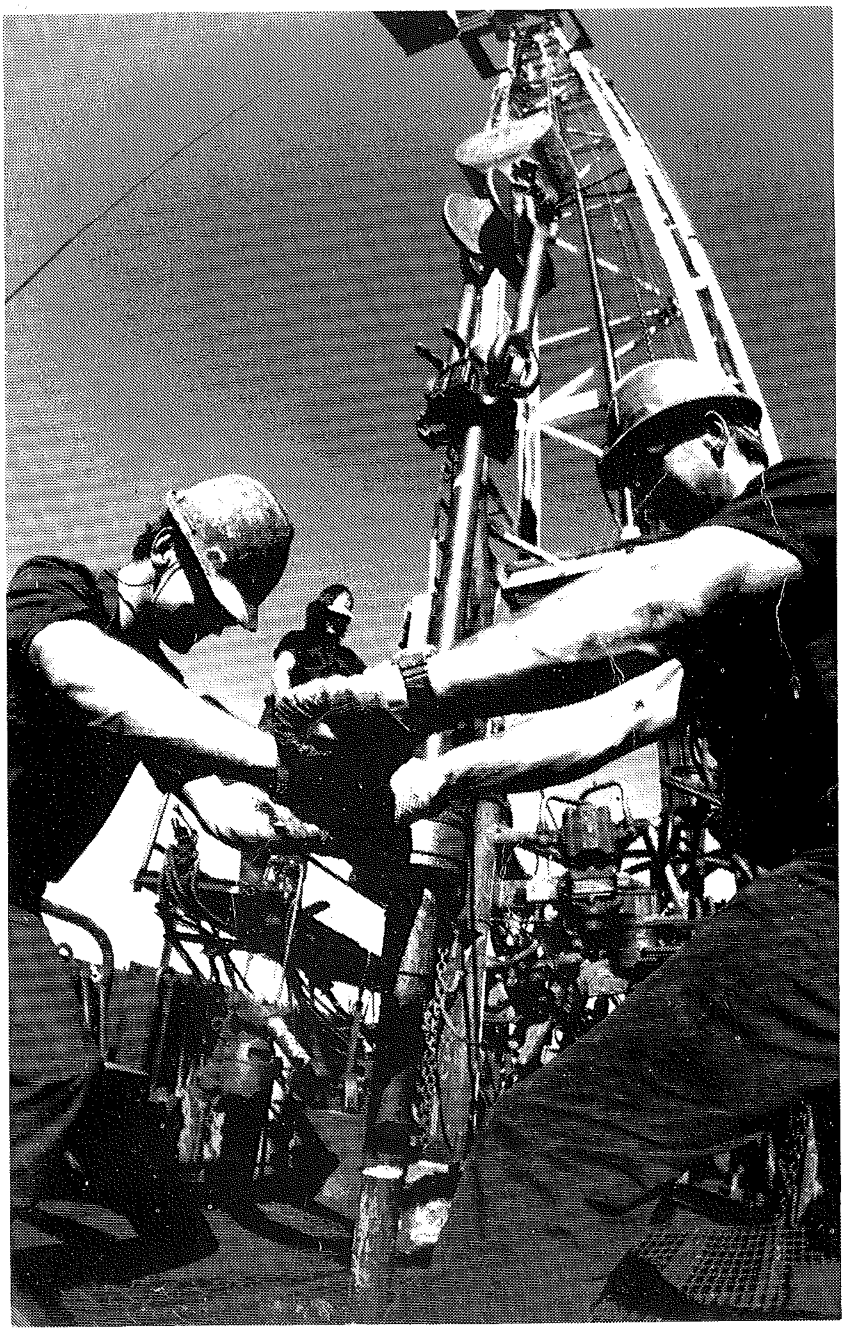
1991-92

MINERAL AND PETROLEUM PRODUCTION

STATISTICAL DIGEST



Royalties and Policy Development Division

DEPARTMENT OF MINERALS AND ENERGY

WESTERN AUSTRALIA

STATISTICAL DIGEST OF MINERAL AND PETROLEUM PRODUCTION 1991-92

ROYALTIES AND POLICY DEVELOPMENT DIVISION

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DECEMBER 1992

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ABBREVIATIONS, REFERENCES, UNITS AND CONVERSION FACTORS

As the following 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	f.o.t.	free on truck
f.o.b.	free on board	n.a.	not available
f.o.r.	free on rail	n.ap.	not applicable

REFERENCES

N.A.	Not available for publication.
(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 by the Australian Bureau of 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 the Gold Producers' Association.
(g)	Estimated f.o.t value.
(h)	Estimated f.o.b 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.

UNITS AND CONVERSION FACTORS

	Metric Unit	Symbol	Imperial Unit	Conversion factors: Multiply Imperial Unit by	Conversion factors: Multiply Metric Unit by
Mass	gram	g	troy (fine) ounce (oz)	31.103522	0.032151
	kilogram	kg	pound (lb)	0.453592	2.204624
	tonne	t	long ton (2,240 lbs)	1.016046	0.984207
	tonne	t	short ton (2,000 lbs)	0.907185	1.102311
Volume	kilolitre	kl	barrel (bbl)	6.28981	0.158987
	kilolitre	kl	cubic metre (m^3)	1	
Energy	gigajoule	GJ	million million British Themal units (mmBTu)	1.055072	0.947803

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

NW Shelf Gas

1 TCF = 1082 petajoules
1 Mt = 54 petajoules

1. OVERVIEW

1.1 Review of the World Economy

While there was some overall growth in the world economy during 1991-92, the main industrialised nations again experienced stagnant economic conditions.

It is forecast that 1992-93 will be another year of weak growth.

The recessed United States and United Kingdom economies have not rebounded, while Japan and Germany are in danger of slipping into a period of severe recession. France and Italy have managed to retain good records on inflation and overall growth, but continue to be plagued by unemployment and political uncertainty.

Political upheaval associated with achieving closer European economic and financial integration has occurred against a background of economic malaise. Social tensions which continue to afflict parts of Western Europe are being manifested in severe regional dislocation in areas of the former Eastern Bloc.

The depressed economic conditions in the major industrialised countries adversely affected economic growth and activity and severely disrupted world trade aggregates. With indicators of US economic activity, such as consumer confidence, housing starts and car sales, revealing a generally patchy and slow recovery, many analysts have pointed to the level of corporate and public debt as the principal inhibitor of growth. The debt has affected both borrowing and lending and is currently being exacerbated by the uncertainty associated with high unemployment. Adjustment remains incomplete, further stifling future demand growth.

While anxiety persists over the sustainability of the US recovery, economists have ruled out a repetition of last year's doubledip recession when an apparently healthy recovery slid back into a slump. Economic growth during 1992 should be around two percent reflecting a relatively weak recovery which should pick up steam into 1993. A lack of employment growth has compelled the Federal Reserve to risk further downward pressure on an already weak US dollar by shaving interest rates to a 30 year low. Because of prevailing conditions, the economic debate has dominated the Presidential election campaign.

The economies of Germany and Japan have both faltered due primarily to government policies designed to check what was seen as a period of unsustainable economic growth. In a determined strategy to control the inflationary effects of German reunification the Bundesbank steadily raised interest rates while the Government attempted to control growth in public sector spending. This policy has reduced domestic economic activity and placed pressure on exporters by boosting the exchange rate. The strategy had a ripple effect in that it limited the scope of other EC members to reflate their economies. While Japan's problems are less severe than Germany's, the structure and importance of the Japanese economy makes anything more than a mild downturn a danger for all of the industrialised countries.

International pressure is being placed on Japanese authorities to restore growth as that nation's stock market continues to bear the brunt of a severe financial shakeout. A declining equities market, now in its third year, is being driven by mounting worries over bad debts, decreased general corporate profitability and the trauma associated with asset deflation. As the slide has not been halted by successive interest rate cuts, authorities have developed a comprehensive fiscal stimulus package designed to prevent a spillover into the real economy.

Although Japan's policy emphasis is now

focussed on a mild expansion of public spending, monetary measures are still to the fore. Interest rate cuts should reduce pressure on the banking system and any boost in stock prices will make available more equity funding for business investment. It is reasoned that by diminishing the air of crisis which has been overhanging the banking system and stockmarket, both business and consumer confidence should revive.

There is an emerging consensus among Australian mineral producers that the traditional emphasis on the US and other major industrialised economies as the main engines of growth may be misplaced. An alternative strategy could see an increased effort in developing trade and cooperative production links with the high growth economies of South East and North Asia.

1.2 Review of the Australian Economy

Although a modest recovery in economic activity is underway, low growth and high unemployment continue to characterise the emergence from recession. GDP grew by approximately 0.5 percent in the June quarter. Over the year to June output rose by approximately 1.5 percent, well below the growth rates usually recorded in the early stages of recovery.

Falling domestic interest rates and ever escalating levels of foreign debt have had the effect of reducing Australia's exchange rate with its major trading partners.

During the first half of 1992 domestic private consumption to provided much of the growth in demand, with dwelling investment the major broad sector concerned. The pick-up in lending and construction activity occurred without any apparent sign of renewed inflationary pressures. Business confidence, which was battered by more than a year of discouraging economic developments, is generally low and fixed investment remains weak. Expectations for general business conditions over the next six months have been revised down.

The reliance of Australian primary producers on overseas markets was again demonstrated as depressed commodity prices continued to force adjustments on exporters.

While improvement is expected in some sectors, there is little evidence of broad recovery in mineral and petroleum product prices.

1.3 Economic Factors Affecting the Mining Industry

Western Australia's export dependent minerals and energy industry is now in the second year of an overall contraction in activity. The impact of the international recession has generally been to reduce demand, prices, and investment flows. The reduction in spending on exploration is of particular concern, with the goldmining sector bearing most of the cut backs.

Mineral commodity prices were buffeted by falls in demand and disproportionate supply responses by some key producing nations. Demand for most metalliferous minerals contracted as a result of a general fall in the production of a wide range of consumer and capital goods. Despite efforts by many governments to encourage infrastructure spending as a means of generating economic activity, there is little evidence of flow through to minerals demand.

The sensitivity of the State's resources sector to international developments continued to force adjustments on local producers. Expansions, and in some cases strategic restrictions, of output and an even closer attention to cost structures were the main strategies employed during the past financial year.

Reduced profit levels had the triple effect of injecting increased uncertainty into longer term investment decisions, diminishing the pool of retained earnings and shortening the required payback periods for new projects. Investment was also impacted upon by a lack of equity funding and by a general reluctance of companies to build up debt.

While the present operating environment is difficult, there are some structural factors at work which could substantially enhance any recovery.

The majority of the large mining houses were in fairly sound positions at the beginning of this period of market contraction. That is they generally had strong financial structures, were well managed, possessed a depth of technological skills and owned a good range of resource assets.

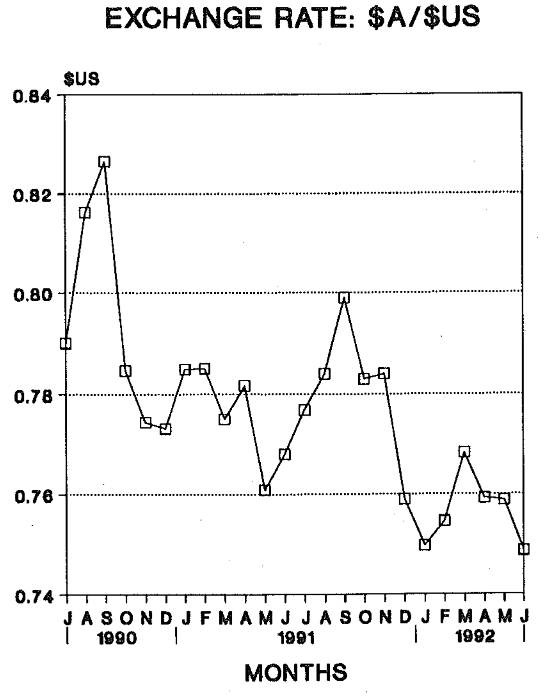
There is a significant amount of restrained demand for final goods in the world economy. As most of these goods have a metalliferous content, even the record high inventories which currently prevail should be run down fairly quickly with any sustained upturn.

An environment of low inflation, low inflationary expectations and falling interest rates will have longer term benefits for the minerals and petroleum industry. Strategies by mining companies to contain and reduce operating and capital cost growth are being enhanced by this change in financial circumstances. Productivity improvements and industry restructuring will continue and be complemented by this regime.

There are also encouraging signs that the level of downstream processing being applied to the State's mineral products is continuing to improve, even in the present straitened circumstances. Industrial and trade linkages, as well as closer integration, to Japan and the emerging Asian economies is similarly continuing to strengthen. Rising per person incomes and metals consumption in the East Asian region represent an important and growing market for Australian exports of minerals and metals.

Another area of significant export growth is in the sale of mining-related services, including environmental management and rehabilitation expertise. The Australian industry is acknowledged as a world leader in this area.

As a direct effect of lower interest rates, and to a lesser extent lower commodity prices, the Australian dollar has been effectively devalued. The medium term outlook for the currency is for an exchange rate in the US 71-72 cents range. This should improve the prevailing low returns to miners and energy producers (Figure 1.1).



SOURCE: A.F.R., MONTHLY AVERAGE. FIGURE 1.1

The market prices of both mineral and energy products should begin to recover during the current trading period and strengthen through 1993. While there will be some sectoral variation, the broad volume of mine production should be steady during 1992-93. Projected strong demand growth in the Asian region and a steady exchange rate should allow both an increase in export volumes and moderately higher real prices.

1.4 Social and Political Factors Affecting the Mining Industry

During 1991-92 a range of issues related to land access continued to be of central concern to the industry, Government and to many in the wider community. Although the debate was joined on several fronts, and some areas of dispute were particularly acrimonious, some positive developments did occur. Issues relating to the total investment environment in the State were also to the fore during the current period.

One significant achievement on the question of land access was the establishment of a code of conduct to allow exploration to be undertaken on pastoral leases. The compact was signed after two years of generally cooperative negotiations between the Pastoralists and Graziers Association and the Association of Mining and Exploration Companies. Progress on this initiative is important in that nearly one third of Western Australia is covered by such leases and the agreement could be useful in the resolution of other land access issues.

Several lengthy disputes connecting potential mining developments with claims made under the Aboriginal Heritage Act received wide attention during the year. The Government attempted to address what were seen as shortcomings of the Act by rewriting the current legislation and regulations. In drafting the new Act an exhaustive process of consultation is being followed. Any ramifications of the "Mabo Decision", recently handed down by the High Court, are yet to be tested in Western Australian courts.

The Pilbara 21 study, an initiative by the State Government which sought to identify the economic development opportunities in the Pilbara, was completed during the year. The study closely examined the requirements for regional industry and social development in a bid to integrate these elements in future mining and petroleum industry investment.

As the recession and its lingering effects impacted on the Australian mining industry there are some indications that the political momentum of the microeconomic reform agenda has slowed. Microeconomic reform in the broad economy remains very important, however, for the future viability of the minerals and energy industry. As reform addresses the supply side issues associated with the market for minerals and processed metals, our competitiveness should be enhanced and scarce investment more readily attracted with a successful outcome.

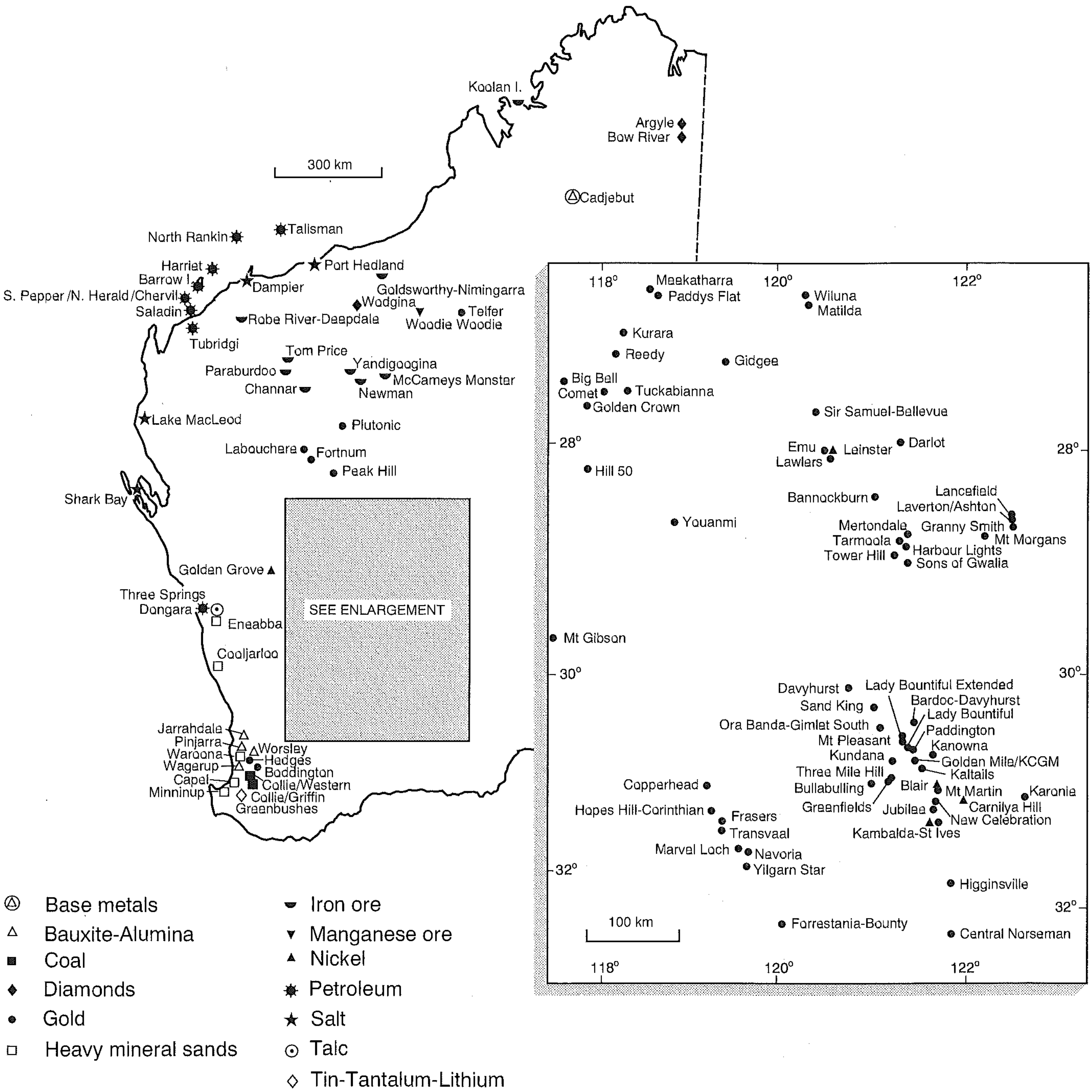
Another development issue which will be of increasing importance during the decade is the efforts of the Commonwealth and States to devise a national gas strategy. A "full, free and fair" interstate trade in natural gas will have enormous ramifications for gas rich Western Australia.

As the world economy begins to recover during 1992-93, and the minerals and petroleum industry again gathers pace, it can be expected that a range of social and political issues, some no doubt vexatious, will again come to the fore.

FIGURE 1.2

MAJOR MINERAL AND PETROLEUM PROJECTS IN WESTERN AUSTRALIA

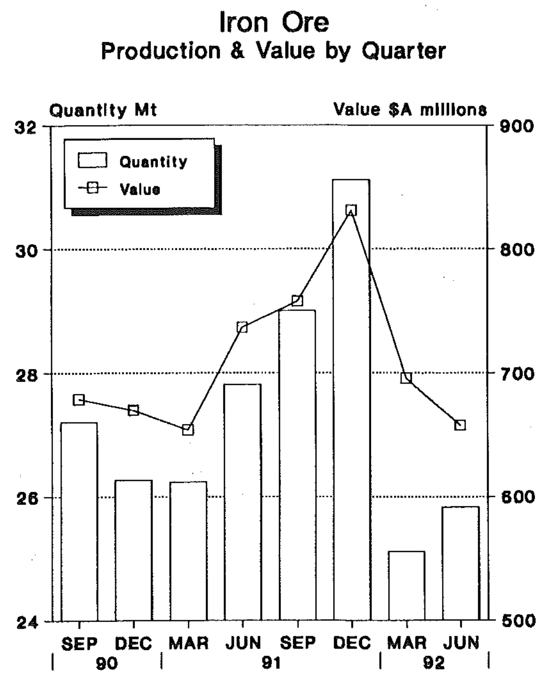
WITH AN ANNUAL VALUE OF PRODUCTION IN EXCESS OF $10 MILLION



2. REVIEW OF MAJOR MINERALS AND PETROLEUM

2.1 IRON ORE

Production and value have generally followed a similar pattern over the past two years. Both declined marginally in the latter half of 1990 before recovering in 1991 and again falling in the first half of 1992. (Figure 2.1).

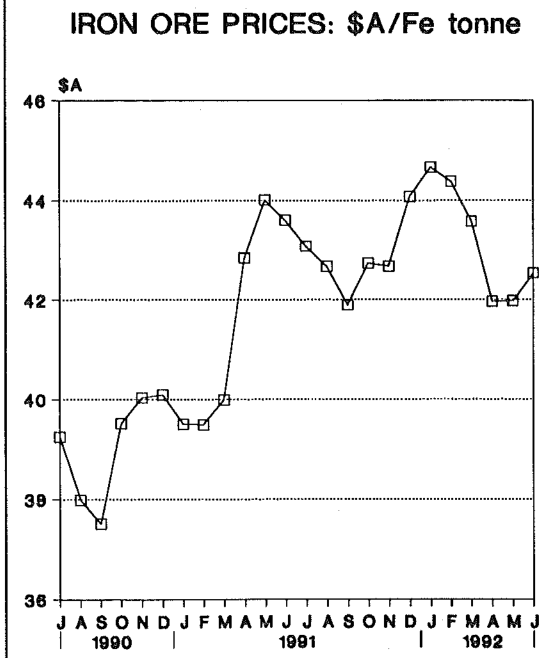


SOURCE: DOME

Figure 2.1

The Western Australian iron ore industry continued to record strong results in output and realised value in 1991-92. A small decline in the exchange rate offset the slight real price decrease negotiated for the trading period. This, and an increase in tonnes shipped resulted in a modest overall increase in value of production (Figure 2.2).

At approximately $3.0 billion, industry receipts from exports and domestic sales were up by 11 percent on the 1990-91 result. The relatively strong result was a function of the State's producer's broad market base, the proximity to the stronger market performers of South East Asia and the preference shown for the range of Western Australian ore types. Aggregated domestic and export tonnages increased by an overall three percent to approximately 112 million tonnes (Figure 2.3).

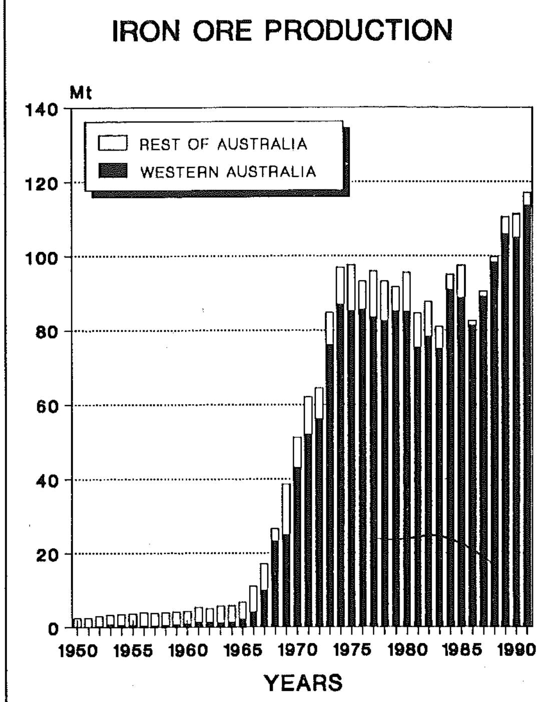


SOURCE: HIGH GRADE FINE ORE PRICES.

FIGURE 2.2

Both supply and demand factors significantly affected the international steel market during 1991-92. Production fell in the former Eastern Bloc countries and Commonwealth of Independent States because of sharply reduced domestic consumption and the gradual closure of inefficient plants. Among the industrialised nations of Western Europe and North America, sluggish demand from steel users and rising inventories resulted in a contraction in iron ore sales. The effect on Japanese steel production was delayed, but for the first time in 6 years output could drop below 100 million tonnes in 1992. The emerging industrialised nations of South East Asia were exceptions to this trend. A mild though steady improvement is expected to emerge in all of these markets during 1992-93.

It is forecast that continued demand growth in the markets of China, Korea and Taiwan should substantially offset any continuing weakness in the other main markets for Western Australian iron ore. This should have an overall effect of stabilising the current level of output and sales at least through the current trading period.



SOURCES: DOME, BMR & ABARE

FIGURE 2.3

In December 1991 Western Australia's iron ore companies were forced to accept an average five percent price cut for all sales completed during the 1992-93 Japanese fiscal year. Given current market conditions, and evidence that steel mills overbought in 1991, it is unlikely that any real price increases will be considered in the December 1992 meetings.

In commissioning new mines, and in proceeding with comprehensive feasibility studies for a range of projects, Western Australia's iron ore producers continue to take a long term view in their investment and production strategies. Committed investment of about $750 million by the three major operators should sustain projected output for the next 20 years. The Marillana Creek (Yandi) mine was commissioned early in 1992 and the Brockman No. 2 detritals project came on stream in mid year. The Marandoo development, which is being developed to extend the life of the Mount Tom Price mine is steadily progressing through the approvals process. Mesa J is being progressed to development at Deepdale. Hamersley Iron is predicting higher production levels in 1992-93 as a result of a steady increase to capacity of the Channar mine. Major expansions of port handling facilities are being undertaken by BHP and the Robe River joint venturers.

The State's producers are also looking with interest at the several steel mill studies which are currently progressing. The most tangible of these is the HiSmelt Corporation's direct smelting project at Kwinana. It is reasoned that relatively small but technologically advanced mills could be more readily established in Western Australia for the purpose of serving domestic and specialty export markets.

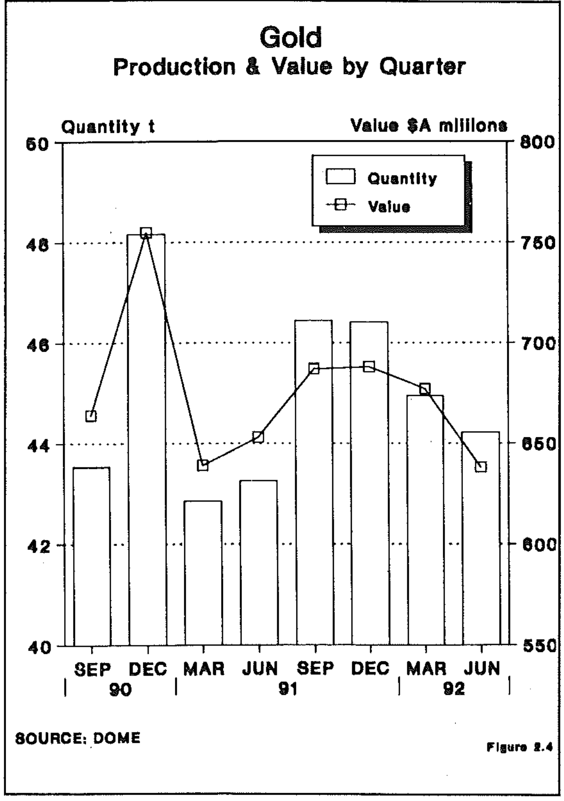
As with Western Australia's other resource industries, the short term outlook for the iron ore sector is tied to developments in the world economy generally and to Japan in particular. Medium to longer term market fundamentals, such as the predicted swing in the trade cycle and a steady increase in demand in the North Asian economies, should favour the State's industry. Capacity expansions in place, and under development, added to an ongoing program of workplace reform will allow a cost efficient increase in output and some important market flexibility.

2.2 GOLD

The gold price has steadily fallen over the past two years. A slight rise in reported output during the second half of 1991 did not offset the lower average price (Figure 2.4). While the industry remains relatively buoyant, there was a small contraction in exploration and development during 1991-92.

Gold production increased marginally to approximately 182 tonnes in 1991-92. Unfortunately for local producers, the prevailing lower average gold price caused total value of reported State output to contract slightly during the period (Figure 2.5).

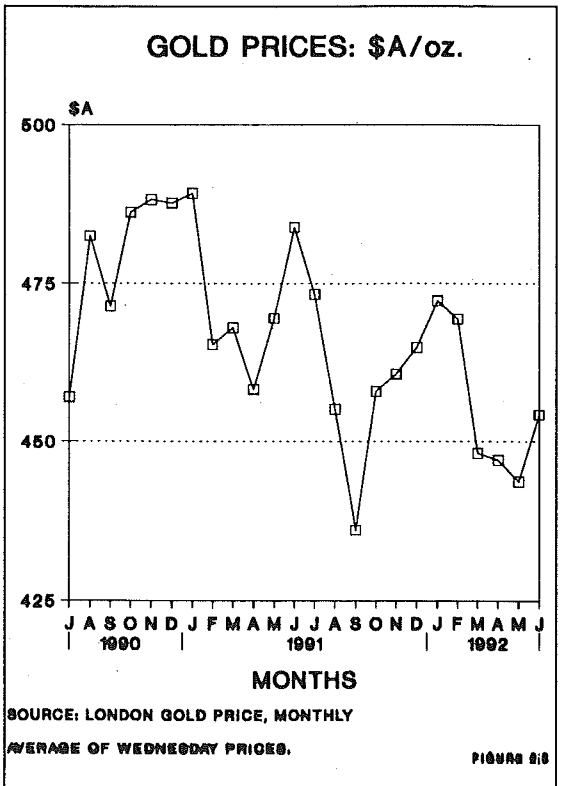
While the calculated value of production was $2.7 billion, given the widespread use of forward sales contracts, the actual sales value of all gold produced was probably closer to $3.0 billion.



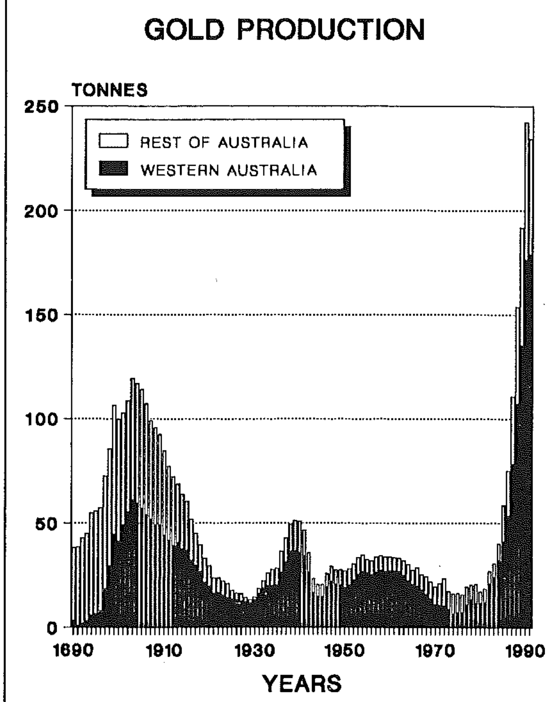
The prevailing relatively low price on world markets of around US$350/oz continues to be the main concern of Western Australian miners. The changing structure of the market, where the precious metal is increasingly being traded like any other commodity, means that supply and demand factors are now the main determinants of price. Analysts believe that with reduced sales by central banks and a lessening of speculative trading, physical demand from the gold fabrication industry will tend to drive the market. As demand from jewellery manufacturers consistently outstrips new production, and as the incidence of large speculative sales seems to be diminishing, some confidence is returning to the industry. International demand is expected to improve in line with an upturn in general economic activity.

Because of the high value nature of the metal, returns to developers, and hence gold mining industry activity, is very sensitive to changes in the exchange rate. If recent downward pressure on the Australian dollar is sustained returns to local producers will be significantly boosted, thus making new investment much more attractive.

There remain, however, several structural factors which are negatively affecting the Western Australian gold mining industry. These include an overall reduction in funds available for exploration and rising input costs which due mainly to the depletion of easily won ores. Generally lower exploration expenditure and a concentration on satellite deposits are matters of concern for the industry's longer term viability.



That the industry shakeout has not been more severe during the past year owes much to the generally sound structure of the State's principal operating companies. A collective ability to restrain operating cost increases, and to utilise a range of market mechanisms in project financing, have been hallmarks of the local industry. While some mine closures have occurred they have generally been as a result of ongoing policies of rationalisation and concentration. Although the industry is currently operating in a difficult environment, Western Australia continues to be the main producing State (Figure 2.6).



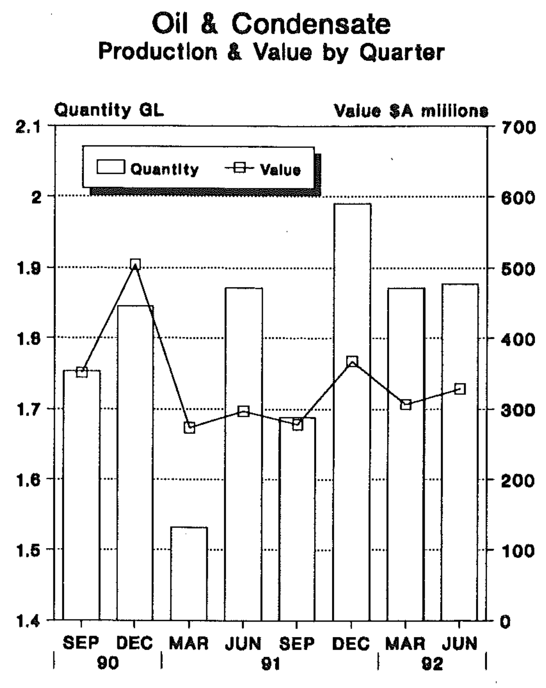
SOURCES:DOME, BMR & ABARE FIGURE 2.6

Despite tight market conditions, new and existing project investment has been relatively strong. The Telfer project is undergoing a large expansion of capacity, primarily through heap leaching. New projects which commenced production during the year include the Yilgarn Star, Marymia, Mount McClure, Mount Monger and Bannockburn. Kanowna Belle, the largest discovery for many years is at an advanced feasibility stage and should commence open cut operations by early 1993.

2.3 PETROLEUM

In 1991-92 total sector value of production decreased marginally relative to the strong result which was recorded during the preceding trading period. Despite a softer crude oil price output of oil, condensate, LNG and natural gas all rose slightly (Figure 2.7).

Western Australia's petroleum industry recorded another year of relatively strong activity in planning, exploration, field development and production. The total value of all sectors production was again robust, though reduced slightly as a result of only small movements in the international oil price. Sales volumes of oil, condensate, LNG and natural gas all rose during the period but, apart from a marginal rise for LNG, receipts for all products fell.

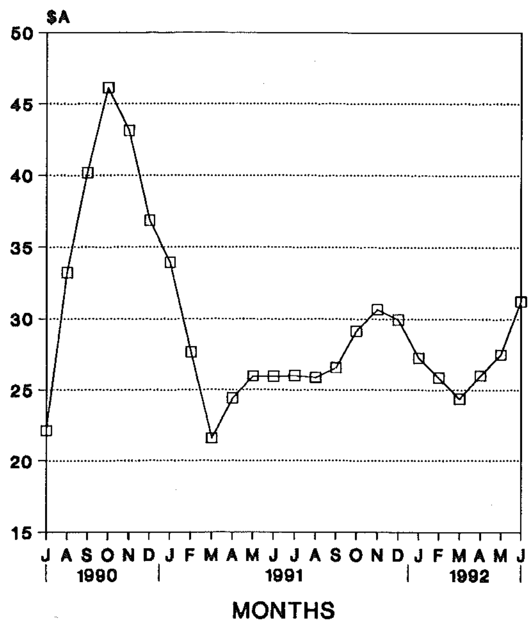


SOURCE: DOME Figure 2.7

Total value of all petroleum sector output was approximately $2.5 billion, a six percent decrease on the 1990-91 figure. Crude oil and condensate receipts contracted marginally to just under $1.3 billion, while natural gas sales similarly fell to about $350 million. LNG sales grew steadily with total receipts at a record $850 million for the trading period.

At approximately $US24 per barrel the average world trade weighted price of crude oil rose by a nominal 10 percent during 1991-92, monthly average spot prices were slightly higher. (Figure 2.8) The relatively subdued nature of oil price movements can be principally ascribed to the effects of the recession on demand from the industrialised nations. This weakening is being offset by strengthening demand in developing countries and by OPEC's intermittent attempts to restrain supply. In the absence of any demand shock, the average price of crude oil is forecast to gradually strengthen during 1992-93. The medium to longer term outlook is for OPEC's market power to become steadily enhanced with falling CIS sourced output being replaced by Kuwaiti, and eventually Iraqi, production.

CRUDE OIL PRICES: $A/bbl



SOURCE: BRENT SPOT, MONTHLY AVERAGE.

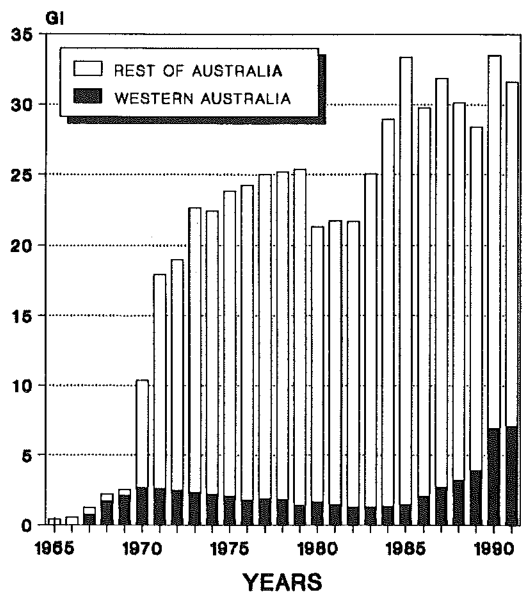
FIGURE 2.8

The State's output of condensate rose to about 2.0 million kilolitres and crude oil to nearly 5.5 million kilolitres during the trading period (Figure 2.9).

All in all 1991-92 was another good year for the State's petroleum industry, with considerable advances in all aspects of activity on the North West Shelf. Massive investment in reserve delineation, field development and production capacity proceeded, even though there was some evidence of a industry wide contraction in exploration activity.

Hadson Energy's gas gathering project came on stream during July and recorded its first sales as part of a 10 year contract with SECWA. In a move which bodes well for the domestic natural gas industry BHP Petroleum's announcement of a development plan for the Griffin oil field included future provision for gas gathering on the immediate and surrounding fields. Griffin will be a two stage project with an estimated field life of 13 years.

PETROLEUM PRODUCTION
(including CONDENSATE)



SOURCES: DOME, SMR & ABARE

FIGURE 2.9

The Roller field, close to Onslow, was committed to development early in 1992, with project funding to be arranged by the end of the year. Production is planned to commence within two years. After successive size downgradings, which have significantly altered the economic viability of the project, the Cossack field is finally set to be developed in conjunction with the larger Wanaea discovery. The combined project, which will not come on stream before the mid 1990s, includes a floating production ship with gas pipeline linkage to the North Rankin/Goodwyn A line.

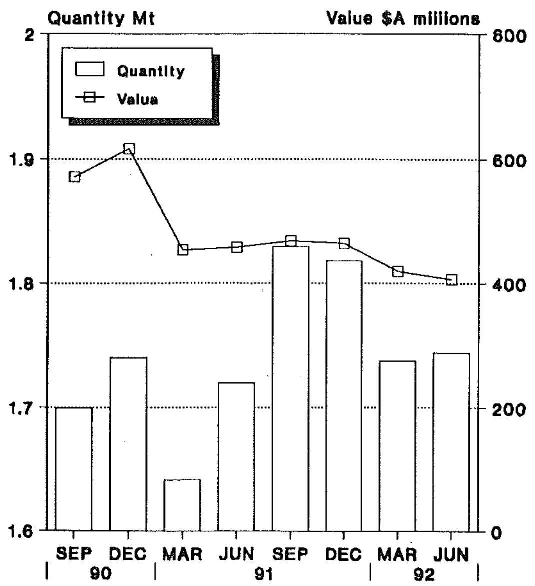
Phase 3 of the North West Shelf project, which involves $1.7 billion of new investment in fabrication and construction centred on the Goodwyn A development, is progressing on schedule. The third LNG train should be operational by the end of 1992.

The overall outlook for the petroleum industry in Western Australia is very good. Medium term developments in international markets should provide demand and price growth, while substantial investment, in place and committed, will allow capacity expansions through the 1990s. Recent studies have shown that the North West Shelf project alone will, by the mechanisms of income, investment and employment multipliers, have a significant effect on the State economy through the next decade .

2.4 ALUMINA

In response to a marked erosion in prices over the past two years producers have steadily increased output. The strategy has been to maintain a reasonably stable aggregate value of production in the face of falling prices (Figure 2.10).

Alumina
Production & Value by Quarter

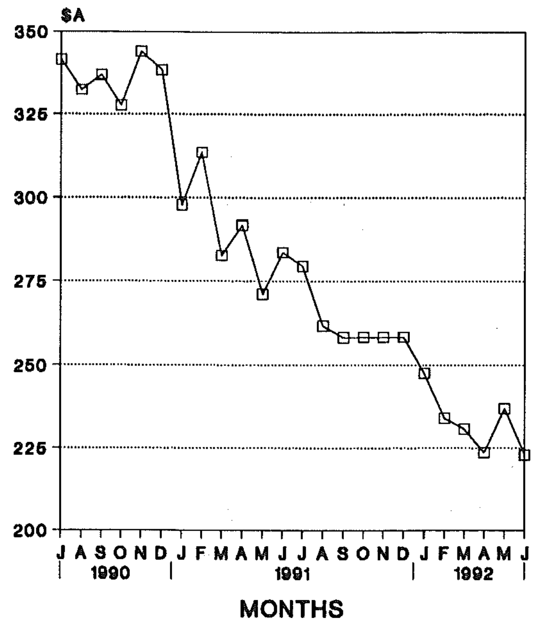


SOURCE: DOME

Figure 2.10

While marketed output from Western Australia's producers rose marginally to over seven million tonnes in 1991-92 the total value of production fell by 16 percent to approximately $1.8 billion. There was a temporary firming of alumina prices during the first quarter of 1992, this followed a rally on aluminium markets which saw prices rise by 25 percent. Over the whole trading period the price rally did little to arrest the slide in receipts recorded by the State's producers (Figure 2.11).

ALUMINA PRICES: $A/tonne



SOURCE: DERIVED FROM L.M.E. & A.B.S.

FIGURE 2.11

Any future movements in the aluminium price will be driven by falling producer stocks, uncertainty over supply from the CIS and any marked increase in speculative purchasing. For aluminium prices to rise significantly in the current market there would need to be a sharp contraction of supply from the CIS. Western Australia's producers are cautiously optimistic that contract and spot prices will improve by approximately 10 percent during 1992-93.

In keeping with their positions as two of the world's most cost efficient producers, ALCOA and Worsley continued to improve the capacity and efficiency of their operations throughout the current market downturn. Western Australian production again dominated the national output during the period (Figure 2.12).

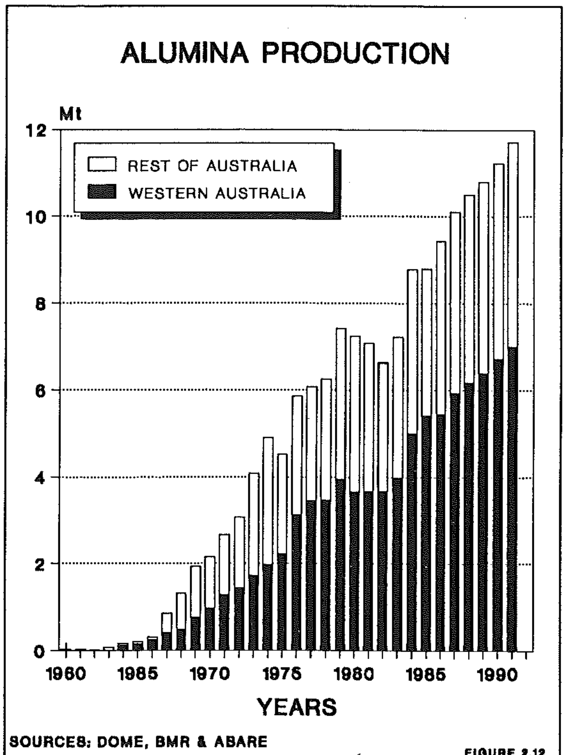


FIGURE 2.12

Aggregate production should increase even further during 1992-93 as a result of the start up of the Wagerup expansion and some capacity increases at Worsley's operation. Worsley is currently undertaking a feasibility study into a significant future expansion which, if proceeded with, will absorb nearly $500 million of new investment. ALCOA is closely considering the expansion of its current output of hydrated alumina more than threefold to 800 000 tonnes per annum.

Western Australia's low cost producers are well positioned to supply a significant proportion of the three percent national increase in exports forecast for 1992-93.

2.5 NICKEL

Over the past two years output and value of production have steadily fallen. The decline has been broadly in line with the gradual erosion in prices (Figure 2.13).

During 1991-92 there was an eight percent fall in the total tonnage of contained nickel metal produced from Western Australian mines. The total value of refined metal and matte sales was also disappointing, sliding by approximately 18 percent to $490 million.

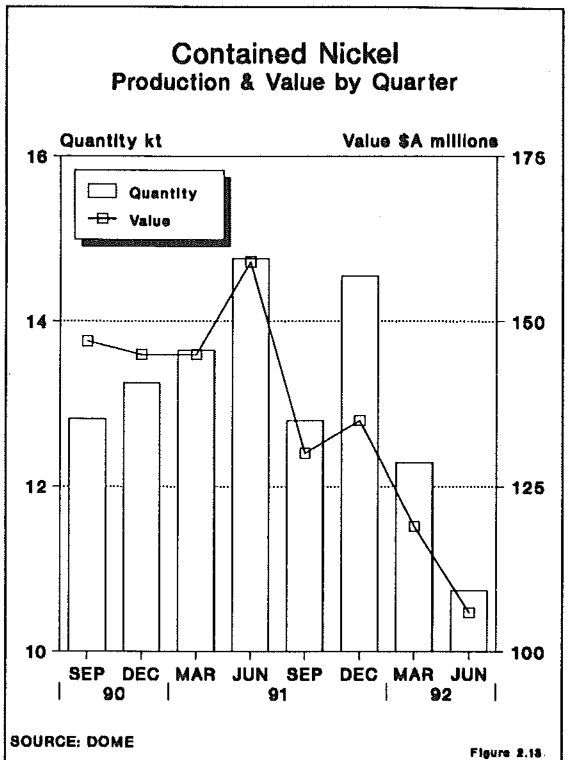
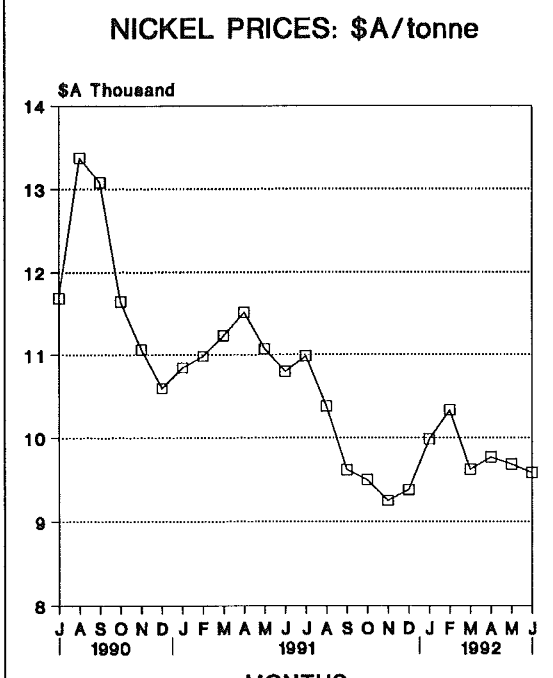


Figure 2.13

The overall result was primarily attributable to a gradual weakening of world market prices over the trading period (Figure 2.14). There was no sign of a price recovery during the first half of 1992. Some evidence of a slight recovery in demand was overwhelmed by a continuation of strong supply growth. Substantial volumes of the metal entering world markets, albeit at relatively low prices, is from suppliers in the CIS.

Notwithstanding current market difficulties, there are some promising signs of recovery in the medium term.

The main demand factor continues to be the long predicted return to positive economic growth by the industrial nations. The level of consumer stocks relative to potential demand, and a trend towards increased nickel intensity, should also improve the market outlook considerably. Stainless steel demand is not only a function of general economic growth, but also of income growth in developing countries, technological change and the level of environmental regulation.



SOURCE: L.M.E CASH, MONTHLY AVERAGE.
FIGURE 2.14

Analysts have predicted a consumption growth rate of around three percent for 1992-93. The direct translation of increased consumption to any marked rise in demand is difficult however, on account of the unpredictability of developments among supply sources in the CIS.

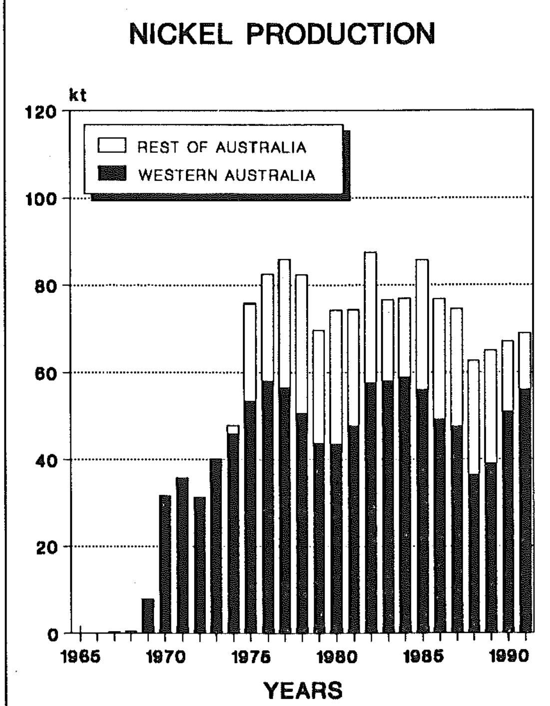
In 1991-92 almost all Western Australian production was again sourced from the predominantly underground operations at Kambalda and Leinster. Aggregate production from these two projects should increase significantly over the next few years as investment in capacity expansions takes place. Spending will be mainly in the areas of smelting and concentrate production.

Operations ceased at Windarra in late 1991 and the relatively small Radio Hill project was rendered uneconomic by a build up of financial and technical problems.

Considerable attention continues to be focussed on the large low grade sulphide resources located in the North-Eastern Goldfields. The development of the Mount Keith and Yakabindie deposits is seen as crucial for the long term future of the Western Australian industry. Detailed evaluation and feasibility studies are progressing for the projects, although final commitment will be contingent on indications of firm nickel prices and the ability of the developers to secure long term contracts.

The development of the relatively high grade Forrestania deposits are on schedule for commissioning late in 1992. Estimated annual output from the project will be 7 500 tonnes of nickel contained in concentrates. This production will be exported through Esperance.

Other minor projects are at various stages of development and should supply small supplementary tonnages to the major established plants.



SOURCES: DOME, BMR & ABARE
FIGURE 2.15

Given the long lead times associated with mine development, and the sensitivity of the metal price to demand changes, the medium term market fundamentals are favouring the Western Australian industry. Committed and conditional capital investment, tied as it is to workplace efficiencies, will also place the local industry well for a strong recovery. Despite production difficulties Western Australia retained its position as the premier nickel producing State (Figure 2.15).

2.6 DIAMONDS

Western Australia's two producers reported significant overall increases in total carats of diamonds sold during 1991-92. This rise was not reflected in the total value of sales as prices fell slightly during the period. While sales volume increased by over 50 percent to around 47 million carats, the value of sales rose by a more modest 30 percent to approximately $565 million.

The unforeseen extent and depth of the recession in the main industrialised countries has decreased demand for all categories of diamonds currently being marketed. It is estimated that world-wide sales by the Central Selling Organisation (CSO) contracted by around 10 percent during 1991-92, the slump tending to worsen the first six months of 1992. This was the group's lowest level of activity since 1987. The CSO has since reduced normal purchase volumes from major producers by 25 percent in a measure designed to stabilise the market.

The overall effect of the recession driven contraction in demand has been made worse by the rapid escalation of rough diamond sales out of Angola. Uncontrolled mining and the illegal trading of rough stones from this source has increased market volume by approximately 10 percent and worked to erode the CSO's regime of managed prices.

Analysts are cautiously optimistic that quotas already in place, and some signs of an improvement in market sentiments, will improve the trading environment in 1992-93. As a result of the CSO's agreements with Angola and Zaire unauthorised supply from those nations should be reduced. Direct purchasing arrangements with the principal producing centre in Russia will similarly tend to enhance the CSO's power to manage the market. Any recovery in the major economies should quickly feed through to boost market demand. It is hoped that new marketing strategies developed to add value and increase turnover will prove successful in the medium term.

Total sales from the State's producers should be approximately the same in 1992-93 as that recorded in 1991-92.

Diamond exploration within the State remains relatively strong with expenditure in the current period projected to exceed $23 million. In addition to continuing work in the Kimberley, active programmes are underway in both the East and West Pilbara and in the region of the Marymia Dome.

2.7 HEAVY MINERAL SANDS

Over the past two years there has been a steady decline in the prices of heavy mineral sands products. This has been due mainly to an oversupply on world markets. The State's output and value of production of ilmenite has fluctuated as producers have attempted to adjust to a faltering market (Figure 2.16).

Western Australia's heavy mineral sands producers were again tested in a very difficult trading environment during 1991-92. As the demand for titanium dioxide pigment has softened prices have continued to decline. There was a fall in the price index for industry products (Figure 2.17). Demand and sales of synthetic rutile, which showed some stability during the year, was the one bright spot in an overall soft market.

Total industry value of production was down by about 13 percent to approximately $336 million. Producers adopted a range of strategies, including reducing output growth, in an attempt to ride out the downturn.

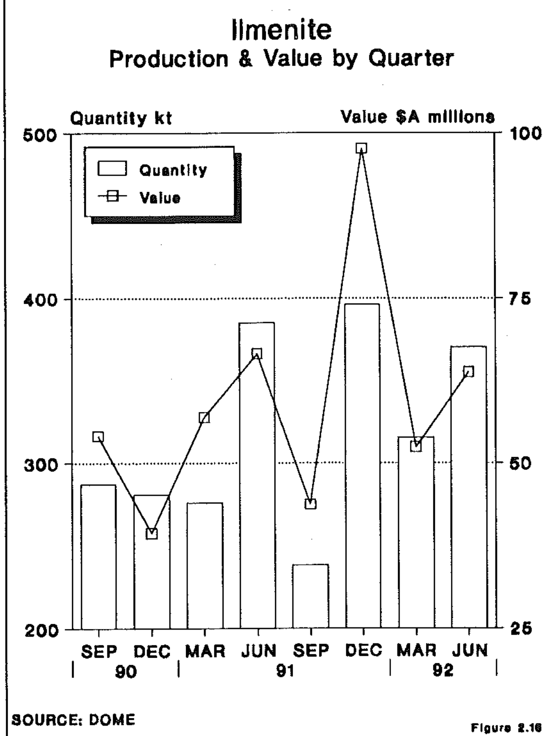


Figure 2.16

Healthy market demand for synthetic rutile was not reflected in the price, which was fairly stable over the trading period.

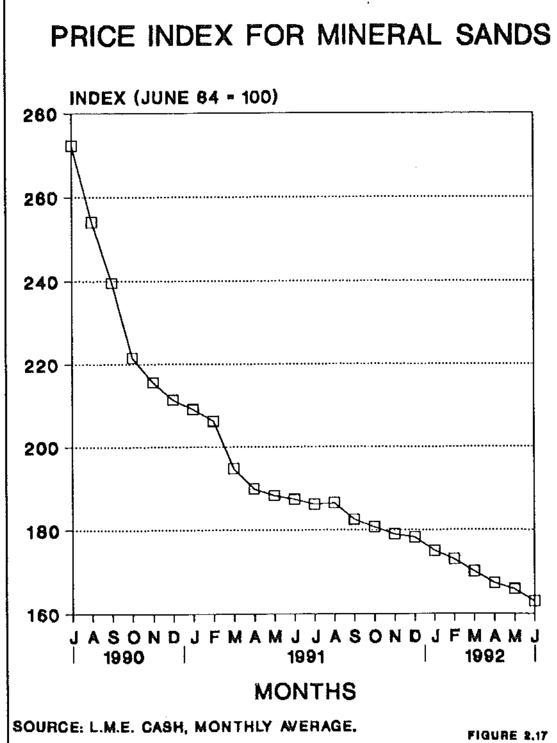


FIGURE 2.17

In order to keep turnover and profit levels as high as possible most of Western Australia's producers have been hard pressed to alter their product mix. The State remains well placed to maintain its world prominence as a mineral sands supplier (Figure 2.18).

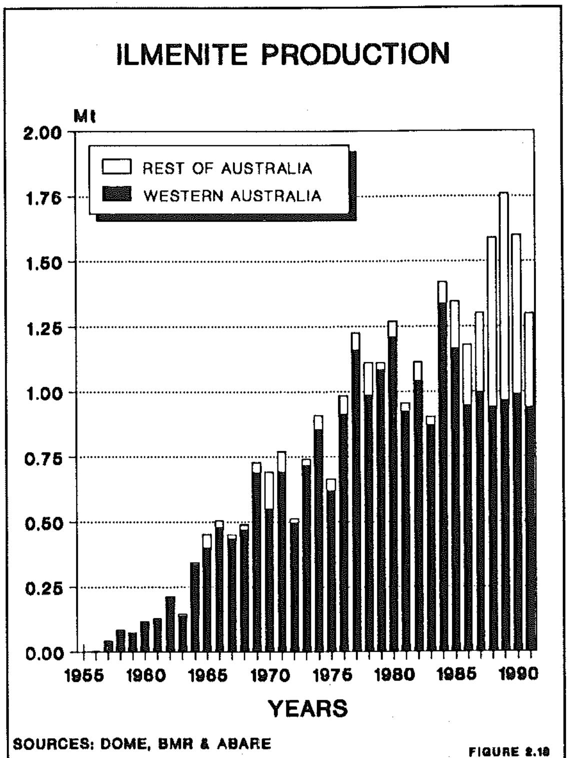


FIGURE 2.18

In the longer term, demand growth is expected to increase strongly for nearly all industry products. Unfortunately for local producers, a sharp increase in world output is also forecast, and with it an added downward pressure on prices. This emerging structural problem is a subject of deep concern for the domestic industry. By the mid 1990s the demand for the range of mineral sands products is predicted to increase by 20 percent while, through new projects alone, worldwide supply will rise by 45 percent. South Africa is expected to be a long term player, particularly in the very important European market. That country is already a very competitive producer of both titanium products in slag form and of zircon,

Notwithstanding these market factors and the industry's sensitivity to changes in economic activity, Western Australian producers have projects worth over $350 million either at advanced feasibility stage or under consideration.

These include significant developments at Jangardup and Dardanup. Although full scale mining of the Beenup deposit has again been delayed, pending indications of an upturn in market demand, the project management has announced a major programme of bulk sampling to be undertaken later this year. Westralian Sand's planned $100 million expansion of synthetic rutile production capacity at Capel has moved a step closer with the preparation of documents relating to environmental requirements. The company is on schedule to make a decision on funding in the new year in order to have the extra capacity on stream by 1995. The strategy is to commission the new cost efficient plant in time to catch the next sustained market rise.

Despite the present market difficulties the State's heavy mineral sands sector is confirmed as a long term, and significant, investor in primary production and as an industry leader in downstream processing.

2.8 SUMMARY AND OUTLOOK

Western Australia's export driven resources sector has continued to bear the effects of a generalised slow-down in the international economy. A protracted period of economic downturn in the industrialised countries has concomitant dangers for the State's minerals producers.

The State's total value of minerals and petroleum production declined for the first time in 30 years. The small fall in receipts to $12 billion occurred despite some producers expanding output in response to falling prices.

Alumina, iron ore, gold and most petroleum sector products all increased significantly. The iron ore and petroleum sectors continued to record strong results during the trading period with receipts amounting to $2.9 billion and $2.5 billion respectively. A steady decline in the Australian dollar against the $US considerably boosted the incomes of these principal export sectors.

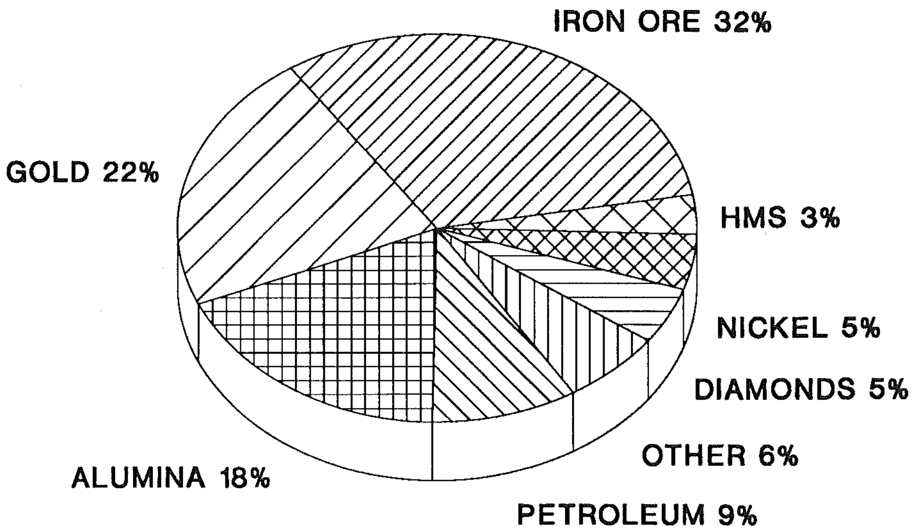
The North West Shelf project will continue to have a significant effect on the State's economy, with a projected increase in employment and associated economic activity as the production phase advances. Although there is currently some downward pressure on prices, iron ore exports should also strengthen in the medium term, bolstered by industry efficiencies and by a steady demand growth for steel in key East Asian markets.

Despite a better than expected performance, the gold sector is under pressure from changes in the market structure, rising costs and a stagnating price. Diamond producers are similarly cautious in their short term projections as there is little scope for price rises and some uncertainty over marketing arrangements.

Analysts forecast that a steady industry wide recovery should commence during 1992-93 and gradually strengthen towards the end of 1993. The recovery will be characterised by modest growth in real prices and by a rise in sales volumes. Any broad improvement will be contingent on the confluence of generalised economic growth and the inventory investment cycle for mineral commodities.

COMPARATIVE VALUE OF PRODUCTION

1986-87 VALUE OF PRODUCTION
TOTAL : $5,950 MILLION



1991-92 VALUE OF PRODUCTION
TOTAL: $11,998 MILLION

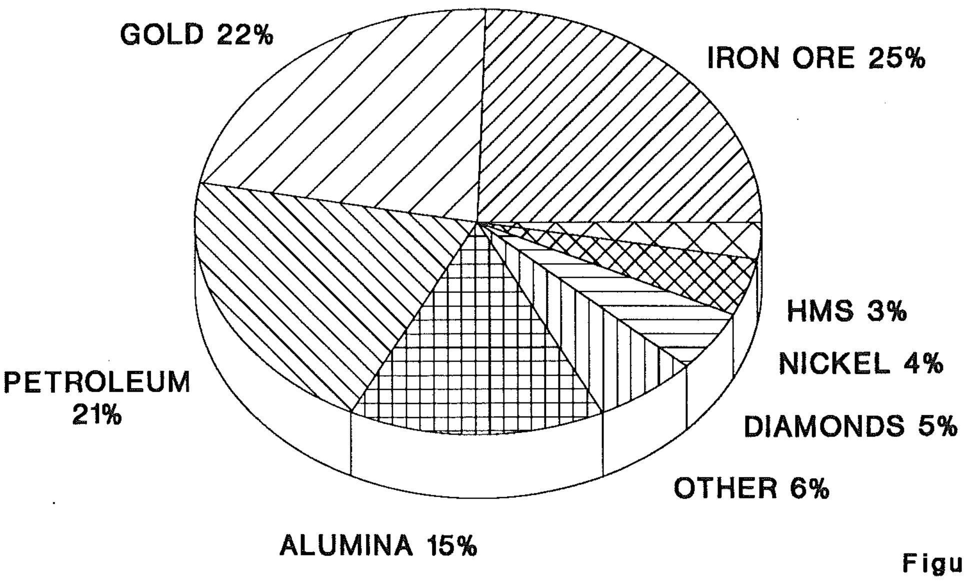


Figure 2.19

TABLE 3.1 **QUANTITY AND VALUE OF MINERALS AND PETROLEUM 1990-91, 1991-92**

		1990-91		1991-92	
MINERAL	UNIT	QUANTITY	VALUE($)	**QUANTITY**	**VALUE($)**
BASE METALS					
Copper	t	11 995	20 349 205	**12 018**	**17 440 805**
Lead	t	12 481 (r)	5 990 776 (r)	**21 678**	**7 297 295**
Zinc	t	57 331 (r)	76 385 678 (r)	**142 919**	**125 578 837**
TOTAL BASE METALS			102 725 659 (r)		**150 316 937**
BAUXITE-ALUMINA					
Alumina	t	6 800 451	2 099 125 726	**7 129 199**	**1 758 150 370**
CLAYS					
Attapulgite	t	15 403	3 914 836	**19 329**	**5 860 557**
Cement Clay	t	22 994	137 964	**16 741**	**170 243**
Fire Clay	t	620	744	**0**	**0**
Kaolin	t	0	0	**3 120**	**218 131**
White Clay	t	153 611 (r)	1 689 718 (r)	**22 575**	**225 745**
TOTAL CLAYS			5 743 262		**6 474 676**
COAL	t	5 218 176	232 915 908	**5 491 310**	**243 540 117**
CONSTRUCTION MATERIALS					
Aggregate	t	102 945	435 358	**121 343**	**737 177**
Gravel	t	30 952	152 200	**120 716**	**620 463**
Rock	t	43 135	454 534	**144 617**	**538 908**
Sand	t	548 673	2 327 258	**1 031 609**	**5 752 069**
TOTAL CONSTRUCTION MATERIALS			3 369 350		**7 648 617**
DIAMOND	ct	29 964 155	435 725 448	**47 485 294**	**564 768 721**
DIATOMITE	t	22	160	**169**	**1 300**
DIMENSION STONE					
Black Granite	t	249	76 706	**5 687**	**1 932 444**
Quartz Rock	t	430	19 302	**295**	**13 258**
Spongolite	t	115	9 430	**376**	**26 836**
TOTAL DIMENSION STONE			105 438		**1 972 538**
GEM SEMI-PRECIOUS & ORNAMENTAL STONE					
Amethyst	kg	24 617	131 426	**17 659**	**127 910**
Chrysoprase	kg	0	0	**18 555**	**342 249**
Jasper	kg	0	0	**8 844**	**7 499**
TOTAL GEM, SEMI-PRECIOUS & ORNAMENTAL STONE			131 426		**477 658**
GOLD	kg	181 175 (r)	2 762 816 830 (r)	**182 043** (e)	**2 689 922 065** (e)

TABLE 3.1 (cont)		1990-91		1991-92	
MINERAL	UNIT	QUANTITY	VALUE($)	**QUANTITY**	**VALUE($)**
GYPSUM	t	82 520	612 778	**101 822**	**1 041 012**
HEAVY MINERAL SANDS					
Garnet	t	22 141	2 071 178	**35 993**	**3 385 985**
Ilmenite	t	965 930	85 482 878	**974 801**	**83 153 556**
Upgraded Ilmenite (a)	t	263 408	131 710 093	**305 118**	**153 117 864**
Leucoxene	t	23 836	13 259 826	**11 782**	**6 517 864**
Monazite	t	6 869	5 113 867	**7 372**	**2 131 269**
Rutile	t	65 446	49 598 010	**47 466**	**26 878 559**
Zircon	t	208 424	100 801 777	**226 930**	**61 114 152**
TOTAL HEAVY MINERAL SANDS			388 037 629		**336 299 249**
INDUSTRIAL PEGMATITE MINERALS					
Felspar	t	34 315	1 346 129	**22 793**	**1 057 900**
Mica	t	2 280	113 597	**164**	**6 483**
TOTAL INDUSTRIAL PEGMATITE MINERALS			1 459 726		**1 064 383**
IRON ORE					
Domestic	t	4 368 036	113 955 037	**5 797 570**	**157 663 947**
Exported	t	103 304 766	2 534 731 534	**105 267 816**	**2 783 845 640**
TOTAL IRON ORE		107 672 802	2 648 686 571	**111 065 386**	**2 941 509 587**
LIMESAND-LIMESTONE-DOLOMITE					
Dolomite	t	0	0	**280**	**1 120**
Limesand-Limestone	t	1 738 427	9 853 611	**2 053 239**	**12 143 544**
TOTAL LIMESAND-LIMESTONE-DOLOMITE			9 853 611		**12 144 664**
MANGANESE ORE	t	160 322 (r)	25 585 813 (r)	**395 303**	**71 855 982**
NICKEL INDUSTRY	t				
Cobalt by-product	t	222	3 697 617	**634**	**28 808 544**
Nickel Concentrate	t	510 320	591 302 981	**475 528**	**486 563 425**
Nickel Matte	t	0	0	**221**	**464 942**
Nickel Ore	t	8 666	4 575 271	**5 210**	**3 135 393**
Palladium by-product	kg	350	1 229 183	**555**	**1 386 855**
Platinum by-product	kg	89	1 268 587	**126**	**1 646 045**
TOTAL NICKEL INDUSTRY			602 073 639		**522 005 204**
PEAT	t	376	28 000	**762**	**56 685**
PETROLEUM					
Condensate	kl	1 867 892	370 948 987	**1 996 708**	**338 981 745**
Crude Oil	kl	5 136 529	1 054 061 459 (r)	**5 432 496**	**941 222 640**
LNG	MMBtu	184 930 679	836 400 762	**219 701 000**	**846 338 551**
Natural Gas	'000m3	3 613 720	379 228 944	**3 768 848**	**349 257 426**
TOTAL PETROLEUM			2 640 640 152		**2 475 800 362**

TABLE 3.1 (cont)		1990-91		1991-92	
MINERAL	UNIT	QUANTITY	VALUE($)	**QUANTITY**	**VALUE($)**
PIGMENTS					
Red Iron Oxide	t	5 757	110 531	**0**	**0**
RARE EARTHS					
Gallium	kg	8 481	267 377	**0**	**0**
SALT	t	6 413 163	136 973 045	**6 927 198**	**153 141 494**
SILICA-SILICA SAND					
Silica	t	80 147	822 975	**74 171**	**749 846**
Silica Sand	t	781 503	6 774 328	**580 467**	**5 489 268**
TOTAL SILICA-SILICA SAND			7 597 303		**6 239 114**
SILVER	kg	36 919 (r)	5 491 093 (r)	**42 697**	**6 540 741**
TALC	t	161 560	11 691 732	**168 891**	**11 822 370**
TIN-TANTULUM-LITHIUM					
Spodumene	t	40 376	7 079 333	**42 516**	**8 893 387**
Tantalite	t	702	22 767 073	**873**	**25 005 667**
Tin	t	262	1 229 162	**273**	**1 286 279**
TOTAL TIN-TANTULUM-LITHIUM			31 075 568		**35 185 333**
VERMICULITE	t	507	90 227	**225**	**39 943**
TOTAL VALUE			12 152 934 002 (r)		**11 998 019 122 (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

TABLE 4.1

QUANTITY AND VALUE OF MINERALS AND PETROLEUM BY LOCAL GOVERNMENT AREA

Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
BASE METALS			Cu Tonnes		
COPPER BY-PRODUCT	Coolgardie		5 702.493	5 972 259	
	Roebourne		42.520	37 778	
			5 745.013	6 010 037	(a) (b)
COPPER CONCENTRATES	Boddington	5 515	1 630.000	3 159 977	
	East Pilbara	7 452	1 438.000	2 269 834	
	Meekatharra	5 334	1 163.000	2 035 531	
	Yalgoo	10 207	2 042.000	3 965 426	
		28 508	6 273.000	11 430 768	(a)
TOTAL COPPER			12 018.013	17 440 805	
			Pb Tonnes		
LEAD	Derby-West Kimberley	27 721	21 678.00	7 297 295	(a)
			Zn Tonnes		
ZINC	Derby-West Kimberley	106 603	55 673.00	53 069 723	
	Yalgoo	205 439	87 246.00	72 509 114	
		312 042	142 919.00	125 578 837	(a)
TOTAL BASE METALS				150 316 937	
BAUXITE - ALUMINA					
ALUMINA	Boddington	1 609 300		436 667 499	
	Harvey	883 215		211 490 088	
	Murray	2 381 946		576 072 359	
	Serpentine-Jarrahdale	2 254 738		533 920 424	
		7 129 199		1 758 150 370	(c)
CLAYS					
ATTAPULGITE	Mullewa	19 329		5 860 557	(a)
CEMENT CLAY	Armadale	16 741		170 243	(d)
KAOLIN	Bridegetown-Greenbushes	3 120		218 131	(d)
WHITE CLAY	Swan	22 575		225 745	(d)
TOTAL CLAYS		61 765		6 474 676	
COAL	Collie	5 491 310		243 540 117	(e)
CONSTRUCTION MATERIALS					
AGGREGATE	Derby-West Kimberley	4 379		24 110	
	Kalgoorlie-Boulder	73 671		460 240	
	Port Hedland	35 533		206 075	

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
CONSTRUCTION MATERIALS (ctd)					
AGGREGATE (ctd)	Roebourne	80		672	
	Wyndham-East Kimberley	7 680		46 080	
		121 343		737 177	
GRAVEL	Broome	590		1 010	
	Coolgardie	1 880		9 400	
	Kalamunda	17 996		110 705	
	Nannup	18 650		92 348	
	Port Hedland	81 000		405 000	
	Shark Bay	100		500	
	Wyndham-East Kimberley	500		1 500	
		120 716		620 463	
ROCK	Broome	16 557		180 330	
	Exmouth	8 103		46 044	
	Port Hedland	98 820		73 200	
	Roebourne	21 077		239 034	
	Shark Bay	60		300	
		144 617		538 908	
SAND	Ashburton	4 817		25 327	
	Canning	11 111		53 355	
	Carnarvon	3 682		18 410	
	Collie	7 880		47 274	
	Coolgardie	61 285		309 525	
	Dandaragan	4 480		26 880	
	Derby-West Kimberley	143		1 024	
	Gingin	1 431		8 588	
	Leonora	2 651		15 906	
	Meekatharra	46 214		277 284	
	Nannup	220		4 400	
	Northam	6 068		21 245	
	Port Hedland	44 782		222 482	
	Roebourne	428 976		2 166 888	
	Swan	407 799		2 553 061	
	Wyndham	70		420	
		1 031 609		5 752 069	
TOTAL CONSTRUCTION MATERIALS		1 418 285		7 648 617	(d)

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
		Carats			
DIAMOND	Wyndham-East Kimberley	47 485 294		564 768 721	(a)
DIATOMITE	Dandaragan	169		1 300	(d)
DIMENSION STONE		5 155		1 716 605	
BLACK GRANITE	Derby-West Kimberley	5 549		1 884 144	
	Dundas	138		48 300	
		5 687		1 932 444	(d)
QUARTZ ROCK	Mukinbudin	295		13 258	(d)
SPONGOLITE	Plantagenet	376		26 836	(e)
TOTAL DIMENSION STONE		6 358		1 972 538	
GEM SEMI-PRECIOUS AND ORNAMENTAL STONE		kg			
AMETHYST	Upper Gascoyne	17 659		127 910	
CHRYSOPRASE	Laverton	18 555		342 249	
JASPER	East Pilbara	8 844		7 499	
TOTAL GEM, SEMI-PRECIOUS AND ORNAMENTAL STONE				477 658	(e)
			Au kg		
GOLD	Ashburton		14.477	213 917	
	Boddington		16 937.460	250 273 185	
	Carnarvon		0.488	7 211	
	Coolgardie		14 372.008	212 365 267	
	Cue		10 899.282	161 051 186	
	Dundas		1 729.154	25 550 518	
	East Pilbara		11 854.736	175 169 272	
	Kalg.-Boulder		44 789.330	661 821 092	
	Laverton		14 497.650	214 221 792	
	Leonora		17 440.140	257 700 941	
	Meekatharra		17 077.529	252 342 888	
	Menzies		431.679	6 378 623	
	Mt Magnet		6 025.071	89 028 326	
	Roebourne		4.782	70 660	
	Sandstone		5 498.944	81 254 110	
	Wiluna		5 011.930	74 057 839	
	Yalgoo		2 148.510	31 747 053	
	Yilgarn		13 309.694	196 668 185	
			182 042.864	2 689 922 065	(f)

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
GYPSUM	Dalwallinu	26 096		387 842	(d) (e)
	Esperance	2 846		16 507	(e)
	Irwin	22 394		347 058	(e)
	Kellerberrin	1 500		10 500	(e)
	Lake Grace	3 018		12 072	(e)
	Merredin	1 055		7 385	(e)
	Nungarin	24 504		146 782	(e)
	Ravensthorpe	2 750		16 500	(e)
	Wyalkatchem	17 659		96 366	(e)
		101 822		1 041 012	
HEAVY MINERAL SANDS					
GARNET SAND	Capel	1 272		87 556	(g)
	Northampton	34 721		3 298 429	(e)
		35 993		3 385 985	
			TiO_2 %		
ILMENITE	Capel	554 288	54.88)		
	Carnamah	106 612	58.28)		
	Dandaragan	248 405	63.00)		
	Waroona	65 496	54.51)		
		974 801		83 153 556	
			TiO_2 %		
UPGRADED ILMENITE	Capel	157 694	92.00)		
	Carnamah	105 139	92.00)		
	Dandaragan	42 285	92.00)		
		305 118		153 117 864	
TOTAL ILMENITE		1 279 919		236 271 420	(a)
			TiO_2 Tonnes		
LEUCOXENE	Capel	10 614	9 662	6 064 677	
	Waroona	1 168	1 059	453 187	
		11 782	10 721	6 517 864	(a)
			ThO_2 Units		
MONAZITE	Capel	1 980	12 870	553 921	
	Carnamah	5 392	35 048	1 577 348	
		7 372	47 918	2 131 269	(a)
			TiO_2 Tonnes		
RUTILE	Carnamah	26 765	25 485	15 973 177	
	Dandaragan	20 701	19 874	10 905 382	
		47 466	45 359	26 878 559	(a)

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
HEAVY MINERAL SANDS			ZrO_2 Tonnes		
ZIRCON	Capel	49 690	32 299	14 899 540	
	Carnamah	117 589	76 737	29 769 555	
	Dandaragan	54 049	35 673	15 131 667	
	Waroona	5 602	3 645	1 313 390	
		226 930	148 354	61 114 152	(a)
TOTAL HEAVY MINERAL SANDS				336 299 249	
INDUSTRIAL PEGMATITE MINERALS					
FELSPAR	Mukinbudin	11 202		534 556	
	Port Hedland	11 591		523 344	
		22 793		1 057 900	
MICA	East Pilbara	164		6 483	
TOTAL INDUSTRIAL PEGMATITE MINERALS				1 064 383	(h)
IRON ORE			Fe%		
DOMESTIC ORE	Ashburton	1 002 355	60.09	24 985 703	
	Derby-West Kimberley	1 260 392	64.70	34 293 499	
	East Pilbara	3 534 823	61.90	98 384 745	
		5 797 570		157 663 947	
			Fe%		
EXPORTED ORE	Ashburton	69 126 108	61.32	1 767 639 396	
	Derby-West Kimberley	2 173 396	63.92	52 765 361	
	East Pilbara	33 968 312	63.17	963 440 883	
		105 267 816		2 783 845 640	
TOTAL IRON ORE		111 065 386		2 941 509 587	(a)
LIMESAND - LIMESTONE-DOLOMITE					
DOLOMITE	Westonia	280		1 120	
LIMESAND - LIMESTONE	Cockburn	1 679 692		8 582 588	
	Dandaragan	2 973		14 845	
	Dundas	81 184		679 472	
	Gingin	28 048		490 960	
	Irwin	3 943		17 828	
	Roebourne	446		2 230	
	Wanneroo	256 953		2 355 621	
TOTAL LIMESAND-LIMESTONE		2 053 519		12 144 664	(d)

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
			Mn%		
MANGANESE ORE	East Pilbara	395 303	45.94	71 855 982	(a)
NICKEL INDUSTRY			Co Tonnes		
COBALT BY-PRODUCT	Coolgardie		633.497	28 776 215	
	Roebourne		0.498	32 329	
			633.995	28 808 544	(a) (b)
			Ni %		
NICKEL CONCENTRATES	Coolgardie	221 897	10.71	230 816 226	
	Kalgoorlie-Boulder	39 159	11.38	43 137 036	
	Laverton	3 401	8.35	2 979 887	
	Leonora	211 071	10.27	209 630 276	
		475 528		486 563 425	
NICKEL MATTE	Roebourne	221	22.83	464 942	
NICKEL ORE	Coolgardie	2 892	6.33	1 767 117	
	Leonora	2 318	6.38	1 368 276	
		5 210		3 135 393	
TOTAL NICKEL PRODUCTION				490 163 760	(i)
			Pd kg		
PALLADIUM BY-PRODUCT	Coolgardie		554.509	1 386 855	(a) (b)
			Pt kg		
PLATINUM BY-PRODUCT	Coolgardie		125.637	1 646 045	(a) (b)
PEAT	Manjimup	762		56 685	(d)
PETROLEUM		Kilolitres			
CONDENSATE	Carnamah	606		26 602	(d)
	Irwin	1 186		138 626	(d)
	Roebourne	1 994 916		338 816 517	(a)
		1 996 708		338 981 745	
CRUDE OIL	Derby-West Kimberley	19 227		2 690 616	
	Irwin	32 541		4 321 481	
	Roebourne	5 380 728		934 210 543	
		5 432 496		941 222 640	(a)
		MMBtu			
LIQUIFIED NATURAL GAS	Roebourne	219 701 000		846 338 551	(a)

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
PETROLEUM		'000 m3			
NATURAL GAS	Ashburton	147 028		10 100 716	(j)
	Carnamah	66 719		7 535 441	(j)
	Irwin	110 543		13 576 054	(j)
	Roebourne	3 444 558		318 045 215	(d)
		3 768 848		349 257 426	
TOTAL PETROLEUM PRODUCTS				2 475 800 362	
SALT	Carnarvon	1 271 680		28 457 630	(e)
	Port Hedland	2 319 823		48 739 998	(a)
	Roebourne	2 568 227		57 767 275	(a)
	Shark Bay	681 988		14 691 650	(a)
	Wyalkatchem	308		24 640	(a)
	Yilgarn	85 172		3 460 301	(a)
		6 927 198		153 141 494	
SILICA - SILICA SAND					
SILICA	Moora	74 171		749 846	(a)
SILICA SAND					
	Canning	152 754		1 680 290	(a)
	Cockburn	240 978		2 574 254	(a) (e)
	Coolgardie	85 133		208 575	(a)
	Swan	81 503		896 533	(a)
	Wanneroo	20 099		129 616	(a)
TOTAL SILICA - SILICA SAND		654 638		6 239 114	
		Ag kg			
SILVER: BY-PRODUCT	Boddington	975.334		139 952	(a) (l)
	Coolgardie	197.801		34 115	(a) (b)
	East Pilbara	207.916		27 379	(a) (l)
	Meekatharra	1 369.442		176 830	(a) (k)
	State-Wide	28 018.078		4 262 551	
	Yalgoo	11 928.138		1 899 914	(a) (l)
		42 896.709		6 540 741	
TALC	Meekatharra	12 690		888 300	
	Three Springs	156 201		10 934 070	
		168 891		11 822 370	(e)

TABLE 4.1 (cont) Mineral	Local Government Area	Quantity tonnes	Metallic Content	Value ($)	Ref
TIN - TANTALUM - LITHIUM			Li_2O Tonnes		
SPODUMENE	Bridegetown-Greenbushes	42 516	2 320	8 893 387	(a)
			Ta_2O_5 kg		
TANTALITE	Bridegetown-Greenbushes	713	180 506	16 714 807	
	East Pilbara	160	73 294	8 290 860	
		873	253 800	25 005 667	(a)
			Sn Tonnes		
TIN	Bridegetown-Greenbushes	273	185.000	1 286 279	(a)
VERMICULITE	Ravensthorpe	225		39 943	(e)
		VALUE OF MINERALS		6 832 296 695	
		VALUE OF PETROLEUM		2 475 800 362	
		VALUE OF GOLD		2 689 922 065	
		TOTAL VALUE		**11 998 019 122**	

TABLE 5.1

QUANTITY AND VALUE OF MINERALS AND PETROLEUM BY MINERAL-FIELD

Mineral	Mineral-field	Quantity tonnes	Metallic Content	Value ($)	Ref
BASE METALS			Cu Tonnes		
COPPER BY-PRODUCT	Coolgardie		5 702.493	5 972 259	
	West Pilbara		42.520	37 778	
			5 745.013	6 010 037	(a) (b)
COPPER CONCENTRATES	Peak Hill	5 334	1 163	2 035 531	
	Pilbara	7 452	1 438	2 269 834	
	South West	5 515	1 630	3 159 977	
	Yalgoo	10 207	2 042	3 965 426	
		28 508	6 273	11 430 768	(a)
TOTAL COPPER			12 018.013	17 440 805	
			Pb Tonnes		
LEAD	West Kimberley	27 721	21 678	7 297 295	(a)
			Zn Tonnes		
ZINC	West Kimberley	106 603	55 673	53 069 723	
	Yalgoo	205 439	87 246	72 509 114	
		312 042	142 919	125 578 837	(a)
TOTAL BASE METALS				150 316 937	
BAUXITE - ALUMINA					
ALUMINA	South West	7 129 199		1 758 150 370	(c)
CLAYS					
ATTAPULGITE	South West	19 329		5 860 557	(a)
CEMENT CLAY	South West	16 741		170 243	(d)
KAOLIN	Greenbushes	3 120		218 131	(d)
WHITE CLAY	South West	22 575		225 745	(d)
TOTAL CLAYS		61 765		6 474 676	
COAL	Collie	5 491 310		243 540 117	(e)
CONSTRUCTION MATERIALS					
AGGREGATE	Dundas	556		2 111	
	East Coolgardie	73 671		460 240	
	Kimberley	7 680		46 080	
	Pilbara	34 977		203 964	
	West Kimberley	4 379		24 110	

TABLE 5.1 (cont) Mineral	Mineral-Field	Quantity tonnes	Metallic Content	Value ($)	Ref
CONSTRUCTION MATERIALS (ctd)					
AGGREGATE (ctd)	West Pilbara	80		672	
		121 343		737 177	
GRAVEL	Coolgardie	1 880		9 400	
	Gascoyne	100		500	
	Kimberley	500		1 500	
	Pilbara	81 000		405 000	
	South West	36 646		203 053	
	West Kimberley	590		1 010	
		120 716		620 463	
ROCK	Ashburton	8 103		46 044	
	Gascoyne	60		300	
	Pilbara	98 820		73 200	
	West Kimberley	16 557		180 330	
	West Pilbara	21 077		239 034	
		144 617		538 908	
SAND	Ashburton	4 192		22 202	
	Coolgardie	61 285		309 525	
	East Murchison	11 986		71 916	
	Kimberley	70		420	
	Mt Margaret	2 651		15 906	
	Peak Hill	34 228		205 368	
	Pilbara	44 782		222 482	
	Roebourne	420 862		2 104 310	
	South West	438 989		2 714 803	
	West Kimberley	143		1 024	
	West Pilbara	12 421		84 113	
		1 031 609		5 752 069	
TOTAL CONSTRUCTION MATERIALS		1 418 285		7 648 617	(d)
		Carats			
DIAMOND	Kimberley	47 485 294		564 768 721	(a)
DIATOMITE	South West	169		1 300	(d)

TABLE 5.1 (cont) Mineral	Mineral-Field	Quantity tonnes	Metallic Content	Value ($)	Ref
DIMENSION STONE					
BLACK GRANITE	Dundas	138		48 300	
	West Kimberley	5 549		1 884 144	
		5 687		1 932 444	(d)
QUARTZ ROCK	South West	295		13 258	(d)
SPONGOLITE	South West	376		26 836	(e)
TOTAL DIMENSION STONE		6 358		1 972 538	
GEM SEMI-PRECIOUS AND ORNAMENTAL STONE		kg			
AMETHYST	Gascoyne	17 659		127 910	
CHRYSOPRASE	Mt Margaret	18 555		342 249	
JASPER	Peak Hill	8 844		7 499	
TOTAL GEM, SEMI-PRECIOUS AND ORNAMENTAL STONE				477 658	(e)
			Au kg		
GOLD	Ashburton		0.488	7 211	
	Broad Arrow		13 876.991	205 050 742	
	Coolgardie		14 371.786	212 361 987	
	Dundas		1 729.128	25 550 134	
	East Coolgardie		28 771.427	425 135 568	
	East Murchison		17 608.399	260 187 189	
	Meekatharra		6 444.612	95 227 594	
	Mt Margaret		23 523.397	347 589 042	
	Murchison		16 929.829	250 160 427	
	North Coolgardie		431.672	6 378 520	
	North East Coolgardie		2 142.768	31 662 207	
	Peak Hill		10 626.916	157 026 621	
	Pilbara		11 854.553	175 166 568	
	South West		16 937.460	250 273 185	
	West Pilbara		19.260	284 592	
	Wiluna		1 316.212	19 448 758	
	Yalgoo		2 148.477	31 746 565	
	Yilgarn		13 309.489	196 665 155	
			182 042.864	2 689 922 065	
GYPSUM					
	Dundas	2 846		16 507	(e)
	Phillips River	2 750		16 500	(e)
	South West	71 964		862 433	(d) (e)

TABLE 5.1 (cont) Mineral	Mineral-Field	Quantity tonnes	Metallic Content	Value ($)	Ref
GYPSUM (ctd)	Yilgarn	24 262		145 572	(e)
		101 822		1 041 012	
HEAVY MINERAL SANDS					
GARNET SAND	South West	35 993		3 385 985	(e) (g)
ILMENITE	South West	974 801		83 153 556	
UPGRADED ILMENITE	South West	305 118		153 117 864	
TOTAL ILMENITE		1 279 919		236 271 420	(a)
			TiO_2 Tonnes		
LEUCOXENE	South West	11 782	10 721	6 517 864	(a)
			ThO_2 Units		
MONAZITE	South West	7 372	47 918	2 131 269	(a)
			TiO_2 Tonnes		
RUTILE	South West	47 466	45 359	26 878 559	(a)
			ZrO_2 Tonnes		
ZIRCON	South West	226 930	148 354	61 114 152	(a)
TOTAL HEAVY MINERAL SANDS				336 299 249	
INDUSTRIAL PEGMATITE MINERALS					
FELSPAR	Pilbara	11 591		523 344	
	South West	11 202		534 556	
		22 793		1 057 900	
MICA					
Commercial Minerals Ltd	Pilbara	164		6 483	
TOTAL INDUSTRIAL PEGMATITE MINERALS				1 064 383	(h)
IRON ORE			Fe%		
DOMESTIC ORE	Peak Hill	2 857 872	63.37	79 876 169	
	Pilbara	528 526	63.20	15 161 102	
	West Kimberley	1 260 392	64.70	34 293 499	
	West Pilbara	1 150 780	60.04	28 333 177	
		5 797 570		157 663 947	
			Fe%		
EXPORTED ORE	Peak Hill	33 526 572	63.67	967 961 301	
	Pilbara	5 333 989	61.56	137 884 526	
	West Kimberley	2 173 396	63.92	52 765 361	
	West Pilbara	64 233 859	61.05	1 625 234 452	
		105 267 816		2 783 845 640	
TOTAL IRON ORE		111 065 386		2 941 509 587	(a)

TABLE 5.1 (cont) Mineral	Mineral-Field	Quantity tonnes	Metallic Content	Value ($)	Ref
LIMESAND - LIMESTONE-DOLOMITE					
DOLOMITE	Yilgarn	280		1 120	
LIMESAND - LIMESTONE					
	South West	1 971 609		11 461 842	
	Warburton	81 184		679 472	
	West Pilbara	446		2 230	
TOTAL LIMESAND-LIMESTONE		2 053 519		12 144 664	(d)
			Mn%		
MANGANESE ORE	Pilbara	395 303	45.94	71 855 982	(a)
NICKEL INDUSTRY			Co Tonnes		
COBALT BY-PRODUCT	Coolgardie		633.497	28 776 215	
	West Pilbara		0.498	32 329	
			633.995	28 808 544	(a) (b)
			Ni %		
NICKEL CONCENTRATES	Coolgardie	221 897	10.71	230 816 226	
	East Coolgardie	39 159	11.38	43 137 036	
	East Murchison	211 071	10.27	209 630 276	
	Mt Margaret	3 401	8.35	2 979 887	
		475 528		486 563 425	
NICKEL MATTE	West Pilbara	221	22.83	464 942	
NICKEL ORE	Coolgardie	2 892	6.33	1 767 117	
	East Murchison	2 318	6.38	1 368 276	
		5 210		3 135 393	
TOTAL NICKEL PRODUCTION				490 163 760	(i)
			Pd kg		
PALLADIUM BY-PRODUCT	Coolgardie		554.509	1 386 855	(a) (b)
			Pt kg		
PLATINUM BY-PRODUCT	Coolgardie		125.637	1 646 045	(a) (b)
PEAT	South West	762		56 685	(d)
PETROLEUM	Basin	Kilolitres			
CONDENSATE	Carnarvon	1 994 916		338 816 517	(d)
	Perth	1 792		165 228	(a) (d)
		1 996 708		338 981 745	

TABLE 5.1 (cont)		Quantity	Metallic		
Mineral	Mineral-Field	tonnes	Content	Value ($)	Ref
PETROLEUM	Basin				
CRUDE OIL	Canning	19 227		2 690 616	
	Carnarvon	5 380 728		934 210 543	
	Perth	32 541		4 321 481	
		5 432 496		941 222 640	(a)
	Basin	MMBtu			
LIQUIFIED NATURAL GAS	Carnarvon	219 701 000		846 338 551	(a)
	Basin	'000 m3			
NATURAL GAS	Carnarvon	3 591 586		328 145 931	(d)
	Perth	177 262		21 111 495	(j)
		3 768 848		349 257 426	
TOTAL PETROLEUM PRODUCTS				2 475 800 362	
SALT	Gascoyne	1 953 668		43 149 280	(a)
	Pilbara	2 319 823		48 739 998	(a)
	South West	308		24 640	(e)
	West Pilbara	2 568 227		57 767 275	(a)
	Yilgarn	85 172		3 460 301	(a)
		6 927 198		153 141 494	
SILICA - SILICA SAND					
SILICA	South West	74 171		749 846	(a)
SILICA SAND	Coolgardie	85 133		208 575	(a)
	South West	495 334		5 280 693	(a) (e)
TOTAL SILICA - SILICA SAND		654 638		6 239 114	
		Ag kg			
SILVER: BY-PRODUCT	Coolgardie	197.801		34 115	(a) (b)
	Peak Hill	1 369.442		176 830	(a) (k)
	Pilbara	207.916		27 379	(a) (l)
	South West	975.334		139 952	(a) (l)
	State-Wide	28 018.078		4 262 551	
	Yalgoo	11 928.138		1 899 914	(a) (l)
		42 696.709		6 540 741	
TALC	Peak Hill	12 690		888 300	
	South West	156 201		10 934 070	
		168 891		11 822 370	(e)

TABLE 5.1 (cont)		Quantity	Metallic		
Mineral	Mineral-Field	tonnes	Content	Value ($)	Ref
TIN - TANTALUM - LITHIUM			Li_2O Tonnes		
SPODUMENE	Greenbushes	42 516	2 320	8 893 387	(a)
			Ta_2O_5 kg		
TANTALITE	Greenbushes	713	180 506	16 714 807	
	Pilbara	160	73 294	8 290 860	
		873	253 800	25 005 667	(a)
TIN			Sn Tonnes		
Greenbushes Ltd	Greenbushes	273	185.000	1 286 279	(a)
VERMICULITE	Phillips River	225		39 943	(e)
		VALUE OF MINERALS		6 832 296 695	
		VALUE OF PETROLEUM		2 475 800 362	
		VALUE OF GOLD		2 689 922 065	
		TOTAL VALUE		**11 998 019 122**	

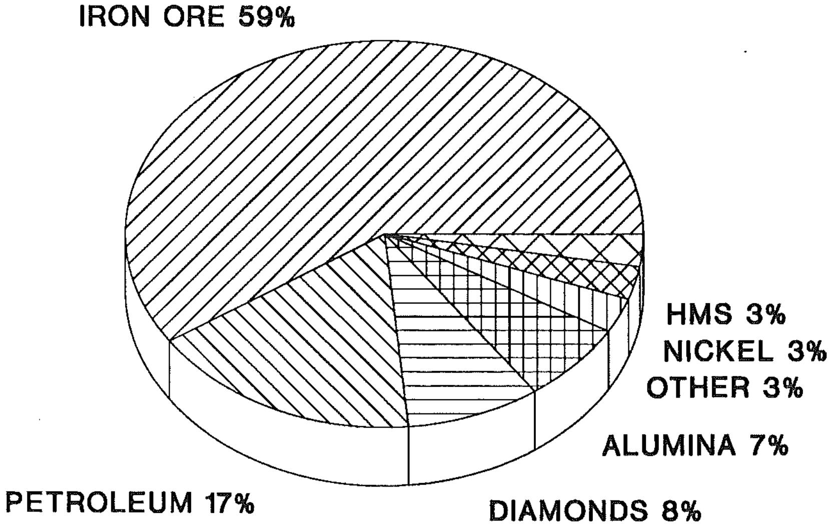
TABLE 6.1 **ROYALTY RECEIPTS 1990-91, 1991-92**

Mineral	1990-91 $A	**1991-92 $A**	Value $A Variance	%up (%down)
BARYTES	50 330.15	**0.00**	(50 330.15)	(100)
BASE METALS				
Copper	1 490 425.64	**697 081.32**	(793 344.32)	(53)
Lead	334 491.55	**255 500.19**	(78 991.36)	(24)
Zinc	3 307 359.63	**5 020 467.96**	1 713 108.33	52
TOTAL BASE METALS	5 132 276.82	**5 973 049.47**	840 772.65	16
BAUXITE-ALUMINA				
Alumina	33 777 840.23	**29 315 958.26**	(4 461 881.97)	(13)
CLAYS	380 489.93	**269 193.35**	(111 296.58)	(29)
COAL	5 236 321.85	**8 560 139.80**	3 323 817.95	63
CONSTRUCTION MATERIALS				
Aggregate	23 274.30	**11 238.80**	(12 035.50)	(52)
Gravel	9 741.60	**34 080.42**	24 338.82	250
Rock	19 251.12	**40 737.09**	21 485.97	112
Sand	156 610.73	**329 922.91**	173 312.18	111
Sandstone	0.00	**58.00**	58.00	n.ap.
TOTAL CONSTRUCTION MATERIALS	208 877.75	**416 037.22**	207 159.47	99
DIAMOND	27 289 552.17	**30 985 305.96**	3 695 753.79	14
DIMENSION STONE	1 381.15	**21 949.43**	20 568.28	1 489
GEM SEMI-PRECIOUS & ORNAMENTAL STONE	1 103.73	**21 360.03**	20 256.30	1 835
GOLD	291 690.92	**204 375.08**	(87 315.84)	(30)
GYPSUM	26 911.03	**30 657.62**	3 746.59	14
HEAVY MINERAL SANDS				
Garnet	102 079.57	**157 601.51**	55 521.94	54
Ilmenite	4 370 511.40	**4 736 252.73**	365 741.33	8
Leucoxene	555 141.31	**226 390.50**	(328 750.81)	(59)
Monazite	302 211.02	**138 056.77**	(164 154.25)	(54)
Rutile	3 140 086.21	**1 295 023.91**	(1 845 062.30)	(59)
Zircon	5 366 172.39	**3 788 578.53**	(1 577 593.86)	(29)
TOTAL HEAVY MINERAL SANDS	13 836 201.90	**10 341 903.95**	(3 494 297.95)	(25)
INDUSTRIAL PEGMATITE MINERALS				
Felspar	67 753.29	**20 826.50**	(46 926.79)	(69)
Mica	6 318.09	**324.00**	(5 994.09)	(95)
TOTAL INDUSTRIAL PEGMATITE MINERALS	74 071.38	**21 150.50**	(52 920.88)	(71)

TABLE 6.1 (cont) Mineral	1990-91 $A	**1991-92 $A**	Value $A Variance	%up (%down)
IRON ORE	130 935 140.94	**152 880 227.56**	21 945 086.62	17
LIMESAND-LIMESTONE-DOLOMITE				
Dolomite	0.00	**84.00**	84.00	n.ap.
Limesand-Limestone	102 706.75	**144 700.81**	41 994.06	41
TOTAL LIMESAND-LIMESTONE-DOLOMITE	102 706.75	**144 784.81**	42 078.06	41
MANGANESE	939 488.38	**5 089 927.45**	4 150 439.07	442
NICKEL				
Cobalt by-product	79 982.92	**480 605.24**	400 622.32	501
Nickel	10 597 322.76	**10 589 461.24**	(7 861.52)	0
Palladium by-product	23 422.80	**26 113.95**	2 691.15	11
Platinum by-product	23 302.38	**35 560.33**	12 257.95	53
TOTAL NICKEL INDUSTRY	10 724 030.86	**11 131 740.76**	407 709.90	4
PEAT	958.62	**1 623.78**	665.16	69
PETROLEUM				
Condensate	2 970 781.49	**2 879 224.65**	(91 556.84)	(3)
LNG	6 511 739.42	**7 144 851.72**	633 112.30	10
Natural gas	5 635 165.38	**4 944 107.97**	(691 057.41)	(12)
Oil	77 309 419.92	**71 552 596.06**	(5 756 823.86)	(7)
TOTAL PETROLEUM	92 427 106.21	**86 520 780.40**	(5 906 325.81)	(6)
PIGMENTS				
Red Iron Oxide	5 526.55	**0.00**	(5 526.55)	(100)
RARE EARTHS				
Gallium	116 950.60	**0.00**	(116 950.60)	(100)
SALT	1 301 673.64	**1 410 094.74**	108 421.10	8
SILICA SAND	389 453.08	**358 707.05**	(30 746.03)	(8)
SILVER	115 630.15	**154 896.97**	39 266.82	34
TALC	87 917.00	**84 649.50**	(3 267.50)	(4)
TIN-TANTALUM-LITHIUM				
Spodumene	356 225.05	**416 760.90**	60 535.85	17
Tantalite	569 877.68	**491 352.52**	(78 525.16)	(14)
Tin	30 711.54	**31 771.14**	1 059.60	3
TOTAL TIN-TANTALUM-LITHIUM	956 814.27	939 **884.56**	(16 929.71)	(2)
VERMICULITE	1 246.69	**2 206.38**	959.69	77
TOTAL ROYALTIES	324 411 692.75	**344 880 604.63**	20 468 911.88	6

COMPARATIVE ROYALTY RECEIPTS

1986-87 ROYALTY RECEIPTS
TOTAL : $156.3 MILLION



1991-92 ROYALTY RECEIPTS
TOTAL : $344.9 MILLION

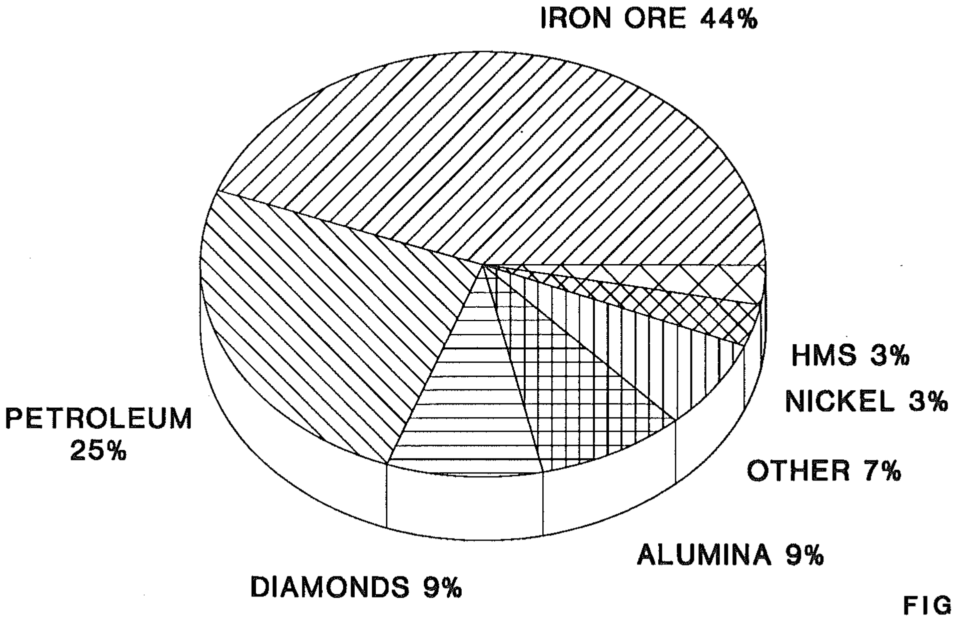


FIGURE 6.1

7.1 Employment in the Minerals and Petroleum Industries

The Western Australian minerals and petroleum industry registered another moderate decrease in employment during 1991-92.

Statistics compiled from industry returns revealed a six percent aggregate contraction in employment to 30 June 1992. A total of 34 840 people were employed in exploration, development and production as of that date. This represented a sharp fall on 1991 total of 36 830.

While there was some moderate increases in employment associated with project construction, the petroleum industry being the major contributor, most sectors reported a reduction in total numbers.

The petroleum industry was the one area in which employment growth was measured in exploration, field development and in production. As activity is increasing in the medium term employment opportunities can be expected to improve even further.

There was some marginal shedding of jobs in the iron ore industry, mainly attributable to the maturing of the sector and productivity driven restructuring. The commencement of the Marandoo project, and several other smaller expansions, will provide some jobs growth but without large new projects employment in the industry will gradually contract.

The gold and heavy mineral sands sectors, both traditionally large employers, have scaled down permanent positions during the past year. It is predicted that gold exploration and mining opportunities will be reduced even further as the sector continues to radically restructure.

The number and range jobs available in the heavy mineral sands industry is expected to increase in the medium term with an expected upturn in activity and an associated move to more downstream processing.

The bauxite-alumina and nickel industries, both hard hit by market contractions during the trading period, reduced employee numbers slightly. Planned and progressing capacity expansions for these sectors, and any significant improvement in market sentiments, should see a rapid increase in employment growth.

Due increasingly to the notion of corporate responsibility, investment in skills development and level of specialisation, most employers are reluctant to retrench staff, even during periods of severe downturn. The circumstances of the current recession, while difficult, are not expected to result in any profound longer term dislocation of employment opportunities in the State's minerals and petroleum industry.

TABLE 7.1

NUMBER OF PERSONS EMPLOYED IN THE WESTERN AUSTRALIAN MINERALS & PETROLEUM INDUSTRIES AS AT JUNE 30, 1992

MINERAL/Company	LOCATION	1990-91	1991-92
BASE METALS			
BHP Minerals Ltd	Cadjebut	162	140
Murchison Zinc Co. Pty Ltd	Golden Grove	277	345
TOTAL BASE METALS		**439**	**485**
BAUXITE - ALUMINA			
Alcoa of Australia Ltd	Del Park-Huntley/Pinjarra	2 220	1 885
	Jarrahdale/Kwinana	1 748	1 632
	Wagerup/Willow Dale	911	585
Australian Fused Materials Pty Ltd	East Rockingham	-	25
Worsley Alumina Pty Ltd	Boddington/Worsley	1 198	1 057
TOTAL BAUXITE - ALUMINA		**6 077**	**5 184**
COAL			
Griffin Coal Mining Co. Ltd	Collie	551	479
Western Collieries Ltd	Collie	734	673
TOTAL COAL		**1 285**	**1 152**
DIAMOND			
Argyle Diamond Mines Pty Ltd	Lake Argyle	694	887
Poseidon Ltd	Bow River	102	106
TOTAL DIAMOND		**796**	**993**
GOLD			
Arimco NL	Gidgee	140	132
	Mt McLure	-	108
Asarco Australia Ltd	Wiluna	151	194
Ashton Gold	Cork Tree Well	149	115
Australian Mine Management Pty Ltd	Mt Pleasant	106	107
	Racetrack/Royal Standard	36	-
Aztec Mining Co Ltd	Bounty	143	191
Big Bell Mines Pty Ltd	Big Bell	208	194
Broken Hill Metals NL	Hopes Hill	95	104
Central Norseman Gold Corp. NL	Central Norseman	197	207
Coolgardie Gold NL	Greenfield	123	120
Dominion Mining Ltd	Bannockburn	-	112
	Labourchere/Nathans	80	89
	Meekatharra	260	243
	Mt Morgans	174	190
	Tower Hill	89	-
Eastmet Ltd	Youanmi	113	84

TABLE 7.1 (cont)

MINERAL/Company	**LOCATION**	**1990-91**	**1991-92**
GOLD (cont)			
Goldfan Ltd	Three Mile Hill	86	187
Hampton Australia Ltd	Jubilee	89	103
Harbour Lights Mining	Leonora	67	108
	Mertondale	51	-
	Nambi	-	33
Hedges Gold Pty Ltd	Hedges	124	122
Hill 50 Gold Mine NL	Mt Magnet	318	298
Kalgoorlie Consolidated Gold Mines Pty Ltd	Kalgoorlie	1 446	1 389
Metana Minerals	Reedy	118	177
Mt Gibson Management Pty Ltd	Lawlers	87	107
	Mt Gibson	134	110
Newcrest Mining Ltd	Gimlet South	151	170
	New Celebration	382	479
	Telfer	740	643
	Tuckabianna	111	135
Pancontinental Pty Ltd	Kundana	80	70
	Paddington	176	229
Placer Pacific Pty Ltd	Granny Smith	193	213
Plutonic Operations Ltd	Plutonic	126	130
Poseidon Ltd	Kaltails	136	99
	Karonie	61	40
Resolute Resources Ltd	Marymia	-	113
Reynolds Yilgarn Gold Operations Ltd	Yilgarn	204	195
Sons of Gwalia NL	Sons of Gwalia	121	117
Spargos Mining Pty Ltd	Bellevue	227	198
St. Barbara Mines Ltd	Meekatharra	157	185
Sundowner Minerals NL	Darlot	107	122
Western Mining Corporation Ltd	Emu	122	120
	Kambalda	232	253
	Lancefield	137	130
Worsley Alumina Pty Ltd	Boddington	405	392
All Other Operators		2 034(r)	2 023
TOTAL GOLD		**10 486**	**10 173**
HEAVY MINERAL SANDS			
Cable Sands Pty Ltd	Capel	185	208
ISK Minerals Pty Ltd	Picton	66	59
RGC Mineral Sands Pty Ltd	Capel	178	211
	Eneabba	107	280
	Narngulu	450	264
TiWest Pty Ltd	Cataby/Chandala	303	242
Westralian Sands Ltd	Capel	434	365
All Other Operators		35(r)	38
TOTAL HEAVY MINERAL SANDS		**1 758(r)**	**1 667**

TABLE 7.1 (cont)

MINERAL/Company	LOCATION	1990-91	1991-92
IRON ORE			
BHP Iron Ore (Goldsworthy) Ltd	Pilbara/Port Hedland	1 001	739
BHP Iron Ore Ltd	Newman/Port Hedland	3 521	3 487
	Yandicoogina	230	81
BHP Minerals Ltd	Yampi	341	269
Hamersley Iron Pty Ltd	Tom Price - Paraburdoo/Dampier/Channar	3 206	3 295
Portman Mining Ltd	Ferro Gully	47	52
Robe River Mining Co. Pty Ltd	Pannawonica/Cape Lambert	897	769
TOTAL IRON ORE		**9 243**	**8 692**
NICKEL			
Agip Australia Pty Ltd	Radio Hill	153	-
Outokumpu Australia Ltd	Forrestania	-	71
Western Mining Corporation Ltd	Kalgoorlie	381	387
	Blair/Kambalda	1 617	1 363
	Kwinana Refinery	299	343
	Leinster	538	751
	Mt Windarra	249	139
All Other Operators		13	10
TOTAL NICKEL		**3 250**	**2 922**
PETROLEUM PRODUCTS			
Hadson Energy Pty Ltd	Harriet/Rosette	130	130
West Australian Petroleum Pty Ltd	Dongara	8	9
	North West Area	229	223
Western Mining Corporation Ltd	North Herald/South Pepper/Chervil	108	110
Woodside Offshore Petroleum Pty Ltd	North Rankin A/Burrup Peninsula	1 550	1661
All Other Operators		23	21
TOTAL PETROLEUM PRODUCTS		**2 048**	**2 154**
SALT			
Dampier Salt Ltd	Dampier	183	167
	Lake MacLeod	120	115
Leslie Salt Co.	Port Hedland	121	129
Shark Bay Salt JV	Useless Loop	79	71
Other		5	6
TOTAL SALT		**503**	**488**
ALL OTHER MATERIALS			
(including Rock Quarries)		**945**	**930**
TOTAL		**36 830**	**34 840**

(SOURCE: AXTAT REPORTING SYSTEM, MINING ENGINEERING DIVISION)

8.1 PRINCIPAL MINERAL & PETROLEUM PRODUCERS 1991-92, address, telephone number: minesite.

BASE METALS

Copper

Murchison Zinc Co. Pty Ltd, C/- Normandy Poseidon Ltd, 8 Kings Park Rd, West Perth 6005, (09) 480 3232: Golden Grove.

Newcrest Mining Ltd, 600 St Kilda Rd, Melbourne 3004, (03) 522 5333: New Celebration, Telfer.

Western Mining Corp. Ltd, 191 Great Eastern Hwy, Belmont 6104, (09) 479 0711: Kambalda.

Lead - Zinc

BHP Minerals Ltd, 44 Hamersley St, Broome 6725, (091) 92 2006: Cadjebut.

Murchison Zinc Co. Pty Ltd, C/- Normandy Poseidon Ltd, 8 Kings Park Rd, West Perth, 6005, (09) 480 3232: Golden Grove

BAUXITE - ALUMINA

Alumina

Alcoa of Australia (WA) Ltd, PO Box 252, Applecross 6153, (09) 316 5111: Del Park, Jarrahdale, Willowdale.

Worsley Alumina Pty Ltd, PO Box 344, Collie 6225, (097) 34 8311: Boddington.

CLAY

Attapulgite

Mallina Holdings Ltd, 249 Stirling Hwy, Claremont 6010, (09) 384 7077: Lake Nerramyne.

Cement Clay

Boral Resources Ltd, 136 Great Eastern Hwy, South Guildford 6055, (09) 279 0000: Armadale.

Kaolin

Greenbushes Ltd, 16 Parliament Pl, West Perth 6005, (09) 481 1988: Greenbushes.

White Clay

Pilsley Investments Pty Ltd, Military Rd, Midland 6056, (09) 250 2111: Middle Swan

COAL

Griffin Coal Mining Co. Ltd, 28 The Esplanade, Perth 6000, (09) 325 8155: Collie

Western Colleries Ltd, 40 The Esplanade, Perth 6000, (09) 327 4511: Collie.

CONSTRUCTION MATERIALS

Aggregate

The Readymix Group (WA), 75 Canning Hwy, Victoria Park 6100, (09) 472 2000: Boodarrie, Boulder, Oscar Range.

8.1 PRINCIPAL MINERAL & PETROLEUM PRODUCERS 1991-92, address, telephone number: minesite.

CONSTRUCTION MATERIALS (cont)

Gravel

Leslie Salt Company (Inc), 225 St Georges Tce, Perth 6000, (09) 321 1668: Port Hedland.

Vinci and Sons Pty Ltd, Lot 3 Pickering Brook Rd, Pickering Brook 6076, (09) 293 8295: Pickering Brook.

Rock

County B.S., C/- Specified Services, 123 Burswood Rd, Victoria Park 6100, (09) 362 1100: Yeeda Station.

Specified Services Pty Ltd, 123 Burswood Rd, Victoria Park 6100, (09) 362 1100: Learmonth, Mt Regal.

Sand

Amatek Ltd, 1 Newburn Rd, Kewdale 6104, (09) 353 3030: Gnangarra, Jandakot.

B & J Catalano Pty Ltd, Southwest Hwy, Brunswick Junction 6224, (097) 26 1247: Wellington.

Quinton Pty Ltd, Lot 117 Cnr Great Eastern Hwy Coolgardie Rd, Kalgoorlie 6430, (090) 213 961: Coolgardie.

The Readymix Group (WA), 75 Canning Hwy, Victoria Park 6100, (09) 472 2000: Boodarrie Station, Christmas Creek, Comet Vale, Karratha, Newman, Rocklea, Sullivan's Creek, Turner River, Warrawanda Creek, Widgiemooltha.

Tuma Holdings Pty Ltd, 42 Noel Rd, Gooseberry Hill 6076, (09) 293 3948: Chidlow.

DIAMOND

Argyle Diamond Mines, 2 Kings Park Rd, West Perth 6005, (09) 482 1188: Argyle.

Poseidon Bow River Diamond Mines Ltd, 100 Hutt St, Adelaide, S.A., (08) 236 1700: Bow River.

DIMENSION STONE

Black Granite

City West Holdings Ltd, C/- 102 Railway Pde, West Perth 6005, (09) 481 5760: Lennard.

De Biasi D, P.O Box 351, Broome 6725, (091) 935 562: Lennard.

Fraser Range Granite NL, 164 Burswood Rd, Victoria Park 6100, (09) 4704487: Mt Malcom.

Quartz rock

Commercial Minerals Ltd, 26 Tomlinson Rd, Welshpool 6106, (09) 362 1411: Mukinbudin.

Spongolite

Woodbridge Investments Pty Ltd, PO Box 591, South Perth 6151: Mt Barker

GEM, SEMI-PRECIOUS & ORNAMENTAL STONE

Amethyst

Soklich F, Lot 326 Dale Pl, Orange Grove 6109, (09) 459 1449: Gascoyne.

Chrysoprase

Aplo Pty Ltd, 132 Broome St, Cottesloe 6011, (09) 383 2551: Marshall Creek.

WA Gem Explorers, 326 Hay St, Perth 6000, (09) 325 4988: Boyce Creek.

8.1 PRINCIPAL MINERAL & PETROLEUM PRODUCERS 1991-92, address, telephone number: minesite.

GOLD

Arimco NL, 20 Berry St, North Sydney NSW 2060 (02) 955 1722: Gidgee.

Asarco Australia Ltd, 15 Altona St West Perth 6005, (09) 481 2050: Wiluna.

Ashton Mining Ltd, 441 St Kilda Rd, Melbourne Vic 3004, (03) 867 5500: Bardoc - Davyhurst, Harbour Lights, Laverton.

Aztec Mining Company Ltd, 99 Shepperton Rd, Victoria Park 6100, (09) 470 1444: Bounty.

Bellevue Project, C/- Forsayth NL, 221 St Georges Tce, Perth 6000, (09) 322 7211: Bellevue:

Big Bell Mines Ltd, PO Box 2135, Geraldton 6530, (099) 63 1144: Big Bell.

Broken Hill Metals Ltd, 28 The Esplanade, Perth 6000, (09) 324 1370: Hopes Hill-Corinthian.

Burmine Ltd, Copperhead Mine, Bullfinch 6484, (090) 49 5066: Copperhead.

Centaur Mining and Exploration Ltd, 47 Collins St, West Perth 6005, (09) 481 5870: Davyhurst Lady Bountiful Extended.

Central Kalgoorlie Gold Mines NL, 49 Stirling Hwy, Nedlands 6009, (09) 381 1311: Bullabulling.

Central Norseman Gold Corp. NL, PO Box 56, Norseman 6443, (090) 39 1101: Central Norseman.

Consolidated Exploration Ltd, 47 Colin St, West Perth 6005,(09) 481 5870: Davyhurst, Lady Bountiful.

Coolgardie Gold NL, 56b Bayley St, Coolgardie 6429, (090) 26 6132: Bayley's Reward.

Dominion Mining Ltd, 10 Richardson St, West Perth 6005, (09) 426 6400: Bannockburn, Gabanintha, Labouchere, Meekatharra, Mt Morgans, Redcastle, Tower Hill.

Eltin Minerals Pty Ltd, PMB 31, Kalgoorlie 6430, (090) 21 4844: Norris.

Eon Metals NL, C/- Jeffrey Herbert (Official Receiver & Manager) Arthur Anderson, 225 St Georges Tce, Perth 6000, (09) 483 2222: Matilda

Forsayth Pty Ltd, 221 St George's Tce, Perth 6000, (09) 322 7211: Cox's, Lawlers, McCafferys.

Golden Kilometre Mines JV, 4/100 Hay St, Subiaco 6008, (09) 382 3300: Mt Pleasant, Lady Bountiful South, Racetrack/Royal Standard.

Golden Valley Mines NL, 174 Hampden Rd, Nedlands 6009, (09) 389 1999: Frasers.

Hampton Australia Ltd, C/- Poseidon Gold Ltd, 8 Kings Park Rd, West Perth 6005, (09) 480 3232: Jubilee.

Hannans Gold Ltd, 49 Stirling Hwy, Nedlands 6009, (09) 389 1311: Comet - Pinnacles.

Hedges Gold Pty Ltd, Cnr Davy and Marmion Sts, Booragoon 6153, (09) 364 0111: Hedges.

Herald Resources Ltd, 45 Richardson St, West Perth 6005, (09) 322 2788: Sandstone, Tindals, Three Mile Hill.

Hill 50 Gold Mine NL, PO Box 83, Mt Magnet 6638, (09) 63 4104: Mt Magnet.

Homestake Gold of Australia Ltd, 191 Fullarton Rd, Dulwich SA 5065, (08) 332 7811: Fortnum.

Kalgoorlie Consolidated Gold Mines Pty Ltd, Fimiston, Kalgoorlie 6430, (090) 22 1100: Super Pit, Fimiston, Mt Charlotte, Mt Percy.

Kitchener Mining NL, Suite 21, Piccadilly Sq, cnr Short St & Nash St, Perth 6000, (09) 325 4997: Bamboo Creek.

Leader ResourcesNL, 3/18 Kearns Cr, Applecross 6153, (09) 364 9222: Double A-Goanna Patch.

Metana Minerals, 191 Great Eastern Hwy, Belmont 6104, (09) 277 9944: Kurara, Penny West. Reedy, Youanmi.

Mt Edon Gold Mines (Aust) NL, 30 Ledgar Rd, Balcatta 6021, (09) 345 1588: Tarmoola.

Mt Gibson Management Pty Ltd, 28 The Esplanade, Perth 6000, (09) 322 2313: Mt Gibson.

8.1 PRINCIPAL MINERAL & PETROLEUM PRODUCERS 1991-92, address, telephone number: minesite.

GOLD (cont)

Newcrest Mining Ltd, 600 St Kilda Rd, Melbourne 3004, (03) 522 5333: New Celebration, Orban JV, Ora Banda - Gimlet South, Telfer, Tuckabianna.

North Broken Hill - Peko Ltd, 476 St Kilda Rd, Melbourne Vic 3004, (03) 829 0000: Kanowna, Peak Hill.

Orion Resources NL, 42 Ardross St, Applecross 6153, (09) 364 8355: Yilgarn Star.

Pancontinental Gold (0perations) Pty Ltd, PO Box 1161, Kalgoorlie 6430, (090) 24 2000: Kundana, Paddington, .

Placer (Granny Smith) Pty Ltd, PO Box 33, Laverton WA 6440, (090) 31 3111: Granny Smith.

Plutonic Resources Ltd, PMB 46 Meekatharra 6642, (09) 370 8201: Plutonic.

Poseidon Gold Ltd, 8 Kings Park Rd, West Perth 6005, (09) 480 3232: Golden Crown, Kaltails, Karonie.

Ramsgate Resources Ltd, 229 Stirling Highway, Claremont 6010, (09) 383 4321: Mt Monger.

Reynolds Yilgarn Gold Oprerations Ltd, 28 The Esplanade, Perth 6000, (09) 322 2313: Edwards Find, Marvel Loch, Transvaal.

St Barbara Mines Ltd, Gt Northern Highway, Meekatharra 6642, (099) 81 8111: South Junction.

Samantha Gold NL, 28 The Esplanade, Perth 6000, (09) 481 5288: Higginsville.

Sons of Gwalia NL, 16 Parliament Pl, West Perth 6005, (09) 481 1988: Barnicoat, Sons of Gwalia.

Southern Goldfields Ltd, 35 Outram St, West Perth 6005, (09) 321 5115: Burbidge, Nevoria.

Sundowner Minerals NL, 221 St George's Tce, Perth 6000, (09) 322 7211: Darlot.

Western Mining Corp. Ltd, 191 Great Eastern Hwy, Belmont 6104, (09) 479 0711: Emu, Kambalda, Lancefield.

Worsley Alumina Pty Ltd, PO Box 48, Boddington 6390, (098) 83 8260: Boddington.

GYPSUM

H.B. Brady & Co. Pty Ltd, PO Box 42, Bayswater 6053, (09) 279 4422: Lake Brown.

Swan Portland Cement Ltd, Burswood Rd, Rivervale 6103, (09) 361 8822: Lake Hillman.

Westdeen Holdings Pty Ltd, 7 Armstromg Rd, Applecross 6153, (09) 364 4951: Wyalkatchem

HEAVY MINERAL SANDS

Garnet Sand

Target Minerals NL, PO Box 188, Geraldton 6530, (099) 23 3644: Port Gregory.

Ilmenite, Rutile, Zircon, Leucoxene & Monazite

RGC Mineral Sands, 45 Stirling Hwy, Nedlands 6009, (09) 389 1222: Capel, Eneabba North, Eneabba South

Cable Sands (WA) Pty Ltd, PO Box 133, Bunbury 6230, (097) 21 4111: Capel.

ISK Minerals Pty Ltd, PO Picton 6229, (097) 25 4899: Waroona.

TiWest Pty Ltd, 1 Brodie Hall Dve, Bentley 6102, (09) 365 1390: Cooljarloo.

Westralian Sands Ltd, PO Box 96, Capel 6271, (097) 27 2002: Yoganup.

INDUSTRIAL PEGMATITE MINERALS

Felspar

Commercial Minerals Ltd, 26 Tomlinson Rd, Welshpool 6106, (09) 362 1411: Mukinbudin, Pippingarra.

8.1 PRINCIPAL MINERAL & PETROLEUM PRODUCERS 1991-92, address, telephone number: minesite.

INDUSTRIAL PEGMATITE MINERALS (cont)

Mica

Commercial Minerals Ltd, 26 Tomlinson Rd, Welshpool 6106, (09) 362 1411: Pippingarra.

IRON ORE

BHP Iron Ore (Goldsworthy) Ltd, 200 St George's Tce, Perth 6000, (09) 320 4444: Shay Gap.

BHP Iron Ore Ltd, 200 St George's Tce, Perth 6000, (09) 320 4444: McCameys, Newman, Yandi.

BHP Minerals Ltd, P.O Koolan Island 6733, (091) 910 575: Koolan Island.

Channar Mining Pty Ltd, 191 St George's Tce, Perth 6000, (09) 327 2327: Channar.

Hamersley Iron Pty Ltd, 191 St George's Tce, Perth 6000, (09) 327 2327: Tom Price, Paraburdoo, Brockman.

Robe River Iron Associates, 12 St George's Tce, Perth 6000, (09) 421 4747: Pannawonica.

LIMESAND - LIMESTONE

Cockburn Cement Ltd, Russell Rd, South Coogee 6166, (09) 410 1988: Cockburn Sound, Coogee.

Success Restaurant Pty Ltd, 18 Harvest Terrace, West Perth 6005,: Moore River.

Limestone Building Blocks Co. Pty Ltd, 41 Spearwood Ave, Bibra Lake 6163, (09) 418 4440: Nowerup.

Swan Portland Cement Ltd, Burswood Rd, Rivervale 6103, (09) 361 8822: Wanneroo.

Westdeen Holdings Pty Ltd, 7 Armstromg Rd, Applecross 6153, (09) 364 4951: Dandaragan, Gingin, Irwin, Yanchep.

MANGANESE ORE

Portman Mining Ltd, Level 13, 256 Adelaide Tce, Perth 6000, (09) 268 3333: Woodie Woodie.

NICKEL

Western Mining Corp. Ltd, 191 Great Eastern Hwy, Belmont 6104, (09) 478 0711: Blair, Carnilya Hill, Kambalda, Leinster.

PEAT

Peat Resources of Australia Pty Ltd, P.O Box 203, Bentley 6102, (09) 453 3388: Manjimup.

PETROLEUM

Arrow Petroleum Ltd, 99 Shepparton Rd, Victoria Park 6010, (09) 470 0400: Mt Horner

Consolidated Gas Pty Ltd, 174 Hamden Rd, Nedlands 6009, (09) 389 8344: Woodada.

Doral Resources, 31 Ventnor Ave, West Perth 6005, (09) 481 5866: Tubridgi.

Hadson Energy Ltd, 35 Ventnor Ave, West Perth 6005, (09) 481 8555: Harriet

Marathon Petroleum Aust. Ltd, 239 Adelaide Tce, Perth 6000, (09) 325 1988: Talisman.

Petroleum Securities Energy Ltd, C/- Ozco Pty Ltd, 15 Whelk Place, Mullaloo 6025, (09) 307 1345: Blina, Lloyd, Sundown/West Terrace.

Sagasco Holdings Ltd, 60 Hindmarsh Sq, Adelaide SA 5000, (08) 235 3700: Beharra Springs.

8.1 PRINCIPAL MINERAL & PETROLEUM PRODUCERS 1991-92, address, telephone number: minesite.

PETROLEUM (cont)

West Aust. Petroleum Pty Ltd (WAPET), QV1, 250 St Georges Tce, Perth 6000, (09) 263 6000: Barrow Island, Dongara, Saladin.
Western Mining Corp. Ltd, 28 Ventnor Ave, West Perth 6005, (09) 482 2444: Airlie Island.
Woodside Offshore Pet. Pty Ltd, 1 Adelaide Tce, Perth 6000, (09) 224 4111: North Rankin.

SALT

Dampier Salt (Operations) Pty Ltd, 177A St George's Tce, Perth 6000, (09) 327 2299: Dampier, Lake Macleod.
Leslie Salt Company (Inc), 225 St George's Tce, Perth 6000, (09) 325 4888: Port Hedland.
Shark Bay Salt Joint Venture, 22 Mount St, Perth 6000, (09) 322 4811: Useless Loop.
WA Salt Koolyanobbing Pty Ltd, Cockburn Rd, Hamilton Hill 6163, (09) 430 5495: Lake Deborah East.

SILICA - SILICA SAND

Silica

Simoca Operations Pty Ltd, P.O Box 1389 , Bunbury 6230, (097) 912 588: Dalaroo.

Silica Sand

ACI Operations Pty Ltd, 35 Baille Rd, Canning Vale 6155, (09) 455 1111: Lake Gnangara.
Amatek Ltd, 1 Newburn Rd, Kewdale 6104, (09) 353 3030: Jandakot, Gnangara.
Boral Resources WA Ltd, 136-138 Gt Eastern Hwy, South Guildford 6055, (09) 279 0000: Jandakot.
The Readymix Group (WA), 75 Canning Hwy, Victoria Park 6100, (09) 472 2000: Jandakot.
Western Mining Corp. Ltd, 191 Great Eastern Hwy, Belmont 6104, (09) 478 0711: Mt Burgess.

TALC

Western Mining Corp. Ltd, PO Box 116, Three Springs 6519, (099) 54 5047: Three Springs.

TIN - TANTALUM - LITHIUM

Spodumene

Lithium Australia Ltd, 16 Parliament Pl, West Perth 6005, (09) 481 1988: Greenbushes.

Tantalite - Tin

Goldrim Mining Australia Ltd, 317 Hunter St, Newcastle NSW 2300, (049) 29 2433: Wodgina.
Greenbushes Ltd, 16 Parliament Place, West Perth 6005, (09) 481 1988: Greenbushes.
Pan West Tantalum Pty Ltd, Gateway, 1 Macquarie Place, Sydney NSW 2000, (02) 256 2000: Wodgina.

VERMICULITE

Vermiculite Industries Pty Ltd, 15 Spencer St, Jandakot 6164, (09) 417 9900: Young River.