferrous Corp (CNNC). CNNC had signed up with the Alcoa-WMC partnership in 1997 for the annual supply of 400,000 tonnes of alumina a year for up to 30 years, with the option to increase the annual take. The dissolution of this agreement would be a severe blow to Alcoa and WMC, however because increased production of aluminium is forecast, it is possible that this quantity of alumina can be absorbed in the international market without too severe an impact on the alumina price.

2.6 Nickel

Output of nickel contained in matte, metal and concentrate in 1997 increased by more than 13% to reach 123 thousand tonnes. Value of production rose by only 10% as the international price of nickel continued to fall from its last peak recorded in 1995. The average US price over 1997 was down 8%. However, due to devaluation of the Australian dollar, local producers did not bear the full brunt of price weakness with Australian dollar prices down on average by less than 3% (Figures 2.18 and 2.19).

Western Australia accounted for around 99% of Australia's nickel production (Figure 2.20) and almost all production was exported (Figure 2.21).

1997 Nickel Industry Highlights

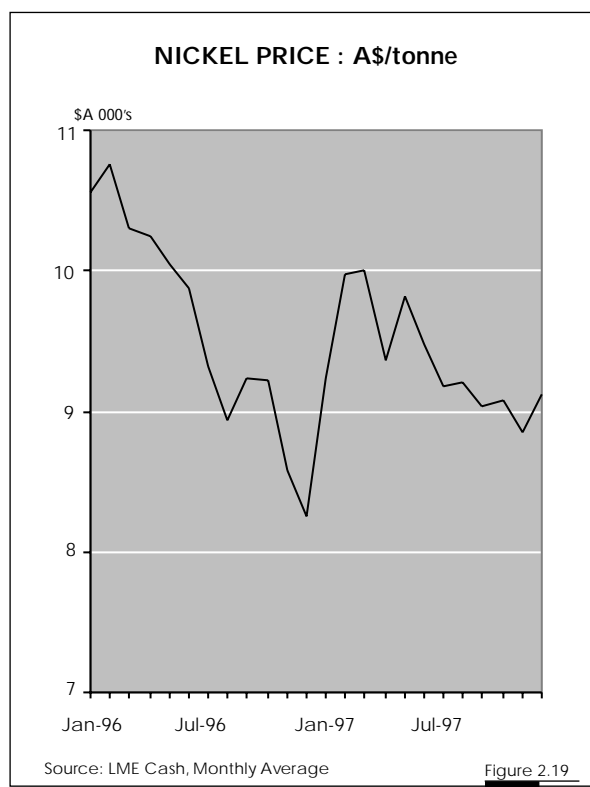
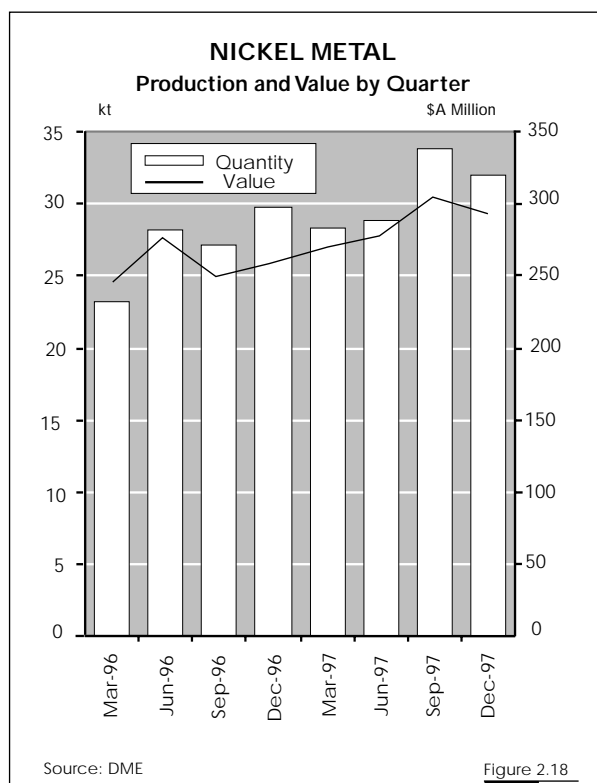
Greater output from WMC's nickel operations, including improvements at the Kwinana nickel refinery and a new mine, meant that Western Australia's nickel production continued to climb in 1997. The new project which helped boost 1997's output was Black Swan Nickel's underground Silver Swan mine near Kalgoorlie. This operation commenced shipping concentrates from Esperance in July 1997.

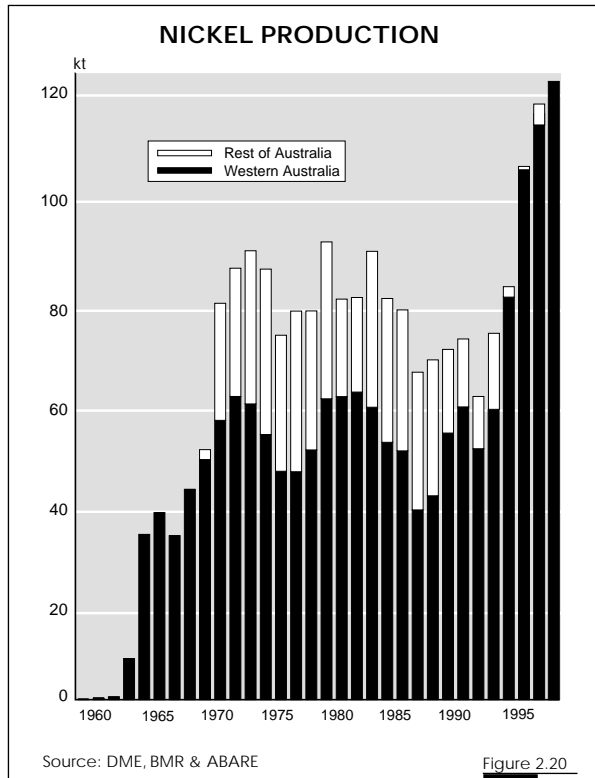
Price weakness of recent years reflects surplus nickel stocks due to lacklustre demand by stainless steel producers and ready availability of nickel and steel

scrap from Russia. This weakness was compounded in late 1997 with uncertainty created by disruptions to financial markets throughout Asia. However, whilst the Asian tiger economies are indeed not healthy, well over half of the world's nickel is consumed outside Asia. High rates of industrial production growth in North America and Western Europe are therefore expected to support increased production of stainless steel. In the Asian region the real question mark hangs over Japan, which consumes over 20% of the world's nickel. Western Australian producers are directly concerned as some 20% of the State's nickel exports go to Japan.

Outlook

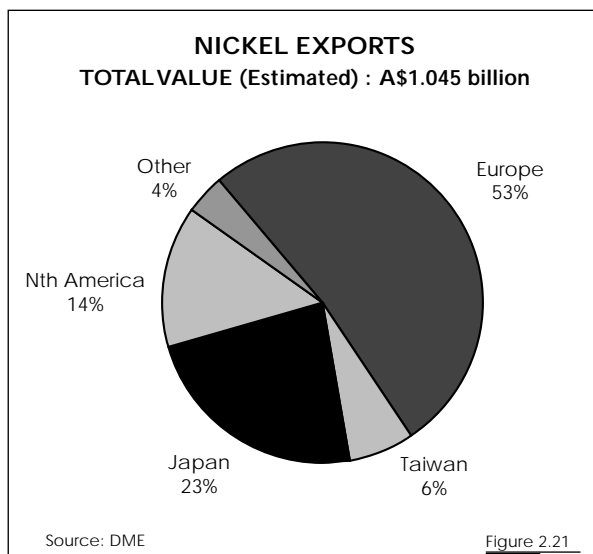
Current world annual nickel production is approximately 1,060 thousand tonnes and new global expansions will add around 230 – 300,000 tonnes. Some commodity analysts predict that these expansions will lead to a glut in world production and thus lower nickel prices. The Canadian Voisey's Bay project alone, for example, is to produce from 60 to 120 thousand tonnes annually. With such production levels accounting for around 10% of the world's output, prices will be subject to severe downward pressure leaving an environment in which only the low cost producers will operate. However, it is now predicted that commencement of Voisey's Bay operations will probably be delayed until around 2002.





Another new laterite project targeting commencement in the second half of this year is Centaur Mining's Cawse nickel project near Kalgoorlie. Cawse is forecast to produce 8,200 tonnes of contained nickel in its first full year of production in 1999. The gold producer Resolute is the third major new entrant into the laterite nickel arena. Resolute's \$200 million Bulong project is located east of Kalgoorlie and the first production of nickel metal from Bulong is expected around September/October 1998. The first stage of the project is expected to produce on average around 9,000 tonnes of nickel per annum. Nickel and cobalt cathode are to be the end products produced on site.

Voisey's Bay aside, a significant increase in world nickel production will in fact emanate from new laterite projects in Western Australia. Leading the way is Anaconda/Glencore's Murrin Murrin nickel project near Leonora. The project proponent's ambitions are to produce around 45,000 tonnes of contained nickel per annum, rising to 70,000 tonnes after expansions. Production from the first stage of the project is expected in the latter half of this year and it was recently announced that the project was committed to expand to 115,000 tonnes per annum. This is equivalent to almost the entire State's current output.

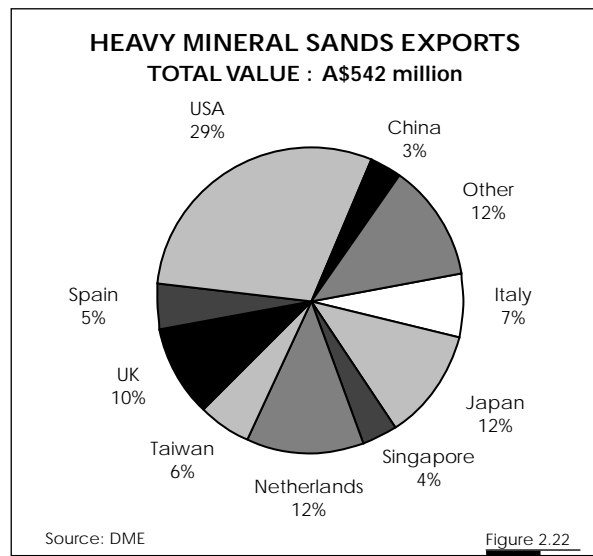


2.7 Heavy Mineral Sands

In 1997 the value of the State's heavy mineral sands production increased by 5.9% to \$633 million. The 1997 outcome was largely attributed to increased ilmenite and upgraded ilmenite production as well as the favourable contract prices received by Australia's mineral sands producers.

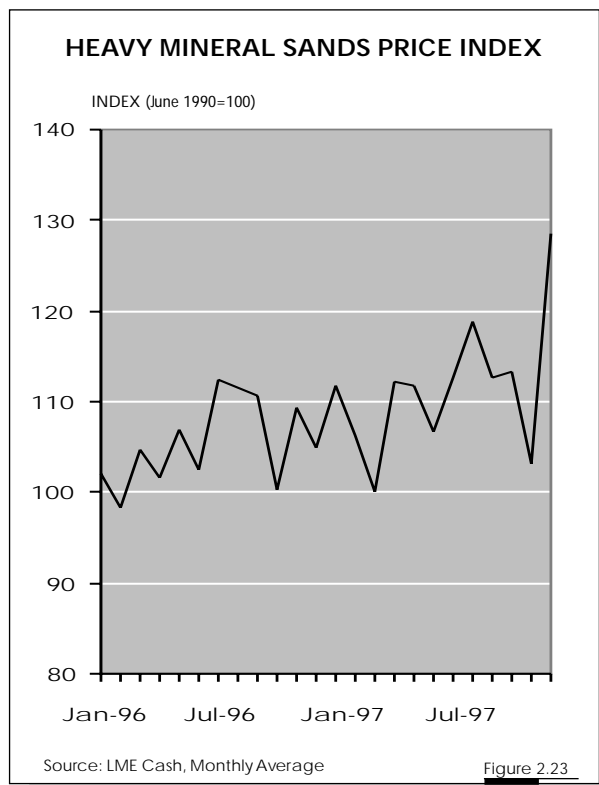
Over three-quarters of the value of production was exported overseas with the principal export destination being the USA (Figure 2.22).

The 1997 outcome was achieved despite a fall in world titanium dioxide prices. Titanium dioxide prices received by Australian exporters fell by 4% in 1997, following a 15% fall in 1996. The Australian mineral sands market, is dominated by long term contracts, so the price decreases were not felt by Australian producers in 1996 and 1997.



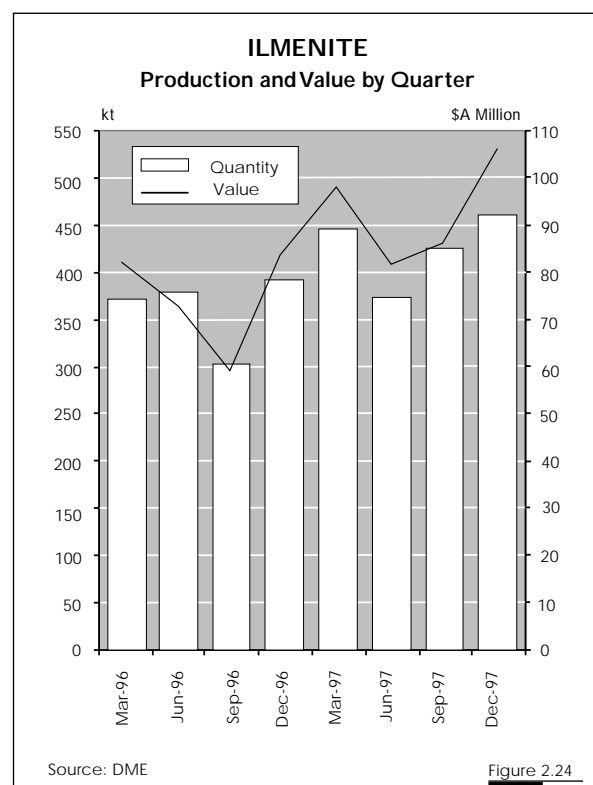
In 1997 ilmenite production increased by 15% to 1.23 million tonnes. The value of production was up by 17% to \$134 million (Figure 2.24).

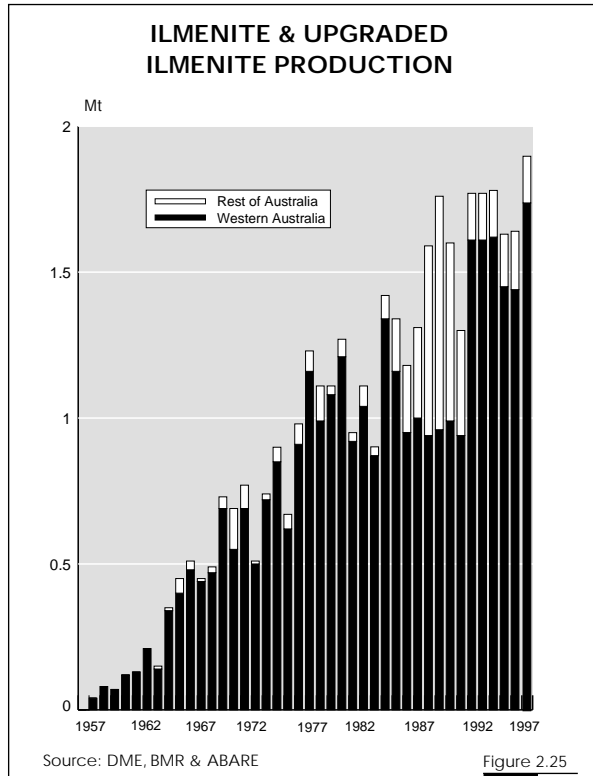
In 1998 the State's ilmenite production is expected to increase dramatically. In March 1997 BHP's \$200 million Beenup minerals sands project came into production. With a projected output of 600,000 tonnes per annum of ilmenite, it is destined to be one of Western Australia's biggest producers of heavy mineral sands. In addition Cable Sand's Yarloop project was commissioned in July 1997.



1997 Mineral Sands Industry Highlights

Western Australia is one of the world's most important producers of feedstocks for titanium dioxide pigments. The most significant of these are ilmenite, rutile and upgraded ilmenite (or synthetic rutile). In 1997 the State accounted for over half of Australia's titanium feedstock.





In 1997 the State's upgraded ilmenite production increased by 28% to 471,866 tonnes. Over the same period the value of production increased by 31% to \$238 million in 1997.

In September 1997 Westralian Sands commissioned a \$134 million expansion of its ilmenite processing plant at Capel. This will increase upgraded ilmenite production capacity to 230,000 - 250,000 tonnes per annum. Tiwest also completed its program of minor capacity increases at its Chandala plant in 1997 by removing bottlenecks from existing processes. The capacity of the Chandala plant has increased from 130,000 to 185,000 tonnes per annum.

Despite a 1% increase in the quantity of rutile produced the total value decreased by 0.8% to \$79 million in 1997. Rutile markets were volatile for much of 1997.

In the early part of 1997 there was considerable market uncertainty over the impact on world rutile prices of the recommencement of operations, scheduled for early 1998, at the world's largest rutile producer, Sierra Rutile. Due to political uncertainty in Sierra Leone the mine has been closed since 1995. This has been the most significant factor in the firming of world rutile prices over 1995 and 1996. Following another military coup in May 1997 it seems that the mine's reopening

has been indefinitely deferred. As a result world rutile prices are forecast to increase over the medium term.

In 1997 the value of the State's leucoxene production fell by 26% to \$11.7 million. This was due to a 32% decrease in output.

The State's zircon production fell by 19% to \$160 million in 1997. This was predominantly the result of a 21% drop in production, largely caused by a decline in grades from RGC's Eneabba North deposit. Zircon output will be boosted in 1998 by BHP's new Beenup mineral sands project which is expected to produce 20,000 tonnes of zircon per annum.

Outlook

Analysts suggest that favourable economic conditions in most major consumer markets should contribute to a recovery in pigment demand as excess stocks are cleared. As pigment prices firm, associated feedstock prices are also expected to rise, especially for ilmenite and upgraded ilmenite.

DuPont's acquisition of ICI's non American pigment production assets in 1997 has increased its share of world capacity from around 25% to 40%. DuPont's actions are part of an increasing industry-wide trend towards acquisitions and mergers. The rationalisation of the titanium dioxide industry should lead to improved prices and hence increased industry profitability. This strategy is achieving its goal with A\$ export prices received by Australia's titanium dioxide producers expected to increase by 14% and 5% respectively in 1997-98 and 1998-99.

The outlook for Australia's rutile, ilmenite and synthetic rutile industry is positive. Overall ABARE has forecast increases of between 2% and 6% in 1997-98 in the prices received by Australia's titanium feedstocks producers. Prices are also expected to increase in 1998-99. This outcome reflects some expected tightening of the overall world heavy mineral sands demand-supply conditions.

Australian zircon exporters are expected to record Australian dollar price falls in 1997-98 and 1998-99 of 4% and 2% respectively. It is thought that Asia will contribute to an easing in zircon demand and hence prices. Nonetheless the 1998-99 estimated price of \$568 remains 15% higher than the 1995-96 price outcome.

ABARE has forecast an increase in Australian exports of heavy mineral sands from \$917 million in 1996-97 to \$1,560 million in 2000-01. Given that Western Australia's heavy mineral sands industry currently contributes half the nation's heavy mineral sands exports the outlook for the State's mineral sands industry is positive.

New additions to State capacity such as Beenup, will enable the Western Australian industry to take advantage of the expected increase in heavy mineral sands prices.

As titanium dioxide prices improve there is also potential for the State's two pigment producers, Tiwest and Millennium Inorganic Chemicals (MIC), to resurrect their expansion plans, previously shelved when titanium prices were poor. MIC had previously planned a \$470 million expansion of its Kemerton plant, while Tiwest had planned a \$270 million expansion of its Kwinana plant.

2.8 Diamonds

In 1997 diamonds produced in Western Australia totalled just over 40.4 million carats. This represents a decrease of 15% from the 1996 level of production of 47.4 million carats. The value of sales for diamonds in 1997 was \$421 million. However, due to lower prices, decreased production and lower diamond grades, the value of diamond sales fell nearly 5% from the 1996 figure of \$442 million.

1997 Diamond Industry Highlights

The sole source of production in Western Australia is the Argyle diamond mine which is the world's largest diamond producer. However, less than 5% of its output is of gem quality. The average value of the product is approximately US\$8 carat. The decrease in overall production can be attributed to a decline in the alluvial stones output due to heavy rain early in 1997. Nonetheless, Argyle recorded a record production level in the fourth quarter of 1997 of 13.3 million carats.

Exacerbating the decreased value of sales is the pressure being placed on Argyle by De Beers' diamond Central Selling Organization (CSO). However the decrease in sales recorded by Argyle was in line with that experienced by the CSO. A significant decline in Japanese purchases and the Asian crisis were the main factors causing decreased sales value in 1997 for both Argyle and the CSO. Buoyant sales in the US however tended to slightly dampen the effects of the Asian crisis and the fall in Japanese demand.

In terms of Western Australian diamond export destinations, no official figures are available because 99.8% of Argyle's diamond production is forwarded to its Antwerp sales office and sold from there.

Although Argyle has not committed to an actual closure date for the mine it is forecast that the mine will close in either 2002 or 2003. At the end of 1996 reserves were estimated to be in the vicinity of 61.5 million tonnes, which with an increase in the throughput rate will be exhausted by 2002. It has been forecast that production will decline gradually to less than 30 million carats in 2001 and the mine will subsequently close.

In order to extend the mine life, the options of expanding the existing pit and going underground are being examined. However, the company has conceded there are technical difficulties associated with extending the existing pit, but has not clarified the extent of such difficulties. Even if approval is granted for an underground mine it will be much smaller than originally expected.

The plan for extending the existing pit involves expansion through the western wall. If this option is chosen it will take place over the next two to three years, extending the mine's life until 2006 or 2007. Even though this would allow access to only approximately half of the reserves that could be reached by shifting underground, the extensions to the open cut mine will cost only about a third as much as the underground option. Another option being explored is for a smaller underground mine using sub-level caving techniques, combined with a smaller open pit mine, with the underground mine gradually taking over the operation. As yet there have been no indications as to the comparative costs of this option.

There does however seem to be increasing reluctance from Rio Tinto to adopt the underground option due to the relatively high capital cost, declining diamond grades and intense competition for the classifications of diamonds produced by Argyle. There is also a belief that Rio Tinto would like to see Argyle continue operation at least until it commissions its Canadian diamond project in 2001-2002 because Argyle's expertise and experience in diamond marketing, gained through its Antwerp sales office, will be of extreme value to the new venture.

After Argyle discontinued its relationship with the CSO in mid 1996, it faced a tremendous hurdle in restoring the confidence of Indian merchants. The gamble paid off and there is now considered to be a sense of loyalty among the Indian merchants towards Argyle. A large proportion of the Argyle product ultimately ends up in India.

The 17 Bombay jewellery manufacturers, that have been helped by Argyle to gain a stronger position in the US market, doubled sales from US\$50 million to US\$100 million in 1997, and expect to double them again in 1998.

Five of the manufacturers won major contracts to supply the biggest chain of jewellery stores in the US,

(600 outlets). This enhances the position of Argyle diamonds in the Indian market as well as indirectly in the U.S.

Disruptions to diamond supplies in several producing regions have improved Argyle's sales and marketing status compared with that of the CSO. A decline in Russian exports and war and civil conflict in Zaire and Angola have reduced the flow of diamonds onto the world market. The reason for Russia's decreased exports is that they have rejoined the CSO after several years of "leaking" significant quantities of diamonds onto the world market. The CSO purchased a \$US250 million stockpile of Russian diamonds as part of a joint consultative council with Russia to help tighten supply conditions

Outlook

The overall outlook for the 1998 world diamond market is subdued. Even the increased demand in the US and a relative upturn in the European market will not be enough to ward off the effects of the Asian crisis and downturn in the Japanese economy on world diamond markets. This was certainly the sentiment expressed at the World Diamond Conference held in Perth in October 1997.

The overall strategy of the CSO in 1998 will be to tighten supply in an effort to stabilize markets and restore price levels. The CSO handles approximately 70% of world diamond output and, with Russia as a renewed member, it has urged Argyle to rejoin to make this strategy a reality. Whether or not the CSO will be successful is questionable due to the emergence of new diamond mines that will be operating outside the CSO. In particular BHP's Ekati (Lac de Gras) diamond mine situated in Canada's Northwest Territories, could threaten this plan. The mine is due to start operating in late 1998 and BHP has decided to sell only a small proportion of its production through the CSO. Also, Ashton Mining has the Merlin diamond mine in the Northern Territory, which is due to start production in January 1999. It is unlikely that it will choose to sell through the CSO given its experience as a partner in Argyle. Ashton has also revealed the possibility of gaining access to a potential high-carat diamond resource in Angola given the withdrawal of rebel forces and good progress of the peace process.

In terms of diamond exploration, expenditure in Western Australia declined 2% in 1997. There seems to be a danger that Australian explorers will pursue opportunities in Africa or look for alluvial projects that offer immediate cashflow, to the detriment of potential large-scale developments in Western Australia.

2.9 Other Minerals

Base Metals

The combined value of the State's copper, lead and zinc production increased by over 49% in 1997 to \$198 million.

High consumption generally coupled with a squeeze on stocks, particularly in China, supported very strong zinc prices in the second half of 1997 before the price collapsed in the Asian financial meltdown. The price drop in zinc towards the end of 1997 was insufficient to negate its earlier gains and overall, the average price over 1997 was up a significant 28%. Devaluation of the Australian dollar through the year translated this price increase for local producers to 37% in local currency terms. So, whilst zinc production increased 10% to 117 thousand tonnes in 1997, very good prices meant that the value of production was up a significant 67% to \$119 million.

Western Australia's zinc production continued to come from two sources, Normandy's Scuddles operation and Western Metal's Lennard Shelf mining operations. In early 1997 Normandy acquired 100% ownership of the Scuddles operation which was then known as the Golden Grove joint venture. Western Metals' activities also saw some changes with the cessation of mining at Cadjebut in December 1997. Western Metals started mining the Cadjebut deposit in 1994 and now operates two nearby mines, Kapok and Goongewa. These provide the ore which is transported to Cadjebut for processing. The end of 1997 also saw the resurrection of Derby as a shipping port with the commencement of monthly zinc and lead concentrate shipments from Western Metal's operations.

Zinc and lead shipments from Derby will increase significantly from July 1998 with Western Metals' development of its \$80 million Pillara operation (formerly known as Blendevale). Pillara will more than double Western Metals' annual production to 168,000 tonnes of zinc metal. This will elevate the Lennard Shelf operations to the world's seventh biggest zinc mining complex.

Western Australia's zinc production is therefore expected to grow significantly in the coming year. Demand for zinc in Europe appears particularly strong early in 1998 to the extent that it is currently offsetting

some of the weakness in Asia and is responsible for much of the recent falls in LME stocks. Strong demand from the US coupled with the European outlook is expected to soften the effect of heavy price cuts at the end of 1997. The outlook for 1998 depends critically on the level of exports to China and Asian developments. Most commodity watchers predict stable zinc prices with possible downward adjustments.

Unlike zinc, lead prices suffered a price fall of almost 20% over 1997 which depreciation of the Australian currency was unable to compensate for. Hence, whilst the quantity of the State's lead production increased 36% to over 23,000 tonnes, its value was up a little over 6% to \$10.5 million. The lead market was closely in balance last year and weaker Asian demand during a period of rising production saw the market enter substantial surplus. In tandem with the zinc production developments, State lead output can be expected to increase despite the unfavourable price outlook in a market which remains oversupplied for the foreseeable future.

Western Australia's copper production increased by 23% in 1997 to reach over 28,000 tonnes. Copper production chiefly emanated from Normandy's Scuddles operation and WMC's Nifty mine. In addition, copper by product was produced from WMC's Kambalda and Newcrest's Telfer operations. Total value of production was up 34% to \$69 million thanks to higher prices in Australian dollar terms. The international price of copper was lower on average in 1997 as a result of fund selling which fed on expectations of an upcoming surplus and on weak sentiment regarding Asia. Local currency devaluation, however, converted the outcome to a small price increase for the State's producers.

In the short term any improvement in the US\$ copper price is likely to be modest, with the market remaining in substantial surplus over 1998 and into 1999. However, this has triggered a series of mine closures and cutbacks. The 39,000 tonne per annum Cobar mine in New South Wales, for example, closed down in 1997 and total annualised capacity cuts already implemented globally have been estimated at 230,000 tonnes. This is likely to rebalance the copper market by the turn of the century and upgrade prices.

Manganese

State manganese production fell 40% to 177,000 tonnes in 1997 due to the shutdown of Valiant's Manganese operations early in the year. Value of production decreased commensurately by over 32% to \$22 million. No manganese is currently produced in Western Australia.

Salt

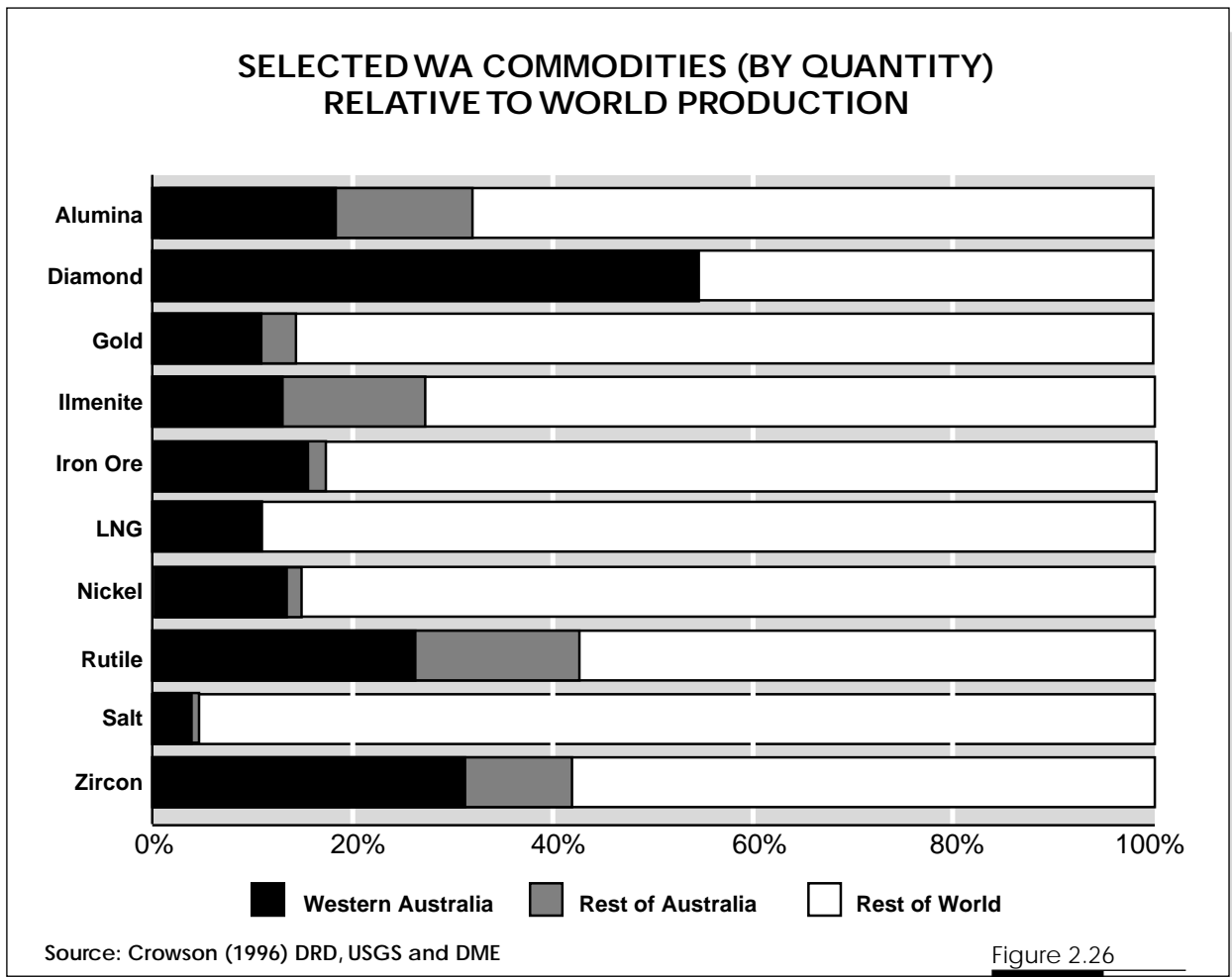
Salt production increased by over 12% to 8.1 million tonnes and thanks to favourable prices its value increased by 20% to \$172 million. Future Western Australian salt production is expected to rise due to the new Onslow salt project and expansion of Shark Bay operations. The Onslow salt project will have a production capacity of 2.5 million tonnes per annum. Construction of salt ponds and levee banks commenced in June 1997 and the project is scheduled for completion by the end of 1999. Also in 1997, Shark Bay Salt commenced expansion of its primary ponds to increase production capacity.

Coal

Western Australia's coal production was down 2% to 5.7 million tonnes in 1997. Value of production fell commensurately to \$261 million. In 1998 it is expected that all operations at Wesfarmers' Premier Mine will be consolidated with the commencement of production at Premier Pit 4. Coal production from the Premier mine will play an integral part in providing feedstock for the 300MW coal fired power station being constructed in Collie.

Other

Tantalite production fell 46% to 299 tonnes. However, very favourable prices meant that this was not fully reflected in the value of production which was down 14% to \$31 million. Tantalite is chiefly sourced from Gwalia Consolidated's Greenbushes mine, as is spodumene, the production of which totalled 57,000 tonnes, worth \$11 million in 1997. The Greenbushes mine is reportedly the world's largest hard rock tantalum mine and Gwalia operates Australia's only tin smelter at Greenbushes. Tin production reached 523 tonnes worth \$3.7 million in 1997.



In 1997, Western Australia supplied (by quantity) around 14% of the world's iron ore production, 10% of gold production, 10% of LNG (world trade) production, 18% of alumina production, 12% of nickel production, 32% of zircon production, 28% of rutile production and 54% of diamond (mainly industrial, approximation only) production.

3. EXPLORATION, INVESTMENT AND EMPLOYMENT

Mineral Exploration

Total minerals exploration expenditure in Australia trended downward in real terms during the 1980s, but has been rising since 1991-92, on average by 10% a year in real terms. This positive trend has reflected Australia's prospectivity and relatively stable economic and policy environment, despite recent uncertainty about access to resources.

The Australian Bureau of Statistics (ABS) has forecast that mineral exploration in Australia will decrease by 25% this half-year from January to June 1998. This is based on declining exploration expenditure in the September and December quarters of 1997.

Mineral exploration in Western Australia expanded despite continued uncertainty arising from native title claims and the Asian crisis, exacerbated by the downturn in the Japanese economy. In 1997, mineral exploration in WA reached \$700.8 million, which was 16.5% higher than the 1996 level of \$601.5 million.

Western Australia received approximately 60% of total Australian mineral exploration expenditure in 1997, as opposed to 56.2% in 1996.

Gold accounted for 73% of the State's exploration funds. This represents a 1% increase from the 1996 proportion. Base metals (copper, silver-lead-zinc, nickel and cobalt) represented 14.8%, while diamonds accounted for 5%. Iron ore received 3.7% of exploration funds, while mineral sands attracted just over 1% and uranium 0.3%.

In 1997 some \$511.4 million was spent on gold exploration in the State. This represented 69.4% of Australia's total gold exploration funds. This compared to \$445 million in 1996, which at the time accounted for 69% of gold exploration expenditure. This occurred despite a significant fall in the gold price in 1997. Although this did not have an immediate impact on State gold exploration activity, it should have a lagged effect in the latter part of 1998 and early 1999.

The Eastern Goldfields continued to be the prime focus of exploration, with further discoveries in the Yandal greenstone belt.

Exploration success continued underground at Bronzewing with delineation of the wide and persistent Herbison vein, averaging 30 grams per tonne of gold. The total resources in all categories at

Bronzewing, Jundee and Mount McClure increased substantially during the year and now total about 12 million ounces. This equates to approximately \$5.5 billion at current prices.

The Duketon greenstone belt continues to attract significant exploration. This was highlighted by the discovery in early 1997 of the Rosemont deposit, located 90km north of Laverton. In addition there was the announcement in late 1997 by Perth based gold explorer Metex Resources that a resource of at least 3 million tonnes will be defined at its Laverton gold project about 380km north east of Kalgoorlie-Boulder.

The Marymia Inlier continues to be a successful exploration area, with the discovery of the Three Rivers and Trident prospects, as well as the expansion of existing operations.

Another area of active grassroots exploration in the past 12 months was the Granites-Tanami Complex, where successful discoveries in the Northern Territory are being repeated in similar settings on the West Australian side of the border.

The Indee discovery, about 80km southwest of Port Hedland, has revealed a potential new area of economic gold mineralization (albeit low grade) in the north Pilbara. This will in turn attract further exploration to the region where there is still significant unrealised mineral potential.

Overall most of the exploration effort for gold in 1997 concentrated on extending known orebodies, identifying new lodes, and discovering satellite orebodies near existing mines.

Base metals exploration in WA attracted 44.8% of total Australian base metal expenditure in 1997 with expenditure of \$103.9 million. In comparison, 1996 expenditure was \$97.8 million, which at the time was nearly 38% of total Australian exploration for base metals.

Base metal activity was concentrated in the Pilbara and Kimberley regions. Regular announcements of good drill intersections have come from the project areas that have been explored over the past few years, including Panorama in the Pilbara, Koongie Park in the East Kimberley and Pillara Range in the West Kimberley.

Nickel exploration has continued to increase even with a falling nickel price. The focus is on upgrading known deposits for 'fast-tracking' development prior to 2002 when Voisey's Bay in Canada is expected to commence production. This particular mine will have significant impact on the world nickel market due to its apparent low operating cost and its potential to supply 10% of the world market. There is also the impetus of the potential \$1 billion expansion of the Murrin Murrin nickel mine. This will bring Murrin Murrin approximately in line with the proposed production level of Voisey's Bay.

The most notable impact of the nickel search and evaluation in WA is the emergence of laterite nickel deposits as front runners for the next phase of development (i.e. Bulong, Murrin Murrin and Cawse). This owes a lot to the application and adaptation of high-pressure acid-leach process technology and cheaper power from the Goldfields Gas Transmission Line. Laterite nickel projects are potentially very cost competitive in comparison with sulphide operations.

In 1997, diamond exploration expenditure decreased approximately 2% from \$36.9 million in 1996 to \$36.1 million. The 1997 expenditure accounts for 68% of total Australian exploration expenditure for diamonds. Exploration is continuing in the Yilgarn Craton in addition to the emergence of the Leonora-Menzies region as a potential kimberlite province. Nonetheless the Kimberley region, both onshore and offshore, continues to be the main focus of activity at a number of defined target areas.

Some diamond explorers have had encouraging results. In particular Striker Resources announced in September 1997 that it had discovered a 2.45 carat diamond at its Beta Creek project in the Northern Kimberley. During 1996 and 1997, Striker delineated the diamond-bearing Ashmore 1 and 2 pipes and discovered the diamond-bearing Ashmore 3 pipe (with strong data suggesting an additional pipe nearby). Striker Resources have commenced an evaluation program and results to date indicate the likelihood of economic grades being obtained, with Ashmore 1 and 2 containing the tonnage potential to support a five-year mine life.

There was also the announcement that Kimberley Resources Ltd may have had success at its Blina project in the Kimberley area. Exploration results indicated that they had struck a lamprite pipe during drilling

of an anomaly of a cluster of nine geological features. It is believed this indicates they are within 500 metres of finding a pipe. Blina lies adjacent to Ellendale, where several diamondiferous pipes had been discovered by the Argyle joint venture partners.

The iron ore sector is continuing to experience a high level of interest with numerous projects at the feasibility study stage and with considerable public promotion of developments connected with downstream processing (direct reduced ironmaking, hot briquetted iron and steelmaking). The reported level of iron ore exploration in Western Australia for 1997 increased to \$26.2 million for the year – an increase of 48% from the 1996 expenditure of \$17.7 million. This increase also reinforces the view held by the Department of Minerals and Energy that the ABS figures for iron ore exploration had been significantly underestimated for the past three years. As a proportion of total exploration expenditure for iron ore, WA accounted for 98% which was the same in 1996.

The exploration effort has concentrated in the State's Hamersley Basin where most of the current iron ore production is located. With the gradual depletion of reserves of low-phosphorous Brockman ores in the Hamersley Basin, major producers are increasingly being forced to evaluate resources hosted by either the Marra Mamba Iron Formation or Robe River Pisolite.

Continued interest is being shown in magnetite-rich deposits within primary banded iron-formation of the western Yilgarn (Tallering Peak, Koolanooka and Mount Gibson) capable of yielding, through beneficiation, a very high-grade product suitable for the direct-reduction process.

With expenditure of \$7.4 million in 1997, Western Australia retains the top share of the nation's heavy mineral sands exploration funds with 57%. In 1996 expenditure was \$5.9 million or 46.8% of the nation's total.

Developments near Capel include the Maidment and Higgins deposits. RGC's Maidment mine came onstream during the year and is to be the main source of ore as nearby reserves are depleted. Plans are in progress to re-open the original Yoganup mine and develop two new operations further to the north, near Roelands and Yarloop.

Petroleum Exploration

ABS data suggests that in 1997 the State's petroleum exploration expenditure decreased by 20% to \$333.7 million. Thus the State's share of Australia's petroleum exploration expenditure decreased from 53.7% in 1996 to 43% in 1997. Even with the decrease, this is still significantly above average 1990s levels. The figures quoted include expenditure on Western Australian leases in the Zone of Cooperation, Area B.

Again in 1997, petroleum exploration activity was concentrated in the North West Shelf area. This was highlighted by the announcement in late December 1997 that the Jaubert 1 exploration well on the North West Shelf had produced oil at a daily rate of 5,900 barrels with associated gas. A second zone in the well is yet to be tested and hopes are high that a potential 40 million barrel find could become an economic project for Woodside Petroleum. Mobil Oil Corp also announced in October 1997 the discovery of a major new gas field adjacent to Woodside's North Rankin gas platform.

In addition there was interest displayed in the hydrocarbon potential of the onshore Canning Basin area in the Kimberley region and the onshore Carnarvon Basin.

Total Australian petroleum exploration expenditure in 1997 decreased by approximately 0.7% to \$775.1 million. Of this total approximately 8.7% was spent on production lease areas while the remaining funds were spent, amongst other things, on exploration permit areas. Compared to 1996, these figures represent a swing away from exploration expenditure on production leases. In 1996 exploration expenditure on production leases was approximately 17%.

ABS data shows that offshore exploration, Australia-wide, is still taking place at strong levels. In 1997 offshore exploration worth \$547.4 million accounted for 70.6% of all petroleum exploration. This is slightly down from the 1996 level of \$568.3 million, which at the time was 72.8% of total expenditure. Onshore petroleum exploration in Australia increased by 7% from \$212 million in 1996 to \$227.6 million in 1997.

Mining Investment

The ABS mining capital investment statistics for 1997 indicate mining investment in 1997 accounted for 65.5% of the State's total investment as compared with 56.5% in 1996. Total State investment increased 7.8%

from the 1996 level of \$6.949 billion to \$7.494 billion. Thus the actual level of mining investment was \$4.908 billion in 1997 and \$3.927 billion in 1996. Western Australia's share of the national total of mining investment was 48.9% in 1997 and 48.2% in 1996. Most impressive about the 1997 statistics was a 24% increase in State mining investment from the September quarter to the December quarter.

ABS mining investment figures need to be treated cautiously as they do not capture all mining investments. Investment in downstream processing is regarded by the ABS as manufacturing investment. A breakdown of the manufacturing figures into resource processing and other categories is not available.

There is some concern that developments in Asia will have a large second round impact on business through diminishing business confidence. However, the link between external conditions and business investment is not as strong as might be expected. Large investment projects quite often take between one and three years to construct. This means that conditions are important in three years' time when production commences rather than at the moment. However, this also means that if current conditions lead to a change in expectations, the impact of the resultant revisions to capital expenditure plans may not be felt for 18 months or more.

Projects with a 20 to 30 year economic life are expected to operate within a range of demand and price environments within that life. Accordingly, the viability of those projects is tested under a variety of scenarios before investment proceeds. Projects must have a long-term horizon and be expected to withstand considerable variability in commodity prices and demand conditions before being committed for development.

The strong growth forecast for Western Australia this financial year is largely driven by strong business investment – particularly in large mineral and energy projects and downstream processing.

The Delta Electricity and Access Economics Investment Monitor for December 1997, indicates that there are currently over \$34 billion worth of mining projects in Western Australia either under construction, committed, under consideration or possible. The mining sector accounts for 55.4% of total investment

(i.e. \$61.7 billion) in Western Australia. When including projects with linkages to mining such as further processing and infrastructure to service the industries, the figure is approximately \$47 billion.

The value of projects under construction or committed for construction was a record \$11.1 billion in the December quarter. The large number of projects is spread broadly across resource recovery and processing of commodities such as nickel, alumina, iron ore and gas.

Overall the viability of many of Western Australia's projects has been improved through:

- The introduction of new low cost technology, such as high pressure acid leach technology with applications for refining of laterite nickel deposits such as Murrin Murrin, Bulong and Cawse; and
- The deregulation of energy markets in Western Australia, which has led to significant reductions in projected operating costs of several projects (i.e. energy prices in the Pilbara and Goldfields regions have been halved).

The Asian economic downturn appears to have had little effect on the timing of major investment project announcements:

- Rio Tinto have just announced plans for the development of the \$1 billion HIs melt iron processing plant at Dampier, due for completion by 2005.
- Commitments have been made on a number of alumina projects, the timing of which has been brought forward.
- Although a number of gold and nickel projects have been delayed in recent months, the delays are unrelated to developments in Asia.

The Australia-wide trend in mining investment is not based on a speculative rush of exploration expenditure or high commodity prices, but on a solid capital expenditure that will generate a growing mineral production profile leading into the next century. The seeds of this expansion were set in the late 1980s and early 1990s when large discoveries were made. New technology, improved infrastructure and microeconomic reform have all helped to encourage companies to develop these large finds.

Expected resource developments not only provide a foundation for the long term viability of the State's resource sector but also, through associated multiplier effects, provide a significant impetus to State economic and employment growth. Such benefits are enhanced when projects have a significant degree of local content. Excellent levels of local content have been obtained in several of the State's more significant mining developments, for example:

- 94% in the \$200 million Beenup mineral sands project;
- 86% in the \$285 million North West Shelf LPG operation;
- 85% in the \$900 million Murrin Murrin nickel mine;
- 82% of all costs to date for the \$820 million Argyle diamond mine;
- 75% in the \$200 million East Spar gas and condensate field; and
- 70% in the \$610 million Wandoo (Carnarvon Basin) oil project.

Mining Employment

The Department of Minerals and Energy's official employment statistics are compiled from industry returns and include contracted mining labour working on the mine sites.

In 1997 employment in the State's mineral and petroleum industries increased approximately 1.3% from 39,599 in 1996 to 40,098 persons. Overall, the decreases in employment by each sector were offset by the increases. The largest increase was in the petroleum sector with 40,098. This seems relatively self-explanatory given the increased production in most areas of the petroleum sector during 1997. Employment growth was also significant in the base metals sector with an increase of 33.8%, nickel went up 22%, salt increased 15.3% and bauxite-alumina rose 4.75%. Decreases occurred in the following sectors: diamonds down by 10.1%, iron ore decreased 7.7%, coal declined by 5.1%, heavy mineral sands were down 4.4% and gold had a 3.9% reduction.

4. SUPPLEMENTARY INFORMATION ON GOLD

South Africa, United States and Australia collectively account for almost half of the world's gold production. However, due to these country's currency movements, their producers have not received uniform prices.

As illustrated in figure A which indexes US dollar, Australian dollar and South African rand gold prices since 1995, currency depreciations have to some extent cushioned price falls for Australia and South Africa. Whilst in US dollar terms the price of gold dropped 15% in 1997, in Australian dollar and South African rand terms the price drop over the same period was 10% and 9% respectively. Significantly, the drop for South African producers occurred after a 21% increase in rand terms over 1996 when the currency collapsed.

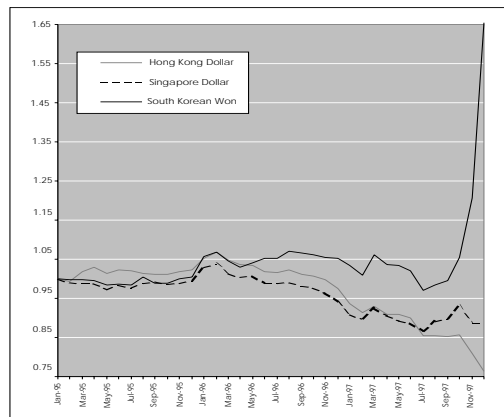
Figure B indexes Hong Kong dollar, Singapore dollar and South Korean won gold prices since 1995. South East Asian currency turmoil had very little effect on gold prices faced by Singaporean and Hong Kong buyers. Hong Kong prices were unaffected by currency movements as the Hong Kong dollar is tied to the US currency and effectively acts as a proxy for US dollar gold prices. The Singapore dollar remained strong throughout the Asian economic turmoil and thanks to a slight appreciation actually resulted in gold prices equal to or below those in US prices.

However, Western Australia's biggest single gold purchaser, South Korea, witnessed a huge price escalation. Having suffered significant depreciation of its currency in the latter half of 1997, in South Korean won terms the gold price soared over 70%

Figure A : Index of Gold Prices



Figure B: Index of Gold Prices



However, just as currency depreciations are a welcome cushion for producers facing lacklustre US dollar gold prices, currency depreciations in buyer countries impact adversely on demand. South East Asian currencies suffered considerable depreciation following the floating of the Thai baht in July 1997. In addition, the South Korean won suffered a similar fate as a result of irresponsible borrowing and lending by large corporations and banks in South Korea.

These were salient developments for Western Australian gold producers. In 1997 over 80% of Western Australia's gold exports went to South Korea (38%), Singapore (29%) and Hong Kong (15%). Effect of currency movements on these buyer countries is shown in Figure B.

from July to December 1997. This dramatically contracted demand. However, gold exports to South Korea in the past have often been re-exported immediately to other regional countries such as Singapore and Hong Kong. This allowed some importers to take advantage of arbitrage opportunities. Consequently, reduced South Korean demand is likely to have been offset by increased sales directly to Singapore and Hong Kong.

TABLE 1 QUANTITY & VALUE OF MINERALS & PETROLEUM

COMMODITY\Mineral	UNIT	1996		1997	
		QUANTITY	VALUE (\$A)	QUANTITY	VALUE (\$A)
BASE METALS					
Copper Metal	t	23,073 (r)	51,280,712 (r)	28,338	68,692,806
Lead Metal	t	17,080 (r)	9,901,951 (r)	23,201	10,500,231
Zinc Metal	t	106,855 (r)	71,282,609 (r)	117,086	118,832,893
TOTAL BASE METALS			132,465,272 (r)		198,025,930
BAUXITE-ALUMINA					
Alumina	t	8,249,660	1,967,808,060	8,481,895	2,084,713,647
Gallium	kg	24,835 (r)	9,841,724 (r)	7,299	2,335,724
TOTAL BAUXITE - ALUMINA			1,977,649,784 (r)		2,087,049,371
CHROMITE-PLATINOIDS					
Chromite	t	2,277 (r)	676,222 (r)	7,751	1,774,752
CLAYS					
Attapulgit	t	17,173	4,180,355	28,262	4,203,131
Clay Shale	t	14,559	179,079	45,530	663,502
Fire Clay	t	116,850	245,820	84,688	101,626
Kaolin	t	440 (r)	61,527 (r)	3,307	215,618
White Clay	t	13,003	130,030	2,360	14,160
TOTAL CLAYS			4,796,811 (r)		5,198,037
COAL	t	5,814,923	268,381,210	5,692,147	260,534,172
CONSTRUCTION MATERIALS					
Aggregate	t	505,750	3,292,862	453,971	2,858,956
Gravel	t	237,095 (r)	1,369,608 (r)	176,792	963,578
Rock	t	549,600	3,303,495	210,401	1,324,367
Sand	t	1,429,967 (r)	6,333,052 (r)	1,554,390	7,585,287
TOTAL CONSTRUCTION MATERIALS			14,299,017 (r)		12,732,188
DIAMOND	ct	47,425,602	442,006,326	40,421,889	421,193,947
DIMENSION STONE					
Black Granite	t	946	283,695	958	287,457
Granite	t	220	11,000	316	77,050
Jasper	t	0	0	0	0
TOTAL DIMENSION STONE			294,693		364,507
GEM & SEMI-PRECIOUS STONE					
Agate	kg	0	0	5	3,089
Chalcedony	kg	41	20,680	0	0
Chrysoprase	kg	20 (r)	4,000 (r)	22	8,936
Jasper	kg	n.a. (r)	1,213 (r)	n.a.	22,585
Variscite	kg	0	0	29	17,238
TOTAL GEM & SEMI-PRECIOUS STONE			25,893 (r)		51,848
GOLD	kg	221,184 (r)	3,528,640,503 (r)	240,245(e)	3,441,669,557(e)
GYPSUM	t	260,520	2,352,729	314,943	3,931,099
HEAVY MINERAL SANDS					
Garnet	t	88,493	9,415,064	97,109	11,168,442
Ilmenite	t	1,077,028	114,289,225	1,233,849	133,592,283
Upgraded Ilmenite (a)	t	367,525	181,809,730	471,866	237,850,873
Leucoxene	t	33,170	15,849,797	22,482	11,687,280
Rutile	t	110,651	79,167,249	111,779	78,531,838
Zircon	t	372,704	197,540,254	292,791	160,337,523
TOTAL HEAVY MINERAL SANDS			598,071,319		633,168,239

TABLE 1 (Cont.) QUANTITY & VALUE OF MINERALS & PETROLEUM

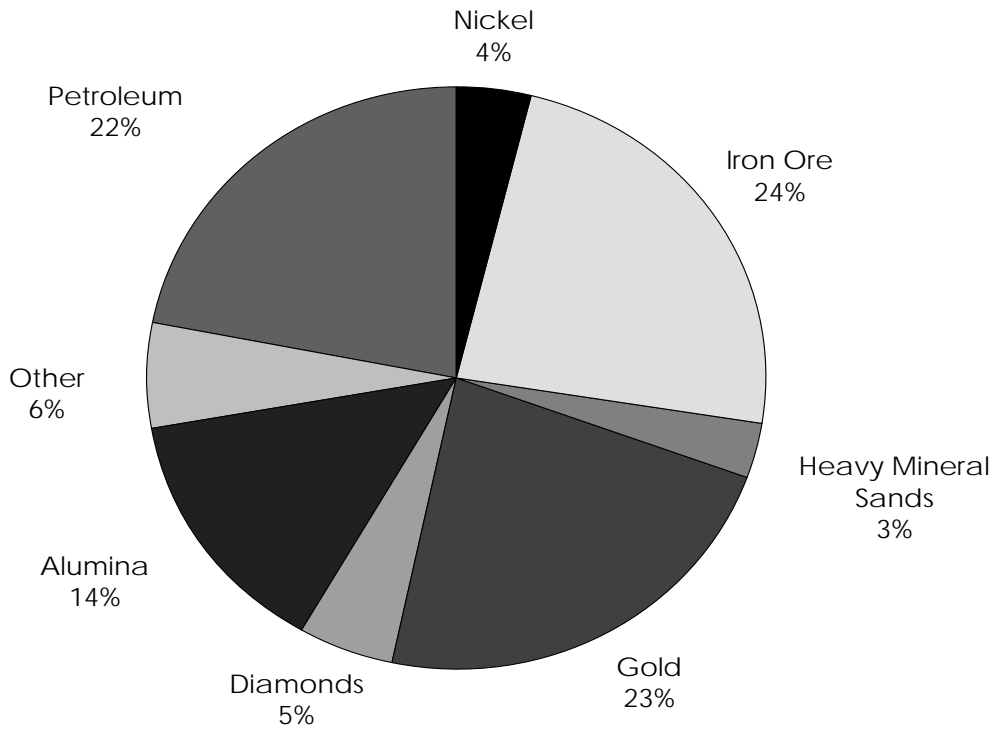
COMMODITY\Mineral	UNIT	1996		1997	
		QUANTITY	VALUE (\$A)	QUANTITY	VALUE (\$A)
INDUSTRIAL PEGMATITE MINERALS					
Felspar	t	57,241 (r)	2,120,733 (r)	65,818	3,527,169
IRON ORE					
Domestic	t	5,791,703	136,656,820	7,413,286	183,370,087
Exported	t	127,859,595	2,787,821,563	144,305,307	3,449,970,594
TOTAL IRON ORE		133,651,298	2,924,478,383	151,718,593	3,633,340,681
LIMESAND-LIMESTONE-DOLOMITE					
Dolomite	t	7,342	62,040	4,387	126,045
Limesand-Limestone	t	2,667,429 (r)	17,747,807 (r)	2,277,880	13,685,622
TOTAL LIMESAND-LIMESTONE-DOLOMITE			17,809,847 (r)		13,811,667
MANGANESE ORE	t	296,807	32,668,655 (r)	176,990	22,153,201
NICKEL INDUSTRY					
Cobalt by-product	t	942	63,521,086	1,219	58,771,721
Nickel Concentrate	t	764,281	1,033,883,708	873,119	1,136,002,794
Palladium by-product	kg	559	2,416,416	429	3,227,915
Platinum by-product	kg	119	1,584,578	315	2,419,386
TOTAL NICKEL INDUSTRY			1,101,405,788		1,200,421,816
PEAT	t	0	0	0	0
PETROLEUM					
Condensate	kl	4,965,927	773,723,615	6,436,741	1,103,307,791
Crude Oil	kl	11,258,708	1,958,824,698	9,539,869	1,719,801,811
LNG	Btu 10 ⁶	377,819,333	1,391,202,011	375,600,011	1,595,472,848
LPG - Butane	t	158,962	37,441,182	320,425	93,168,890
LPG - Propane	t	150,835	36,929,761	253,817	73,825,137
Natural Gas	000m ³	6,624,510 (r)	494,681,365	7,331,730	571,510,516
TOTAL PETROLEUM			4,692,802,632		5,157,086,994
PIGMENTS					
Red Oxide	t	6,000	164,250	5,340	1,014,600
SALT	t	7,214,536 (r)	143,609,587 (r)	8,115,941	172,120,951
SILICA-SILICA SAND					
Silica	t	79,048	790,479	84,582	845,819
Silica Sand	t	642,064 (r)	6,251,040 (r)	720,155	7,199,961
TOTAL SILICA-SILICA SAND			7,041,519 (r)		8,045,780
SILVER	kg	47,817 (r)	8,892,075 (r)	51,252	9,546,962
TALC	t	189,507 (r)	15,155,833 (r)	188,835	14,971,392
TIN-TANTALUM-LITHIUM					
Spodumene	t	139,287 (r)	18,289,945 (r)	56,567	10,701,568
Tantalite	t	557 (r)	35,638,738 (r)	299	30,550,308
Tin Metal	t	401 (r)	2,783,005 (r)	523	3,637,931
TOTAL TIN-TANTALUM-LITHIUM			56,711,688 (r)		44,889,807
TOTAL VALUE			15,972,520,772 (r)		17,346,624,666(e)

Note: Quantities used in this table only apply to Minerals and Petroleum covered by the Mining Act 1978, the Petroleum Act 1967, the Petroleum (Submerged Lands) Act 1982 and relevant State Agreement Acts.

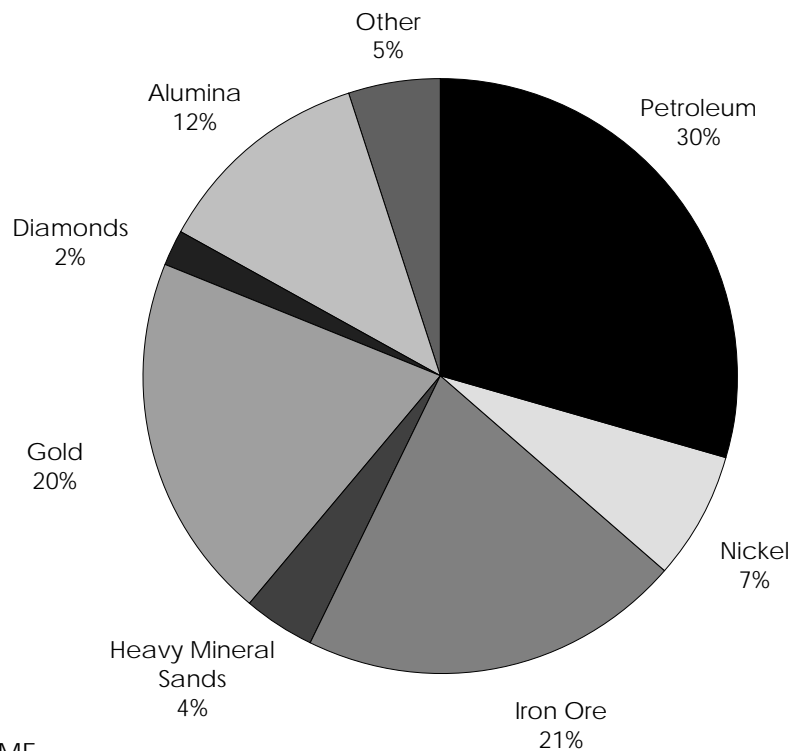
- (a) Also known as synthetic rutile
- (e) Estimate
- (r) Revised from previous edition

COMPARATIVE VALUE OF PRODUCTION

1992 Total : A\$12.126 billion



1997 Total : A\$17.347 billion



Source : DME

Figure 0.1

TABLE 2
PERSONS EMPLOYED IN THE WA MINERALS & PETROLEUM INDUSTRIES

COMMODITY GROUP	YEAR 1996	YEAR 1997
BAUXITE - ALUMINA	5,515 (r)	5,777
CLAYS	74	62
COAL	780 (r)	740
CONSTRUCTION MATERIALS	327	328
COPPER - LEAD - ZINC (Base Metals)	766 (r)	1,025
DIAMONDS	1,116 (r)	1,003
DIMENSION STONE	76	71
GOLD	13,080 (r)	12,569
HEAVY MINERAL SANDS	2,721 (r)	2,601
INDUSTRIAL PEGMATITE MINERALS	27	32
IRON ORE	8,867 (r)	8,182
LIMESTONE - LIMESAND	105	208
MANGANESE ORE	3	0
NICKEL	3,698 (r)	4,512
PETROLEUM	1,157	1,647
SALT	595 (r)	686
SILICA - SILICA SAND	244	241
TALC	45	37
TIN - TANTALUM - LITHIUM	268	273
OTHER	135	104
TOTAL	39,599 (r)	40,098

TABLE 3 **QUANTITY AND VALUE OF SELECTED MAJOR COMMODITIES**

	Unit	1988		1989		1990		1991	
		Quantity	Value \$m	Quantity	Value \$m	Quantity	Value \$m	Quantity	Value \$m
ALUMINA	Mt	6.18	1,301.43	6.38	2,096.79	6.72	2,358.95	7.01	1,844.03
BASE METALS									
copper metal	kt	7.43	17.76	19.04	40.70	14.96	22.55	11.79	17.92
lead metal	kt	0.00	0.00	7.85	4.42	13.61	7.18	10.70	4.35
zinc metal	kt	20.25	14.70	38.06	48.15	51.70	61.55	112.01	94.69
TOTAL BASE METALS			32.46		93.27		91.28		116.96
COAL	Mt	3.79	158.00	3.83	166.80	4.83	214.25	5.11	228.56
DIAMOND	M ct	35.22	302.50	37.51	427.45	31.18	429.93	33.36	456.93
GOLD	tonnes	107.29	1,913.15	147.28	2,295.58	176.35	2,794.00	186.34	2,800.1
HEAVY MINERAL SANDS									
ilmenite	Mt	0.94	68.29	0.96	77.07	0.99	86.20	0.94	81.50
rutile	kt	91.19	54.01	88.97	58.36	76.07	57.91	59.13	39.66
synthetic rutile	kt	183.50	69.15	261.60	115.53	249.27	120.77	317.96	162.17
zircon	kt	368.16	123.87	343.82	187.95	224.46	126.68	204.33	79.16
other hms			7.91		10.12		9.37		5.14
TOTAL HEAVY MINERAL SANDS			323.23		449.03		400.93		367.63
IRON ORE	Mt	98.32	1,757.28	106.47	2,122.07	103.85	2,426.81	114.17	2,978.72
MANGANESE ORE	kt	0.00	0.00	11.74	0.05	364.58	57.93	209.64	37.77
NICKEL METAL	kt	36.30	480.85	42.79	688.85	50.91	557.97	55.76	569.24
PETROLEUM									
condensate	Gl	1.13	146.25	1.35	197.16	1.72	333.90	1.87	313.74
crude oil	Gl	2.06	246.11	2.51	369.85	5.20	1,023.22	5.21	901.42
lng	btu 10 ¹²	0.00	0.00	37.68	113.43	153.14	508.10	204.80	957.95
lpg - butane	kt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
lpg - propane	kt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
natural gas	Gm ³	3.65	301.43	3.74	321.73	3.70	366.43	3.74	372.20
TOTAL PETROLEUM			693.79		1,002.17		2,231.65		2,545.31
SALT	Mt	5.85	98.53	5.90	112.38	6.12	130.77	6.83	149.36
OTHER			70.85		88.68		99.56		91.69
TOTAL			7,132.07		9,543.12		11,794.03		12,186.38

1997 STATISTICS DIGEST

1992		1993		1994		1995		1996		1997	
Quantity	Value \$m	Quantity	Value \$m	Quantity	Value \$m	Quantity	Value \$m	Quantity	Value \$m	Quantity	Value \$m
7.08	1,689.72	7.80	1,891.86	7.93	1,684.58	8.07	1,757.36	8.25	1,967.81	8.48	2,084.71
12.09	18.68	28.98	30.21	35.11	68.13	24.31	73.29	23.07	51.28	28.34	68.69
20.96	7.43	32.28	7.84	20.29	7.32	15.64	8.25	17.08	9.90	23.20	10.50
141.39	132.98	141.10	87.02	123.62	85.14	126.34	87.73	106.86	71.28	117.09	118.83
	159.09		125.07		160.59		169.27		132.46		198.02
5.66	251.76	5.47	248.44	5.03	234.02	6.06	280.66	5.81	268.38	5.69	260.53
41.15	565.06	22.65	486.77	27.72	470.34	23.45	480.15	47.43	442.01	40.42	421.19
182.10	2,751.38	183.47	3,139.61	192.98	3,265.93	189.48	3,163.66	221.18	3,528.64	240.25	3,441.67
1.04	87.30	1.01	85.40	1.08	93.52	1.00	96.27	1.08	114.29	1.23	133.59
68.96	39.05	56.60	29.97	87.16	44.46	124.87	68.14	110.65	79.17	111.78	78.53
334.48	157.88	308.60	143.53	357.53	164.53	452.74	215.43	367.53	181.81	471.87	237.85
265.17	51.46	299.76	46.26	444.26	99.00	458.44	152.54	372.70	197.54	292.79	160.34
	10.26		6.49		6.62		8.07		25.26		52.86
	345.95		311.65		408.13		540.45		598.07		633.17
108.15	2,921.98	116.34	2,996.73	124.26	2,630.61	135.97	2,980.69	133.65	2,924.48	151.72	3,633.34
402.84	72.20	247.86	43.40	202.52	22.74	227.90	28.42	296.81	32.67	176.99	22.15
48.04	461.54	55.46	437.74	77.00	630.13	101.36	1,094.17	108.38	1,033.88	122.99	1,136.00
2.06	366.70	2.17	359.86	2.34	331.19	3.83	564.91	4.97	773.72	6.44	1,103.31
5.05	917.36	4.05	709.32	8.75	1,299.75	8.68	1,384.83	11.26	1,958.82	9.54	1,719.80
237.64	966.47	264.75	997.88	335.11	1,080.17	375.37	1,390.75	377.82	1,391.20	375.60	1,595.47
0.00	0.00	0.00	0.00	0.00	0.00	19.42	4.73	158.96	37.44	320.43	93.17
0.00	0.00	0.00	0.00	0.00	0.00	14.14	3.44	150.84	36.93	253.82	73.83
3.78	368.96	4.21	422.96	4.92	441.96	5.83	421.92	6.62	494.68	7.33	571.51
	2,619.49		2,490.02		3,153.07		3,770.58		4,692.80		5,157.09
6.67	155.39	6.53	159.57	6.86	153.49	7.29	155.81	7.21	143.61	8.12	172.12
	132.36		112.77		149.67		182.81		207.71		186.63
12,125.92		12,443.63		12,963.30		14,604.03		15,972.52		17,346.62	

TABLE 4 QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE SA	Ref.
BASE METALS			Cu Tonnes		
Copper By-Product	Coolgardie		4,047.301	6,874,346	(a), (b)
			Cu %		
Copper Concentrates	East Pilbara	8,189	21.274	3,517,732	
	Yalgoo	69,352	20.023	23,597,84	
Total Copper Concentrates		77,541		27,115,575	(a)
			Cu Tonnes		
Copper Cathode	East Pilbara		8,662.406	34,702,885	(a)
Total Copper				68,692,806	
			Pb %		
Lead	Derby-West Kimberley	31,648	73.311	10,500,231	(a)
			Zn %		
Zinc	Derby-West Kimberley	106,879	55.211	61,566,745	
	Yalgoo	140,341	41.383	57,266,148	
		247,220		118,832,893	(a)
TOTAL BASE METALS				198,025,930	
BAUXITE - ALUMINA					
Alumina	Boddington	1,719,913		415,367,520	
	Murray	3,128,037		771,873,356	
	Serpentine-Jarrahdale	1,856,082		458,608,755	
	Warooka	1,777,863		438,864,016	
		8,481,895		2,084,713,647	(c)
			Ga kg		
Gallium	Murray		7,299.138	2,335,724	
TOTAL BAUXITE - ALUMINA				2,087,049,371	(j)
CHROMITE - PLATINOIDS			Cr2O3 %		
Chromite Ore	Meekatharra	18,756	41.325	1,774,752	
CLAYS					
Attapulgitic	Mullewa	28,262		4,203,131	(a)
Clay Shale	Collie	45,530		663,502	(a)
Fire Clay	Chittering	84,688		101,626	(d)
Kaolin	Bridegetown-Greenbushes	3,307		215,618	(d)
White Clay	Swan	2,360		14,160	(d)
TOTAL CLAYS		164,147		5,198,037	
COAL	Collie	5,692,147		260,534,172	(e)
CONSTRUCTION MATERIALS					
Aggregate	Broome	16,567		227,464	
	Collie	33		1,667	
	Exmouth	20,127		120,763	
	Nannup	400		8,000	
	Port Hedland Town	331,522		1,989,132	
	Roebourne	40,230		241,378	
	Wyndham-East Kimberley	45,092		270,552	
Total Aggregate		453,971		2,858,956	

TABLE 4 (cont.)
QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE SA	Ref.
Gravel	Broome	7,826		33,742	
	Coolgardie	62,732		345,997	
	Kalamunda	72,902		437,409	
	Port Hedland Town	26,000		130,000	
	Shark Bay	140		700	
	Wyndham-East Kimberley	7,192		15,730	
Total Gravel		176,792		963,578	
Rock	Broome	2,703		78,184	
	Derby-West Kimberley	373		2,233	
	Kalgoorlie-Boulder	207,325		1,243,950	
Total Rock		210,401		1,324,367	
Sand	Ashburton	2,102		44,984	
	Broome	21,726		131,363	
	Cockburn	138,688		802,450	
	Collie	55,404		332,423	
	Coolgardie	189,004		1,103,017	
	Coorow	3,486		17,431	
	Dandaragan	1,291		7,746	
	Derby-West Kimberley	1,118		7,828	
	Exmouth	1,992		11,950	
	Gingin	3,937		23,624	
	Kalgoorlie-Boulder	4,321		25,925	
	Meekatharra	28,657		170,142	
	Menzies	6,515		32,575	
	Northam	2,892		8,676	
	Port Hedland Town	130,145		675,530	
	Roebourne	91,853		698,585	
	Shark Bay	490		2,450	
	Wanneroo	865,253		3,461,012	
	Wyndham-East Kimberley	2,050		10,250	
	Yilgarn	3,466		17,326	
Total Sand		1,554,390		7,585,287	
TOTAL CONSTRUCTION MATERIALS				12,732,188	(d)
DIAMOND	Wyndham-East Kimberley	40,421,889	Carats	421,193,947	(a)
DIMENSION STONE					
Black Granite	Dundas	958		287,457	
Granite	Derby-West Kimberley	175		70,000	
	Roebourne	141		7,050	
Total Granite		316		77,050	
TOTAL DIMENSION STONE				364,507	(d)

TABLE 4 (cont.) QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE \$A	Ref.
GEM & SEMI-PRECIOUS STONE			kg		
Agate	East Pilbara		5	3089	
Chrysoprase	Menzies		22	8,936	
Jasper	Ashburton		n.a.	22,585	
Variscite	Upper Gascoyne		29	17,238	
TOTAL GEM & SEMI-PRECIOUS STONE				51,848	
GOLD			Au kg		
	Boddington		13,281.453	190,509,405	
	Coolgardie		37,273.007	533,680,052	
	Cue		7,556.567	108,242,719	
	Dundas		4,587.659	65,680,829	
	East Pilbara		10,933.739	156,618,226	
	Halls Creek		380.511	5,500,269	
	Kalg.-Boulder		50,209.766	719,559,485	
	Katanning		212.460	3,068,420	
	Laverton		16,694.422	239,143,616	
	Leonora		37,780.009	540,889,381	
	Meekatharra		17,462.358	250,172,258	
	Menzies		3,410.423	48,836,663	
	Mt Magnet		5,452.365	78,106,754	
	Sandstone		4,297.255	61,577,765	
	Wiluna		13,442.401	192,550,456	
	Yalgoo		1,533.955	22,029,035	
	Yilgarn		15,736.843	225,504,224	
TOTAL GOLD			240,245.193	3,441,669,557	(f)
GYPSUM					
	Bruce Rock	960		9,600	(e)
	Carnarvon	57,337		1,001,539	(e)
	Dalwallinu	70,932		1,581,449	(d)(e)
	Dandaragan	10,687		106,870	(e)
	Dundas	6,122		36,734	(e)
	Esperance	4,296		18,775	(e)
	Koorda	125		1,500	(e)
	Lake Grace	56,481		436,078	(e)
	Merredin	1,775		16,800	(d)(e)
	Mt Marshall	815		6,520	(e)
	Mukinbudin	0		0	(e)
	Nungarin	24,018		144,108	(e)
	Ravensthorpe	11,843		71,058	(e)
	Wyalkatchem	64,713		459,486	(e)
	Yilgarn	4,839		40,582	(e)
TOTAL GYPSUM			314,943	3,931,099	(e)

TABLE 4 (cont.)
QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE SA	Ref.
HEAVY MINERAL SANDS					
Garnet Sand	Bunbury City	39		4,680	(g)
	Northampton	97,070		11,163,762	(e)
Total Garnet Sand		97,109		11,168,442	
Ilmenite			TiO ₂ %		
	Augusta-Margaret River	75,201	54.999	7,741,744	
	Bunbury City	466,293	56.333	54,943,236	
	Capel	388,233	52.740	44,410,429	
	Carnamah	304,122	58.323	26,496,874	
Total Ilmenite		1,233,849		133,592,283	(a)
Upgraded Ilmenite (Synthetic Rutile)				TiO ₂ %	
	Capel	198,440	92.440	98,782,716	
	Carnamah	192,739	92.948	97,597,965	
	Dandaragan	80,687	92.000	41,470,192	
Total Upgraded Ilmenite		471,866		237,850,873	
Leucoxene			TiO ₂ Tonnes		
	Bunbury City	3,790	2,852.000	3,209,053	
	Capel	8,093	5,821.000	5,833,408	
	Dandaragan	10,599	373.000	2,644,819	
Total Leucoxene		22,482	9,046.000	11,687,280	(a)
Rutile			TiO ₂ Tonnes		
	Bunbury City	10,350	9,667.000	7,821,655	
	Carnamah	81,506	76,855.000	57,019,850	
	Dandaragan	19,923	18,588.000	13,690,333	
Total Rutile		111,779	105,110.000	78,531,838	(a)
Zircon			ZrO ₂ Tonnes		
	Bunbury City	36,653	23,825.000	21,234,199	
	Capel	50,669	27,977.000	28,074,106	
	Carnamah	154,633	100,828.000	81,052,667	
	Dandaragan	50,836	21,639.000	29,976,551	
Total Zircon		292,791	174,269.000	160,337,523	(a)
TOTAL HEAVY MINERAL SANDS				633,168,239	
INDUSTRIAL PEGMATITE MINERALS					
Feldspar	Mukinbudin	6,078		506,054	
	Port Hedland Town	59,740		3,021,115	
Total Feldspar		65,818		3,527,169	(h)
TOTAL INDUSTRIAL PEGMATITE MINERALS				3,527,169	
IRON ORE					
Domestic Ore			Fe%		
	East Pilbara	7,413,286	62.780	183,370,087	
Exported Ore			Fe%		
	Ashburton	86,356,047	61.260	2,004,225,744	
	Derby-West Kimberley	583,204	66.123	13,852,866	
	East Pilbara	56,307,787	62.250	1,408,545,273	
	Yilgarn	1,058,269	43.314	23,346,711	
Total Exported Ore		144,305,307	61.530	3,449,970,594	
TOTAL IRON ORE		151,718,593	61.590	3,633,340,681	(a)

TABLE 4 (cont.) QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE \$A	Ref.	
LIMESAND - LIMESTONE-DOLOMITE						
Dolomite	Lake Grace	4,069		122,070		
	Yilgarn	318		3,975		
Total Dolomite		4,387		126,045		
Limesand-Limestone	Cockburn	1,817,325		8,278,321		
	Dandaragan	22,665		190,308		
	Dundas	92,061		1,380,915		
	Exmouth	0		0		
	Gingin	115,226		1,287,907		
	Irwin	33,028		131,890		
	Kwinana	54,285		542,850		
	Shark Bay	344		42,942		
	Wanneroo	142,946		1,830,489		
Total Limesand-Limestone		2,277,880		13,685,622		
TOTAL LIMESAND-LIMESTONE-DOLOMITE				13,811,667		
MANGANESE ORE						
	East Pilbara	176,990	Mn % 49.487	22,153,201	(a)	
NICKEL INDUSTRY						
Cobalt By-Product			Co Tonnes			
	Coolgardie		1,219.008	58,771,721(a),(b)		
Nickel Concentrates			Ni %			
		Coolgardie	224,923	12.976	270,769,812	
		Kalgoorlie-Boulder	43,392	14.750	56,514,685	
		Kondinin	64,628	12.688	73,796,031	
		Leonora	361,338	10.967	367,222,246	
		Wiluna	178,838	22.130	367,700,020	
Total Nickel Concentrates		873,119		1,136,002,794	(i)	
Palladium By-Product			Pd kg			
	Coolgardie		429.307	3,227,915(a),(b)		
Platinum By-Product			Pt kg			
	Coolgardie		314.654	2,419,386(a),(b)		
TOTAL NICKEL INDUSTRY				1,200,421,816		
PETROLEUM						
Condensate			Kilolitres			
		Ashburton	174,992	30,067,595	(d)	
		Carnamah	97	5,161	(d)	
		Irwin	2,637	411,773		
		Roebourne	6,259,015	1,072,823,262		
Total Condensate		6,436,741		1,103,307,791		
Crude Oil			Kilolitres			
		Ashburton	4,344,273	802,716,071		
		Derby-West Kimberley	7,992	1,552,089		
		Irwin	15,134	2,308,712		
		Roebourne	5,172,470	913,224,940		
Total Crude Oil		9,539,869		1,719,801,811	(a)	

TABLE 4 (cont.)
QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE SA	Ref.
Liquefied Natural Gas		Btu 10 ⁶			
	Roebourne	375,600,011		1,595,472,848	(j)
L.P.G. - Butane		Tonnes			
	Roebourne	320,425		93,168,890	(j)
L.P.G. - Propane		Tonnes			
	Roebourne	253,817		73,825,137	(j)
Natural Gas		'000 m ³			
	Ashburton	638,617		57,313,892	
	Carnamah	35,103		6,355,189	(j)
	Irwin	374,547		48,453,485	
	Roebourne	6,283,463		459,387,950	
Total Natural Gas		7,331,730		571,510,516	
TOTAL PETROLEUM				5,157,086,994	
PIGMENTS					
Red Oxide	Cue	5,340		1,014,600	
SALT					
	Carnarvon	1,178,393		25,467,220	
	Dalwallinu	1		39	
	Esperance	15,509		504,054	
	Port Hedland Town	2,582,657		54,794,295	
	Roebourne	3,356,879		71,876,454	
	Shark Bay	869,132		14,496,332	
	Wyalkatchem	351		24,367	
	Yilgarn	113,019		4,958,190	
TOTAL SALT		8,115,941		172,120,951	(a)
SILICA - SILICA SAND					
Silica					
	Moora	84,582		845,819	(a)
Silica Sand					
	Albany	88,729		1,330,935	(a)
	Cockburn	166,060		1,826,660	
	Coolgardie	119,592		292,999	(a)
	Swan	337,016		3,687,317	
	Wanneroo	8,758		62,050	(a)
Total Silica Sand		720,155		7,199,961	
TOTAL SILICA - SILICA SAND				8,045,780	
SILVER: BY-PRODUCT					
		Ag kg			
	Coolgardie	198		41,976(a), (b)	
	Derby-West Kimberley	2,330		384,721 (a), (l)	
	East Pilbara	444		84,096(a), (l)	
	State-wide	28,506		5,339,780	
	Yalgoo	19,774		3,696,389 (a), (l)	
TOTAL SILVER: BY-PRODUCT		51,252		9,546,962	

TABLE 4 (cont.) QUANTITY & VALUE OF MINERALS & PETROLEUM BY LOCAL GOVERNMENT AREA

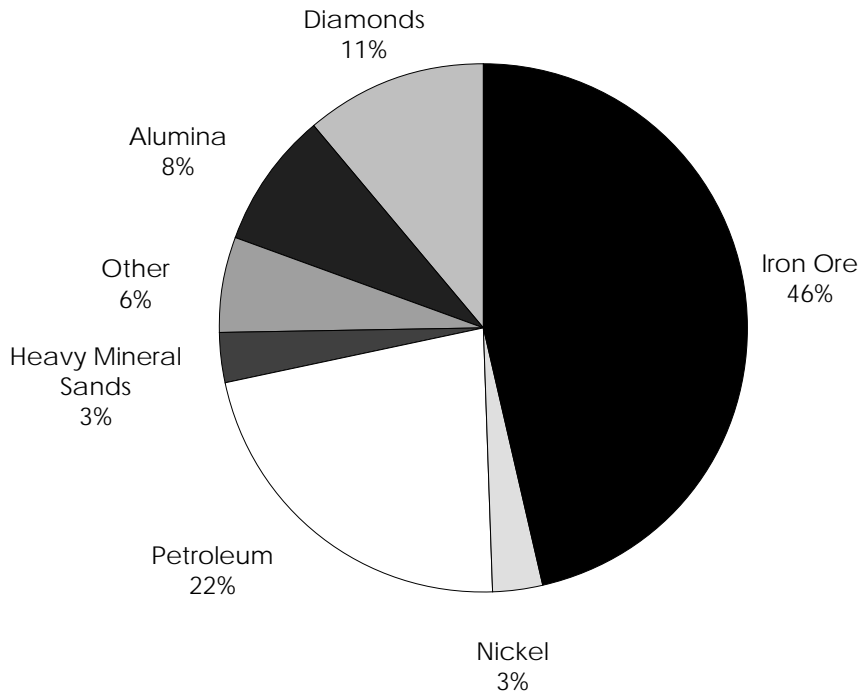
MINERAL	LOCAL GOVERNMENT AREA	QUANTITY TONNES	METALLIC CONTENT	VALUE SA	Ref.
TALC	Meekatharra	17,672		1,237,040	
	Three Springs	171,163		13,734,352	
TOTAL TALC		188,835		14,971,392	(e)
TIN - TANTALUM - LITHIUM					
Spodumene			Li2O %		
	Bridegetown-Greenbushes	56,567	5.539	10,701,568	(a)
Tantalite			Ta2O5 kg		
	Bridegetown-Greenbushes	299	173,950.000	30,550,308	
Tin			Sn Tonnes		
	Bridegetown-Greenbushes	-	523.000	3,637,931	(a)
TOTAL TIN - TANTALUM - LITHIUM				44,889,807	

VALUE OF MINERALS	8,747,868,116
VALUE OF PETROLEUM	5,157,086,994
VALUE OF GOLD	3,441,669,557
TOTAL VALUE	17,346,624,666

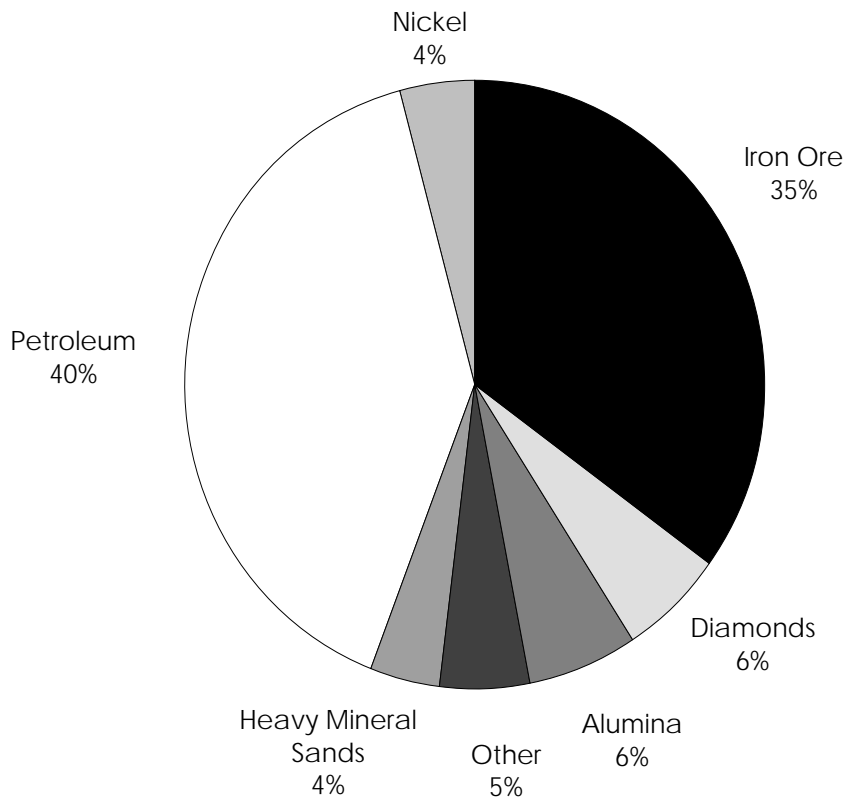
REFERENCES :

- (a) Estimated F.O.B. value.
- (b) Metallic by-product of nickel mining.
- (c) Value based on the average Australian value of alumina as published by the Australian Bureau Statistics
- (d) Value at works.
- (e) Estimated ex-mine value.
- (f) Value based on monthly production and average gold price of that month as supplied by GoldCorp
- (g) Estimated F.O.T. value.
- (h) Estimated F.O.R. value.
- (i) Estimated F.O.B. value based on the current price of nickel containing products.
- (j) Delivered value.

COMPARATIVE ROYALTY RECEIPTS
1992 Total : A\$371.82 million



1997 Total : A\$584.95 million



Source : DME

Figure 0.2

TABLE 5 ROYALTY RECEIPTS

COMMODITY\Mineral	1996 Total \$A	1997 Total \$A	1997 Growth \$A	%
BASE METALS				
Copper	1,882,088.89	2,810,094.98	928,006.09	49
Lead	399,615.36	627,517.46	227,902.10	57
Zinc	3,228,618.17	5,550,953.07	2,322,334.90	72
TOTAL BASE METALS	5,510,322.42	8,988,565.51	3,478,243.09	63
BAUXITE-ALUMINA				
Alumina	31,542,321.24	34,465,298.71	2,922,977.47	9
Gallium	56,339.17	102,900.23	46,561.06	83
TOTAL BAUXITE-ALUMINA	31,598,660.41	34,568,198.94	2,969,538.53	9
CLAYS	275,167.16	198,149.79	(77,017.37)	(28)
COAL	13,670,806.28	11,397,217.93	(2,273,588.35)	(17)
CONSTRUCTION MATERIALS				
Aggregate	165,995.63	133,855.55	(32,140.08)	(19)
Gravel	57,824.34	71,236.01	13,411.67	23
Rock	172,601.62	60,224.09	(112,377.53)	(65)
Sand	465,180.46	474,849.64	9,669.18	2
TOTAL CONSTRUCTION MATERIALS	861,602.05	740,165.29	(121,436.76)	(14)
DIAMOND	34,781,689.90	36,098,081.00	1,316,391.10	4
DIMENSION STONE	1,138.41	533.74	(604.67)	(53)
GEM & SEMI-PRECIOUS STONE	33,148.96	7,053.69	(26,095.27)	(79)
GOLD	375,885.38	436,011.97	60,126.59	16
GYPSUM	78,604.01	107,853.21	29,249.20	37
HEAVY MINERAL SANDS				
Garnet	405,245.84	548,410.34	143,164.50	35
Ilmenite	7,011,884.27	7,617,418.76	605,534.49	9
Leucoxene	479,331.21	677,779.53	198,448.32	41
Rutile	4,144,030.01	3,813,218.28	(330,811.73)	(8)
Zircon	9,624,691.93	8,401,130.35	(1,223,561.58)	(13)
TOTAL HEAVY MINERAL SANDS	21,665,183.26	21,057,957.26	(607,226.00)	(3)
INDUSTRIAL PEGMATITE MINERALS				
Feldspar	68,225.32	139,919.77	71,694.45	105
IRON ORE	153,742,932.16	181,589,062.12	27,846,129.96	18
LIMESAND-LIMESTONE-DOLOMITE				
Dolomite	2,202.60	1,316.10	(886.50)	(40)
Limesand-Limestone	298,368.96	320,702.42	22,333.46	7
TOTAL LIMESAND-LIMESTONE-DOLOMITE	300,571.56	322,018.52	21,446.96	7
MANGANESE	1,932,626.31	81,722.55	(1,850,903.76)	(96)

TABLE 5 (Cont.) ROYALTY RECEIPTS

COMMODITY\Mineral	1996 Total \$A	1997 Total \$A	1997 Growth \$A	%
NICKEL INDUSTRY				
Cobalt by-product	1,506,409.62	1,079,863.33	(426,546.29)	(28)
Nickel	24,375,885.59	21,581,045.24	(2,794,840.35)	(11)
Palladium by-product	59,555.54	60,101.72	546.18	1
Platinum by-product	67,955.28	118,593.56	50,638.28	75
TOTAL NICKEL INDUSTRY	26,009,806.03	22,839,603.85	(3,170,202.18)	(12)
PEAT	452.54	0.00	(452.54)	(100)
PETROLEUM				
Condensate	22,606,555.31	44,490,817.80	21,884,262.49	97
Liquefied Natural Gas	53,104,202.98	80,761,811.37	27,657,618.17	52
LPG - Butane	1,016,837.96	3,650,015.27	2,633,177.31	259
LPG - Propane	1,033,291.69	3,173,541.44	2,140,249.75	207
Natural gas	20,861,877.32	28,489,289.39	7,627,412.07	37
Oil	67,529,049.88	76,270,007.44	8,740,957.56	13
TOTAL PETROLEUM	166,151,815.14	236,835,482.71	70,683,677.35	43
PIGMENTS				
Red oxide	8,212.50	0.00	(8,212.50)	(100)
SALT	1,778,814.58	1,815,897.58	37,083.00	2
SILICA SAND	354,625.10	373,696.78	19,071.68	5
SILVER	187,111.58	260,278.29	73,166.71	39
TALC	99,921.00	77,664.00	(22,257.00)	(22)
TIN-TANTALUM-LITHIUM				
Spodumene	745,819.29	791,750.95	45,931.66	6
Tantalite	959,428.92	736,205.73	(223,223.19)	(23)
Tin	90,173.81	87,792.05	(2,381.76)	(3)
TOTAL TIN-TANTALUM-LITHIUM	1,795,422.02	1,615,748.73	(179,673.29)	(10)
TOTAL ROYALTY RECEIPTS	461,282,744.08	559,550,883.23	98,268,148.93	21
IRON ORE ADDITIONAL RENTAL	23,934,547.36	25,398,811.75	1,464,264.39	6
TOTAL REVENUE	485,217,291.44	584,949,694.98	99,732,413.32	21

Note: All Royalty Receipts above are only those paid to Consolidated Revenue Fund

TABLE 6

PRINCIPAL MINERALS & PETROLEUM PRODUCERS 1997

BASE METALS

Copper

Murchison Zinc Co. Pty Ltd, 100 Hutt Street, Adelaide SA 5000, (08) 8303 1700: Golden Grove.

Newcrest Mining Ltd, 600 St Kilda Road, Melbourne VIC, 3004, (03) 9522 5333: Telfer.

WMC Ltd, 168 Greenhill Road, Parkside SA 5063, (08) 8372 7200: Nifty.

Lead - Zinc

Murchison Zinc Co. Pty Ltd, 100 Hutt Street, Adelaide SA 5000, (08) 8303 1700: Golden Grove.

Westmet Metals Zinc NL, 263 Adelaide Terrace, Perth WA 6000, (08) 9221 2555: Cadjebut.

BAUXITE - ALUMINA

Alumina

Alcoa of Australia (WA) Ltd, cnr Davey & Marmion Streets, Booragoon WA 6154, (08) 9316 5111: Del Park, Jarrahdale, Willowdale.

Worsley Alumina Pty Ltd, PO Box 344, Boddington WA 6225, (08) 9734 8311: Boddington.

CLAY

Attapulgit

Hudson Resources Ltd, James St Narngulu, Geraldton WA 6530, (08) 9923 3604: Lake Nerramyne.

Clay Shale

Griffin Coal Mining Co. Ltd, 28 The Esplanade, Perth WA 6000, (08) 9325 8155: Collie.

Wesfarmers Coal Ltd, 276 Leach Highway, Myaree WA 6153, (08) 9333 0391: Collie.

Fire Clay

Midland Brick Co Pty Ltd, Bassett Rd, Middle Swan WA 6056, (08) 9273 5522: Muchea

Kaolin

Gwalia Consolidated Ltd, PMB 16, West Perth WA 6872, (08) 9481 1988: Greenbushes.

White Clay

Metro Brick, Locked Bag 100, Midland WA 6056, (08) 9250 2111: Middle Swan.

COAL

Griffin Coal Mining Co. Ltd, 28 The Esplanade, Perth WA 6000, (08) 9325 8155: Collie.

Wesfarmers Coal Ltd, 276 Leach Highway, Myaree WA 6153, (08) 9333 0391: Collie.

CONSTRUCTION MATERIALS

Aggregate

The Readymix Group (WA), 75 Canning Highway, Victoria Park WA 6100, (08) 9472 2000: Boodarrie, Boulder, Burrup-Dampier.

Gravel

Boral Resources (WA) Ltd, 63 Abernethy Rd, Belmont WA 6104, (08) 9333 3400: Grosmont.

Rock

Boral Resources (WA) Ltd, 63 Abernethy Rd, Belmont WA 6104, (08) 9333 3400: Grosmont.

Sand

Rocla Quarry Products, 1 Newburn Road, Kewdale WA 6104, (08) 9353 3030: Jandakot.

The Readymix Group (WA), 75 Canning Highway, Victoria Park WA 6100, (08) 9472 2000: Comet Vale, Pinnacles, Sandy Hill, Sullivan's Creek, Turner River, Warrawanda, Widgiemooltha.

DIAMOND

Argyle Diamond Mines, 2 Kings Park Road, West Perth WA 6005, (08) 9482 1166: Argyle.

TABLE 6 (Cont.)

PRINCIPAL MINERALS & PETROLEUM PRODUCERS 1997

DIMENSION STONE**Black Granite**

Fraser Range Granite NL, The Esplanade (cnr Manning St), Scarborough WA 6019, (08) 9245 8003: Mt Malcolm.

GOLD

Acacia Resources Ltd, 60 City Road, South Melbourne VIC 3205, (03) 9684 4999: Sunrise Dam.

Amalg Resources NL, 11 Keogh Way, Kalgoorlie WA 6430, (08) 9091 1422: Burbanks-Lady Robinson.

Australian Gold Fields NL, 66 St George's Terrace, Perth WA 6000, (08) 9486 7300: Bannockburn.

Australian Resources Ltd, 20 Berry Street, North Sydney NSW 2060, (02) 9955 1722: Gidgee, Mt McClure.

Barminco Pty Ltd, 9 Bowman Street, South Perth WA 6151, (08) 9474 1340: Two Boys.

Camelot Resources Ltd, 50 Colin Street, West Perth WA 6005, (08) 9321 0616: Mt Gibson, Tarmoola.

Centaur Mining & Exploration Ltd, 580 St Kilda Rd, Melbourne Vic 3004, (03) 9276 7870: Mt Pleasant-Golden Kilometre, Ora Banda.

Central Norseman Gold Corp. NL, 60 City Road, Southbank VIC 3006, (03) 9685 6000: Central Norseman.

Consolidated Gold NL, 10 Richardson St, West Perth WA 6005, (08) 9481 5870: Davyhurst.

Croesus Mining NL, 39 Porter Street, Kalgoorlie WA 6430, (08) 9091 2222: Binduli.

Equigold NL, 7 Sleat Rd, Applecross WA 6153, (08) 9316 3661: Dalgaranga.

Forrestania Gold NL, 15 Ord St, West Perth WA 6005, (08) 9481 5656: Bounty-Forrestania.

Gindalbie Gold NL, 124 Hannan St, Kalgoorlie WA 6430, (08) 9021 1877: Two Boys.

Goldfields Kalgoorlie Ltd, 1 Alfred St, Sydney NSW 2000, (02) 9934 8888: Kundana, Paddington.

Great Central Mines NL, 580 St Kilda Road, Melbourne VIC 3004, (03) 9276 7888: Bronzewing, Jundee-Nimary, Wiluna.

Hedges Gold Pty Ltd, Pinjarra - Williams Road, Boddington WA 6390, (08) 9538 4500: Hedges.

Herald Resources Ltd, 40 Kings Park Road, West Perth WA 6005, (08) 9322 2788: Hancocks, Gum Creek-Montague, Coolgardie-Three Mile Hill.

Hill 50 Gold NL, 2 Emerald Terrace, West Perth WA 6005, (08) 9485 0070: Hill 50-Mt Magnet.

Kalgoorlie Consolidated Gold Mines Pty Ltd, Private Bag 27, Kalgoorlie WA 6430, (08) 9022 1100: Golden Mile.

New Hampton Goldfields NL, 9 Havelock St, West Perth WA 6005, (08) 9321 0611: Jubilee.

Newcrest Mining Ltd, 600 St Kilda Road, Melbourne VIC 3004, (03) 9522 5333: New Celebration, Telfer.

Normandy Mining Ltd, 100 Hutt Street, Adelaide SA 5000, (08) 8303 1700: Big Bell, Golden Crown, Kaltails.

North Ltd, 476 St Kilda Road, Melbourne VIC 3004, (03) 9207 5111: Kanowna Belle.

Perilya Mines NL, 31 Ventnor Avenue, West Perth WA 6005, (08) 9423 1700: Fortnum.

Placer Pacific Ltd, 1 Alfred Street, Sydney Cove NSW 2000 (02) 9256 3800: Granny Smith.

Plutonic Resources Ltd, 100 Miller Street, North Sydney NSW 2060, (02) 9900 5000: Darlot, Lawlers, Mt Morgans, Peak Hill, Plutonic.

Resolute Ltd, 28 The Esplanade, Perth WA 6000, (08) 9261 6100: Chalice, Higginsville.

Sons of Gwalia NL, 16 Parliament Place, West Perth WA 6005, (08) 9263 5555: Bullfinch, Laverton, Marvel Loch-Southern Cross, Nevoria, Sons of Gwalia, Yilgarn Star.

St Barbara Mines Ltd, 28 The Esplanade, Perth WA 6000, (08) 9324 6350: Bluebird.

WMC Ltd, 250 St George's Terrace, Perth WA 6000, (08) 9442 2000: Emu-Leinster, Kambalda-St Ives.

Worsley Alumina Pty Ltd, PO Box 48, Boddington WA 6390, (08) 9883 8260: Boddington.

TABLE 6 (Cont.) PRINCIPAL MINERALS & PETROLEUM PRODUCERS 1997**GYPSUM**

Dampier Salt (Operations) Pty Ltd, 152-158 St George's Terrace, Perth WA 6000, (08) 9327 2299: Lake Macleod.

H.B. Brady & Co. Pty Ltd, PO Box 42, Bayswater WA 6053, (08) 9279 4422: Lake Brown.

Quantum Holdings Pty Ltd, 17 Hawkstone St, Cottesloe WA 6011, (08) 9481 4101: Jurien Bay.

Swan Cement Ltd, PO Box 528, Kwinana WA 6966, (08) 9499 2222: Lake Hillman.

Westdeen Holdings Pty Ltd, 7 Armstrong Road, Applecross WA 6153, (08) 9364 4951: Lake Cowcowing.

HEAVY MINERAL SANDS**Garnet Sand**

GMA Garnet Pty Ltd, PO Box 188, Geraldton WA 6530, (08) 9923 3644: Port Gregory.

Ilmenite, Leucoxene, Rutile & Zircon

BHP Titanium Minerals Pty Ltd, PO Box 22, Karridale WA 6288, (08) 97582500: Beenup.

Cable Sands (WA) Pty Ltd, PO Box 133, Bunbury WA 6230, (08) 9721 4111: Busselton, Jangardup, Waroona.

RGC Mineral Sands, PO Box 62, Geraldton WA 6530, (08) 99568 822: Capel, Eneabba North, Eneabba West, Narngulu.

TiWest Pty Ltd, 1 Brodie Hall Drive, Bentley WA 6102, (08) 9365 1390: Cooljarloo, Chandala.

Westralian Sands Ltd, PO Box 96, Capel WA 6271, (08) 9780 3200: Yoganup, Yoganup Extended.

INDUSTRIAL PEGMATITE MINERALS**Feldspar**

Commercial Minerals Ltd, 26-28 Tomlinson Road, Welshpool WA 6106, (08) 9362 1411: Mukinbudin, Pippingarra.

IRON ORE

BHP Iron Ore (Goldsworthy) Ltd, 200 St George's Terrace, Perth WA 6000, (08) 9320 4444: Nimingarra, Yarrie.

BHP Iron Ore (Jimblebar) Ltd, 200 St George's Terrace, Perth WA 6000, (08) 9320 4444: Jimblebar.

BHP Iron Ore Ltd, 200 St George's Terrace, Perth WA 6000, (08) 9320 4444: Newman, Yandicoogina.

Channar Mining Pty Ltd, 152 George's Terrace, Perth WA 6000, (08) 9327 2327: Channar.

Hamersley Iron Pty Ltd, 152 George's Terrace, Perth WA 6000, (08) 9327 2327: Brockman, Marandoo, Tom Price, Paraburdo.

Koolyanobbing Iron Pty Ltd, 1 William St, Perth WA 6000, (08) 426 3388: Cockatoo Island, Koolyanobbing.

Robe River Iron Associates, 12 St George's Terrace, Perth WA 6000, (08) 9421 4747: Pannawonica.

LIMESAND - LIMESTONE

Cockburn Cement Ltd, Russell Road, East Munster WA 6166, (08) 9411 1000: Cockburn Sound, Coogee.

Swan Cement Ltd, PO Box 528, Kwinana WA 6966, (08) 9499 2222: Wanneroo.

MANGANESE

Consolidated Minerals Ltd, 250 George's Terrace, Perth WA 6000, (08) 9321 3797: Woodie Woodie.

NICKEL

Mining Project Investors Pty Ltd, 600 Bourke Street, Melbourne Vic 3000, (03) 9672 3222: Black Swan.

Outokumpu Australia Pty Ltd, 141 Burswood Road, Burswood WA 6100, (08) 9472 3144: Forrestania.

WMC Ltd, 250 St George's Terrace, Perth WA 6000, (08) 9442 2000: Blair, Carnilya Hill, Kambalda, Leinster, Mt Keith.

TABLE 6 (Cont.)

PRINCIPAL MINERALS & PETROLEUM PRODUCERS 1997

PETROLEUM

Apache Energy Ltd, 256 St George's Terrace, Perth WA 6000, (08) 9422 7222: Campbell, Agincourt, East Spar, Harriet, Rosette, Sinbad, Tanami.

BHP Petroleum Pty Ltd, 152-158 St George's Terrace, Perth WA 6000, (08) 9278 4800: Griffin

Boral Energy Resources Ltd, 60 Hindmarsh Square, Adelaide SA 5000, (08) 8235 3737: Beharra Springs, Tubridgi.

Capital Energy N.L., Level 7, The Landmark, 345 George Street, Sydney NSW 2000, (02) 9262 6833.

CMS Gas Transmission of Australia Pty Ltd, 8 Marchesi St, Kewdale WA 6105, (08) 9353 7555: Dongara, Mondara.

Mobil Exploration & Producing Australia Pty Ltd, 250 St George's Terrace, Perth WA 6000, (08) 9424 9200: Wandoo

Novus West Australia Pty Ltd, 76 Kings Park Road, West Perth WA 6005, (08) 9486 7700: Chervil, North Herald, South Pepper, Airlie Island.

Phoenix Energy Pty Ltd, 28 The Esplanade, Perth WA 6000, (08) 9261 2800: Woodada.

Premier Oil Australia Pty Ltd, 31 Ventnor Avenue, West Perth WA, 6005, (08) 9480 4100: Mt Horner.

West Aust. Petroleum Pty Ltd (WAPET), QV1, 250 St George's Terrace, Perth WA 6000, (08) 9263 6000: Barrow Island, Cowle, Crest, Roller-Skate, Saladin, Yammaderry.

Woodside Offshore Pet. Pty Ltd, 1 Adelaide Terrace, Perth WA 6000, (08) 9224 4111: Cossak, Goodwyn, Hermes, North Rankin, Wanaea.

SALT

Cargill Australia Ltd, PO Box 420, Port Hedland WA 6721, (08) 9140 1255: Port Hedland.

Dampier Salt (Operations) Pty Ltd, 152-158 St George's Terrace, Perth WA 6000, (08) 9327 2299: Dampier, Lake Macleod.

Shark Bay Salt Joint Venture, 22 Mount Street, Perth WA 6000, (08) 9322 4811: Useless Loop.

WA Salt Koolyanobbing Pty Ltd, Cockburn Road, Hamilton Hill WA 6163, (08) 9430 5495: Lake Deborah East, Pink Lake.

SILICA - SILICA SAND

Silica

Simcoa Operations Pty Ltd, PO Box 1389, Bunbury WA 6231, (08) 97912 588: Dalaroo.

Silica Sand

Rocla Quarry Products, 1 Newburn Road, Kewdale WA 6104, (08) 9353 3030: Jandakot.

Boral Resources WA Ltd, 136-138 Gt Eastern Highway, South Guildford WA 6055, (08) 9279 0000: Jandakot.

The Readymix Group (WA), 75 Canning Highway, Victoria Park WA 6100, (08) 9472 2000: Jandakot.

WMC Ltd, 250 St George's Terrace, Perth WA 6000, (08) 9442 2000: Mt Burgess.

TALC

Gwalia Minerals NL, PMB 16, West Perth WA 6872, (08) 9481 1988: Mt Seabrook.

WMC Ltd, PO Box 116, Three Springs WA 6519, (08) 9954 5047: Three Springs.

TIN - TANTALUM - LITHIUM

Spodumene

Gwalia Consolidated Ltd, PMB 16, West Perth WA 6872, (08) 9481 1988: Greenbushes.

Tantalite - Tin

Gwalia Consolidated Ltd, PMB 16, West Perth WA 6872, (08) 9481 1988: Greenbushes, Wodgina.

ABBREVIATIONS, REFERENCES, UNITS AND CONVERSION FACTORS

As the document makes use of abbreviations and references, an explanation of each has been included below. A conversion table, relating the units by which various commodities are measured, has also been provided.

ABBREVIATIONS

cons	concentrates	n.ap.	not applicable
f.o.t.	free on truck	f.o.b.	free on board
f.o.r.	free on rail	¥	Japanese Yen
A\$	Australian Dollar	US\$	United States Dollar
ABS	Australian Bureau of Statistics	GDP	Gross Domestic Product
AFR	<i>Australian Financial Review</i>	BMR	Bureau of Mineral Resources
CSO	Central Selling Organisation	HBI	Hot Briquetted Iron
DRI	Direct Reduced Iron	IMF	International Monetary Fund
RBA	Reserve Bank of Australia		
ABARE	Australian Bureau of Agricultural and Resource Economics		

REFERENCES

- (a) Estimated f.o.b value.
- (b) Metallic by-product of nickel mining.
- (c) Value based on the average Australian value of alumina as published by the ABS.
- (d) Value at works.
- (e) Estimated ex-mine value.
- (f) Value based on monthly production and average gold price of that month as supplied by GoldCorp.
- (g) Estimated f.o.t value.
- (h) Estimated f.o.r value.
- (i) Estimated f.o.b value based on the current price of nickel containing products.
- (j) Delivered value.
- (k) Metallic by-product of copper mining.
- (r) Revised from previous edition.

UNITS AND CONVERSION FACTORS

	Metric Unit	Symbol	Imperial Unit
Mass	1 gram	(g)	= 0.032151 troy (fine) ounce (oz)
	1 kilogram	(kg)	= 2.204624 pounds (lbs)
	1 tonne	(t)	= 1.10231 United States short ton [1 US short ton = 2,000 lbs]
	1 tonne	(t)	= 0.98421 United Kingdom long ton [1 UK long ton = 2,240 lbs]
Volume	1 kilolitre	(kl)	= 6.28981 barrels (bbls)
	1 cubic metre	(m ³)	= 35.3147 cubic feet (ft ³) [1 kilolitre (kl) = 1 cubic metre (m ³)]
Energy	1 kilojoule	(kj)	= 0.94781 British Thermal Units (Btu)

Energy Content

Coal	19.7 GJ/t
Condensate	32.0 MJ/L
Crude oil	37.0 MJ/L
LNG	25.0 MJ/L
Natural gas	38.2 MJ/m ³

Prefix

kilo (k)	10 ³
mega (M)	10 ⁶
giga (G)	10 ⁹
tera (T)	10 ¹²
peta (P)	10 ¹⁵