

AUSTRALIANS IN COMPANY

The Broken Hill Proprietary Company Limited in its One Hundredth Year



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AUSTRALIANS IN COMPANY

BHP in its 100th Year

August 1985

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Foreword

by Sir James Balderstone
Chairman

BHP's early history made it inevitable that the company should have a strong national consciousness, something it has retained over a century of progress. Most large enterprises in the early days in Australia had their origins overseas; BHP was formed in Australia by men who regarded themselves (wherever born) as Australians.

Yet from the start, the nature of BHP's business also made it inevitable that the people involved should have an orientation towards markets and affairs in the larger world outside. Well before the last turn of century BHP products were being sold in Europe and Asia. Even from its earliest days the company looked to highly skilled and experienced men from America and Europe to help set new standards in technology and management in this country.

More recently, BHP's ventures overseas in search of both outlets for investment and sources of funds have been in part deliberate diversification, and in part a recognition that the Australian economy just does not offer sufficient scope on the scale and within the range required. Without any sense of turning away from the country in which the company has so large a stake, and without losing that characteristic national identity, it seems likely that offshore growth will continue.

While BHP has not always been Australia's largest corporation (it only became so after the second world war) the idea of size has been linked with the company's name from the time of the Big Mine. It has become a part of the company's tradition that concerns over size as such should not be allowed to bar planning for future growth.

In style, people have said of the company that it is conservative rather than radical, functional rather than flamboyant, marked by a certain self-reliance and apt to see virtue in consistency. Such descriptions may well be justified.

Nevertheless it has to be noted that, once again from earliest days, BHP people have shown an innovative flair. From first discoveries in treatment of ores through to today's high-technology developments, original concepts fostered within the group have found world-wide application. Few processes in the company's use are not improved along the way. This stems from the pursuit of excellence as a management objective, and will certainly continue.

Note also that BHP has changed the direction of its major investments quite significantly four times in its first century. . . first, from base metal mining into steelmaking; then integrating backwards into steel's raw materials; then finding substantial success in petroleum exploration; then taking a bold step forward on the world stage with the acquisition of two large international resource companies. Each of these changes resulted in major impacts on the national economy. With the broadening of the group's horizons, the latest stage of the company's development has begun, and it is quite likely that there will be further changes along the way.

BHP has always had an evident technical bias, although with a board composition more generalist than might

be expected. Today and for the years immediately ahead the company sees its mission as achieving profitable growth servicing diverse markets as a competitive international producer and supplier of resource-related products and services, while growing in other areas by making use of the expertise drawn from its existing businesses.

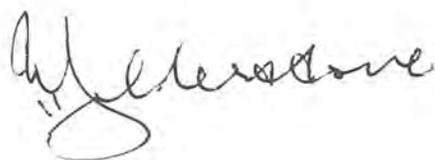
So you have BHP in its hundredth year: a corporate group with large-scale and diversified activities throughout Australia and in several other countries. Its formal objectives are simple and direct –

- to be responsive to customers' needs and to be their preferred supplier;*
 - to achieve the highest possible levels of productivity, quality and profitability;*
 - to provide employees with consistent satisfaction as they fulfil their daily assignments;*
 - to be a responsible corporate citizen –*
- and thereby to promote the financial interests of the company's shareholders.*

Such are the aims of a company with substantial achievements behind it and with more – perhaps many more – in prospect. I believe that those basic ideas will serve well in guiding BHP into its next hundred years.

I write this foreword in all humility, because it is only by accident of birth date and fate that I became chairman of the company in 1984 and hold that office in the centenary year. It is indeed a great honour.

It falls to me therefore to pay sincere tribute to the fifteen distinguished chairmen who preceded me, to the 52 other directors who have served or are serving on the board, and to the many thousands of men and women who have otherwise contributed in so many capacities and brought the company through its first century so well. While some of their names are recorded in this book, most by far are not, but there is no one person who has made the company the success described in these pages. . . there are a great many indeed, Australians in company.



James Balderstone

*Melbourne
August 1985*





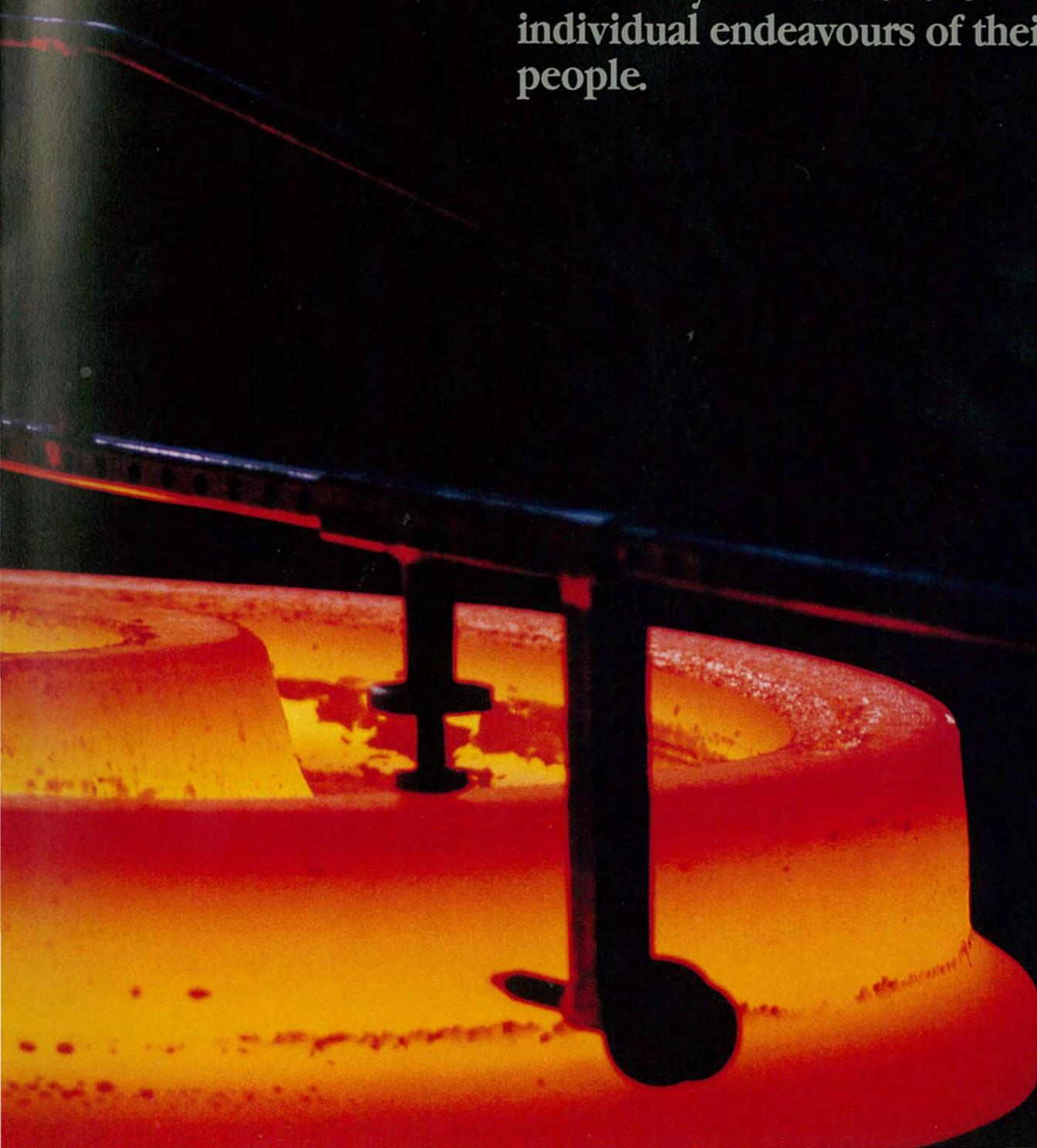
Time Present:
**Pictures of
Achievement.**

Corporations, after all, are companies of people, not of things.

Corporate achievements are merely the sum of the individual endeavours of their people.

Nor should the endeavours of the thousands of men and women involved in such as the BHP group be seen only in a workplace.

The first pictures of achievement in this book acknowledge that John Donne's words of 350 years ago, '*No man is an island*', were never more true than in today's society.











Think of people, every one person with aspirations active or contemplative, simple or profound. Think of John Phillips, Sydney-based Rheem manager, tilting his ASW 15B fibreglass craft across the Australian Alps (previous pages) while 14-year-old Deanne Thirlwell, daughter of a Port Kembla manager, gallops her Arab mare Gipsy across an Illawarra field. Down at the outer harbour, Jimmy Gorgievski and Rob Rakiposki, whose parents work at the steelplant, consider the space of days.



Think of the opportunities offering in today's environment. Kelvin Smith soars over Redhead Beach at Newcastle, a skill he shares with his father Kevin, a steelworks foreman, while out at Nobby's you catch the poised moment in the curl of a Pacific wave.







Think of the creative possibilities of life. Larry Durila, a painter when not working on the Grootte Eylandt mine, mixes his traditional colours while 7-year-old Victoria Grundy (her father is an A&S man) concentrates on the lesson from Beverley Rowles.



Think of the fellowship that enriches life. At Moranbah, pony club and golf course are but two of the many settings for the outdoor days of the miners and their families.



Think of the great community of people linked to BHP's success and you understand much of how it became possible.





BHP

now entering its second century, is a resources and manufacturing group with operations and interests extending throughout Australia and in the United States of America, Canada, Brazil and other countries.

The Broken Hill Proprietary Company Limited was incorporated in Melbourne in August 1885 following a rich silver find by seven sheep-station-men-turned-prospectors. It remains preponderantly Australian-owned.

With group sales of more than \$6000,000,000, shareholders' funds approaching a similar figure and total employment of some 59,000 people, BHP is Australia's largest company. Through joint ventures and shared investments BHP is linked with some of the world's largest corporations and itself ranks as the major Australian participant on the international business scene.

The group produces oil and natural gas, iron ore, gold and other minerals, and energy and coking coal in large-scale operations in five countries. Exploration and new developments are even more widespread. As the major industrial force within Australia, BHP produces almost all of the country's steel needs and a range of manufactures.

A century of growth has resulted in a pioneering mining syndicate, formed to work a stony hill alive with wallabies, becoming a huge diversified venture with a distinctive sense of identity. . . and a habit of success.

It is from fields below these turbulent waters that the BHP/Esso joint venture produces oil and natural gas to supply a large part of Australia's energy needs.





Oil production by BHP/Esso from the Bass Strait fields is at the rate of about 440,000 barrels a day, largely sold to Australian refiners but with some available for export. Eight of the platforms already in place are chiefly oil producers with Kingfish (rig is pictured left) the largest field. The other very large field is Halibut, the drilling platform of which is shown at right.

Natural gas is produced mainly from three fields at a rate varying between 600 m cu ft and 800 m cu ft a day according to season. Marlin and Snapper are the larger gas fields.

The construction base established earlier at Barry Beach in South Gippsland is being reopened to build the new platforms planned for some of the marginal fields of the Gippsland Basin. The first of these will be on Bream, discovered nearly 25 years ago but earlier regarded as too small to warrant development. Changes in the Australian government tax regimen have made investment in some smaller fields possible.

The marginal fields overall are expected to yield about 150,000,000 barrels of oil, less than a year's supply for Australia at present consumption rates, and about 1.2 trillion cu ft of gas, equal to about one-fifth of all gas taken from Bass Strait to date.

Mini-platforms and sub-sea connections will be used on some of the smaller fields, taking advantage of the extensive network of pipelines which links the existing production units.



In 20 eventful years, BHP has established itself as a major producer and explorer in the petroleum industry.

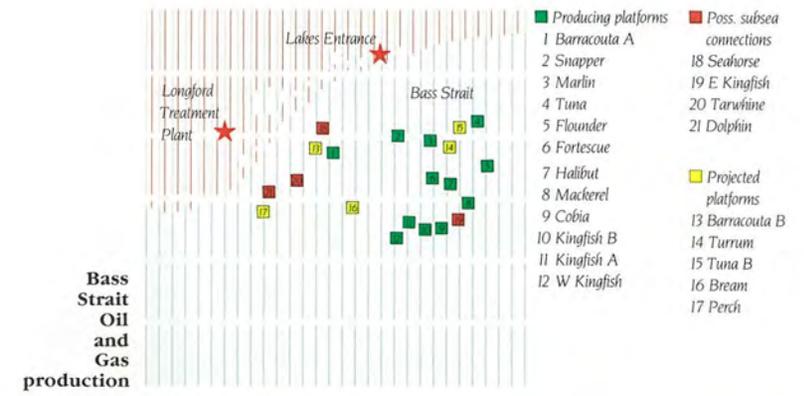
Australia draws two thirds of its crude oil supply from ten fields in Bass Strait discovered and developed by the partnership of BHP and Esso from the mid-60s. That joint venture also supplies all of Victoria's natural gas. Current development plans involving new investment in the order of \$1800,000,000 envisage four additional platforms and some sub-sea connections. These will extend Gippsland Basin oil production for many years; gas sales are already contracted into the next century.

The onshore facilities needed to deliver Bass Strait oil and gas are themselves substantial. A pipeline network carries products from the platforms to Longford near Sale Vic, where liquids are extracted from the gas and the crude oil is stabilised. Treated gas is then piped to the distributors, and crude piped to Long Island Point on Westernport Vic for shipment to refiners. Gas liquids are also piped to Long Island Point for fractionation.

BHP Petroleum is also a participant in the Australian North West Shelf Joint Venture, supplying natural gas to markets in Western Australia and preparing to ship liquefied natural gas to Japan. This \$11,000,000,000 project is based on the large gas fields off the north west coast discovered by Woodside Petroleum Ltd, in which company BHP and Shell Australia hold a controlling interest.

In North America, the Kansas-based Energy Reserves Group Inc, now a BHP subsidiary, produces oil and natural gas in 19 states of the USA and in Canada, and has an extensive exploration and development portfolio in hand.

Exploration by BHP Petroleum includes drilling offshore from Australia's north-west coast, where promising results have been achieved, and onshore drilling in Queensland and Western Australia. BHP was also included in the first group to be awarded drilling rights for the South China and Yellow Seas by the People's Republic of China, and has other exploration interests in the North Sea, Papua New Guinea and Indonesia.

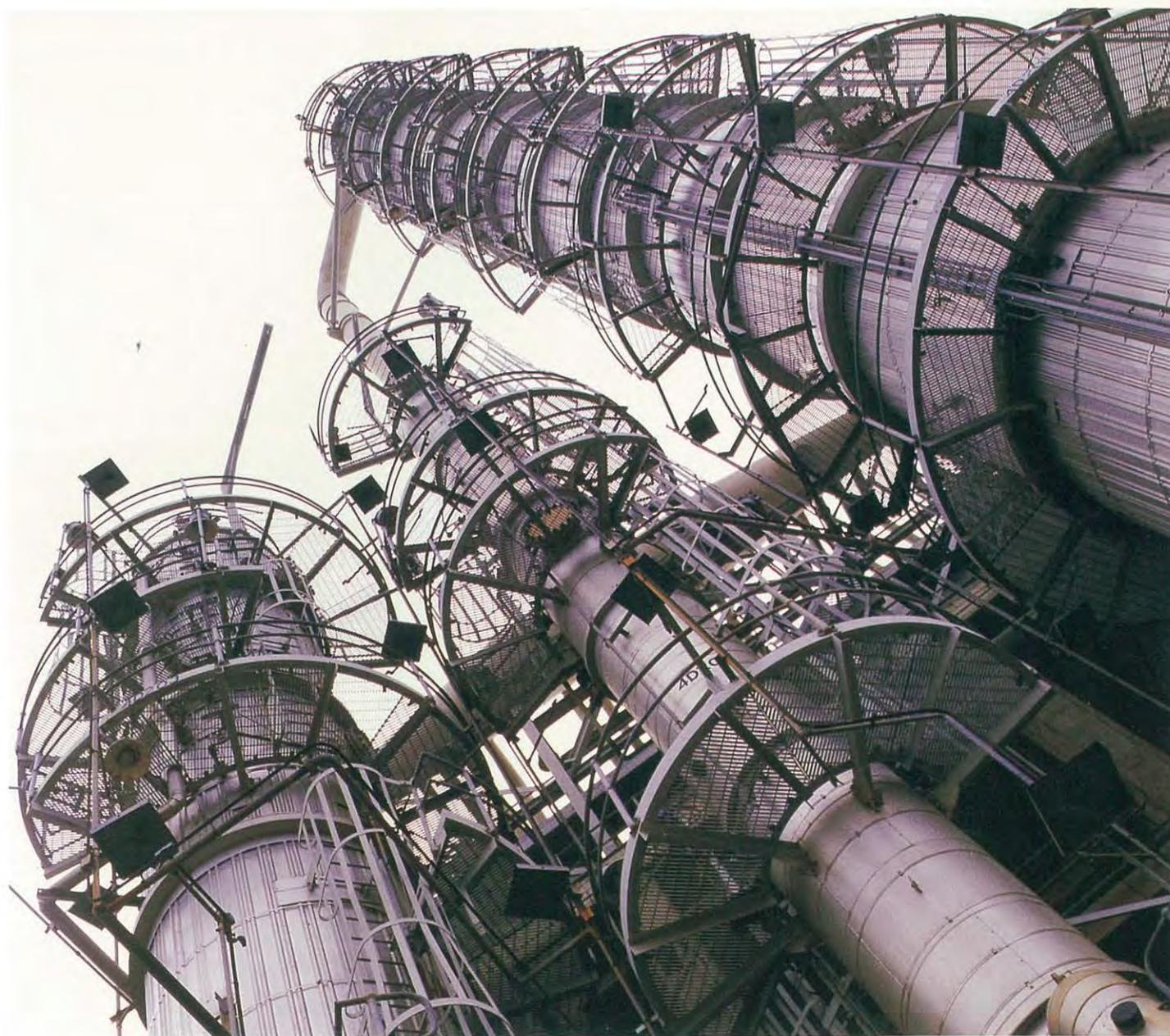




Development of the Bass Strait oilfields has resulted in the introduction to Australia of a whole range of new skills and technical standards. At the time of first discoveries, nowhere in the world were there fully developed oil production facilities operating offshore at such depths of water and in such forbidding weather patterns. (Flounder and Mackerel platforms stand in nearly 100 m of water).

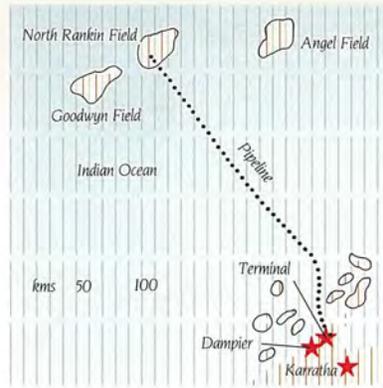
Since production began in March 1969 however the extraordinary has become the routine and the uncertainty of nature is seen as the norm. At left, divers prepare to check Halibut platform (which stands in 71 m water depth) in a maintenance operation, while the service helicopter leaves Marlin for the base near Sale.

BHP's only downstream investment in the petroleum industry is in a joint venture with Monsanto Australian Ltd producing styrene monomer (feedstock for the making of a range of plastic materials) at a plant in Footscray, a Melbourne suburb (right). BHP's share of the ethane from the Long Island Point fractionation plant is piped to the Footscray works, which also take crude benzene from BHP steelplants. Operating company for the joint venture is Hydrocarbon Products Pty Ltd, jointly owned by the two venturers.





**Australian
North
West
Shelf
Gas
Project**



A substantial investment was required from the Bass Strait partners to deliver oil and natural gas to customers.

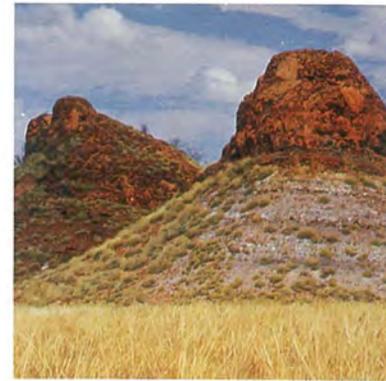
A pipeline network of over 1000 km had to be laid to link the producing platforms with the gas processing and crude stabilisation plant at Longford near Sale Vic (far left), the oil terminal and fractionation plant at Long Island Point on Westernport (left) and customers in the Melbourne area.

Stabilised crude oil is shipped to other customers from Long Island Point, where also gas liquids are separated into ethane, propane and butane. Natural gas and crude oil are marketed on a joint basis by the BHP/Esso partnership, but the venturers make separate arrangements for the sale of their respective shares of the LPG products.

BHP's other major petroleum investment is in the North West Shelf natural gas project, which is already supplying Western Australian markets from a huge platform on the North Rankin field (right). This structure stands some 214 m above the ocean floor, supported by piles driven about 120 m into the sea bed. Up to 34 production wells are being drilled into the field, which extends over about 50 sq. kms. The platform is about 130 km offshore from the terminal and treatment plant at Withnell Bay on Burrup Peninsula near Karratha.

Negotiations to build a liquefied natural gas plant to supply Japanese customers are at an advanced stage. The venture, with Woodside Petroleum Ltd as operator, has delineated two other fields, Goodwyn and Angel, making up the largest natural gas discoveries yet brought to this stage in Australia.





While exploration and development work has continued in Bass Strait for over twenty years, BHP Petroleum has also been active in exploration programmes in other parts of Australia, both onshore and offshore, and overseas.

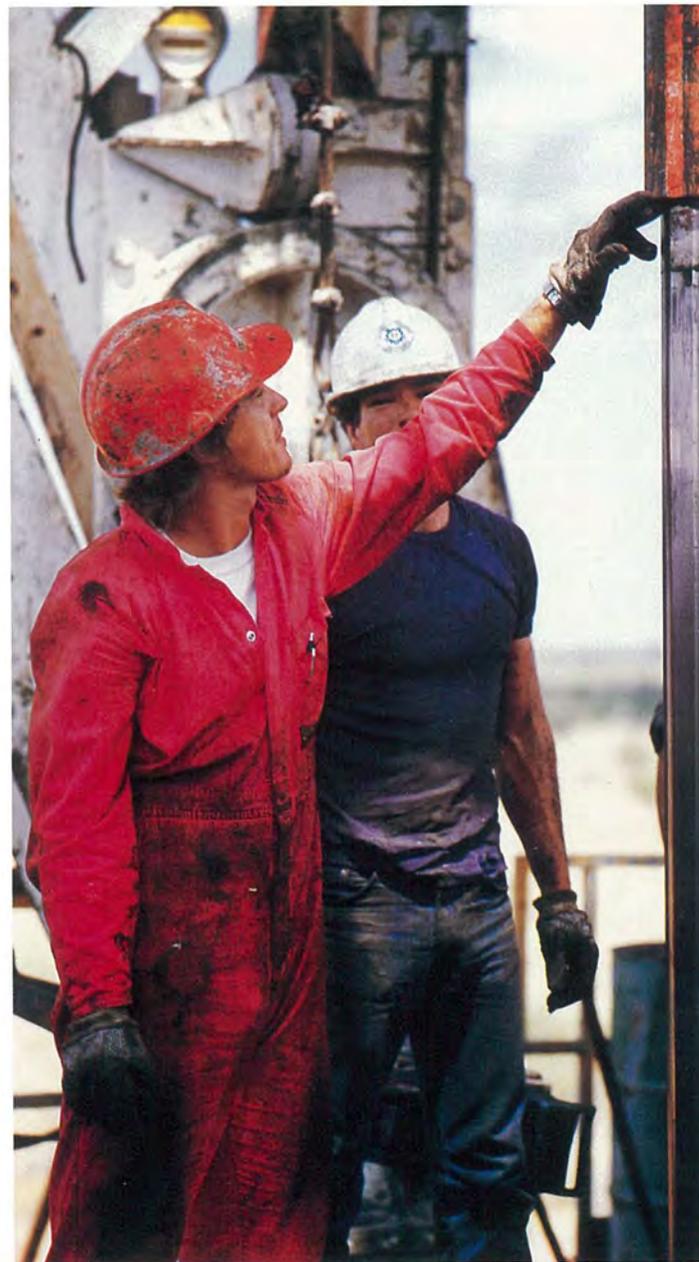
Onshore work has been chiefly in the Surat Basin in Queensland, and in several of the basins in the north west of Western Australia. Pictures left and right show a BHP-operated rig working on the Pictor prospect in the north-west.

The most promising offshore oil finds to date have been in the Timor Sea with two fields, Jabiru and Challis. Both are in deep waters, and are likely to be developed with sea-bed connections rather than production platforms. A base has been established at Darwin for the development operations.



Prior to ERG joining the group BHP Petroleum had taken up interests in a number of exploration and production ventures in the United States, and had established a Denver office to handle them. It is planned that these American activities will be brought together under ERG direction.

For management purposes, ERG now forms part of the San Francisco-based Utah Division.







Groote Eylandt manganese ore is now sold in virtually every region of the world. While Japan remains the largest customer, and with about one fifth of output used within Australia, shipments are made to other countries in Europe, Asia and North America.

The shiploader at Milner Bay (left) has a handling capacity of over 1000 tonnes per hour. Careful sampling of the product at the loading point to meet customers' specifications has been a major factor in winning markets.

Ore is screened and concentrated in a large-scale plant near the mining area and then trucked in 150-tonne and 120-tonne road units to the port stockpile area.



Mining

is still very much the heartland of BHP's operations within Australia. Iron ore, coal, manganese, dolomite, gold and bauxite are won from mines scattered around the country, in lush tropics and in the arid inland, some remote, some near at hand. Shipping the minerals has involved BHP in building and operating heavy-haul railway systems, large-scale port facilities and a fleet of bulk carriers. Handling and processing some raw materials has required the establishment of whole industries.

Manganese is mined by a group subsidiary on Groote Eylandt in the Gulf of Carpentaria. The ore is of metallurgical grade, shipped direct to customers overseas and also to the group's ferro-alloy plant at Bell Bay Tas. Groote is a significant competitor in the world manganese ore trade.

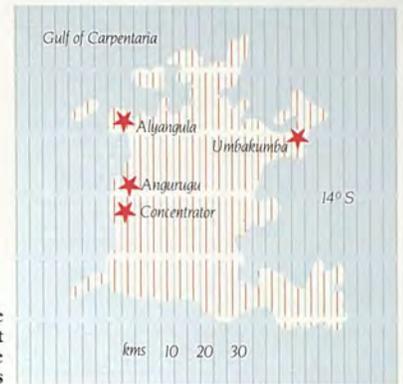
The Mt Newman iron ore project in the Pilbara region of Western Australia, a joint venture managed by a BHP subsidiary, is one of the world's largest iron mines. Production capacity is over 40,000,000 tpa. High grade hematite is shipped to steelmakers in Japan and other countries (and to BHP steelplants) from Port Hedland in an operation remarkable for the scale and complexity of the logistics involved. BHP's interest is 30 per cent.

BHP also produces iron ore from Koolan Island in Yampi Sound WA, one of the most spectacular parts of the north west coast, and from Iron Monarch and the Middleback Ranges SA, the rich deposits which first drew the company into steelmaking.

Dolomite for the steelworks' refractories is taken from a quarry at Ardossan SA, set in magnificent farming country. In stark contrast is the Telfer gold mine on the edge of the Great Sandy Desert WA; this is a Newmont-managed joint venture in which BHP holds 30 per cent.

BHP's alumina output is from a joint venture based on a bauxite deposit in the Darling Ranges WA with a refinery at Worsley, north east of Bunbury. The group has a 20 per cent interest in the project.





Groote Eylandt Manganese Operations

At the Groote Eylandt mine, overburden is removed by scrapers and bulldozers, and the exposed ore then loaded by excavators into haul trucks (far left).

Constant field checks ensure product standards (left: geological assistant Janis Murphy marks a sample). At the plant, laboratory tests form part of the quality control system (below right).

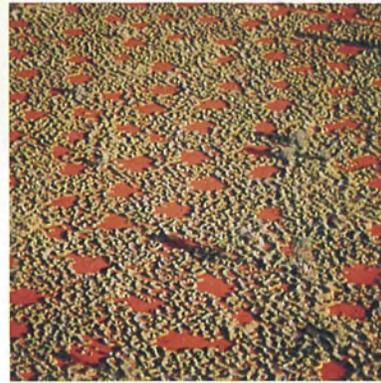
The remote location of the island means that, with a large fleet of operational vehicles, maintenance workshops (above right) have a key role in meeting production schedules.

Groote is an aboriginal reserve where mining is carried on under an arrangement with the island people and Northern Territory aboriginal representatives. Ever since the mine was commissioned in 1966, good relations have been sustained with the traditional owners.

Alyangula, the company township, now has over 200 houses with blocks of flats, television transmitters and a full range of community services. The tropical setting and the surrounding waters of the Gulf of Carpentaria make it an attractive place indeed.







The heart of the Mt Newman Iron Ore Project is the huge mine on Mt Whaleback. With its 18 benches and great array of hauling and handling equipment (left) it presents a picture of very large-scale mining by any standard.

The pits are worked with some 74 haul trucks — the largest of them with 189 tonne carrying capacity — which deliver ore to the crushers over roads constantly graded and watered to keep down dust. The trucks are loaded by electric shovels: the largest of the mine's units have 18.5 cu m bucket capacity, and the mine's power plant has an available output of 85 megawatts.

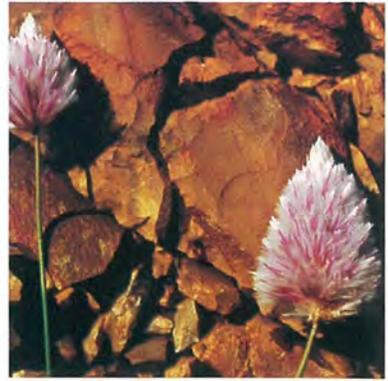
An automated beneficiation plant is able to handle up to 6,800,000 tonnes a year of medium and low-grade ore to bring such material within customers' specifications.

The nearby town of Newman has a population of over 5400; built originally as the usual company-owned centre, local government responsibility has now been taken over by the regional authorities and the project has already initiated a scheme to enable employees to buy their homes.

The Mt Newman Project is a joint venture in which BHP holds a 30 per cent interest. Other interests are held by subsidiaries of CSR Ltd (30 per cent), AMAX Inc (25 per cent), and Selection Trust Ltd (5 per cent), and by a joint subsidiary of Mitsui & Co Ltd and C. Itoh Co Ltd (10 per cent).

The management company is a wholly-owned BHP subsidiary.





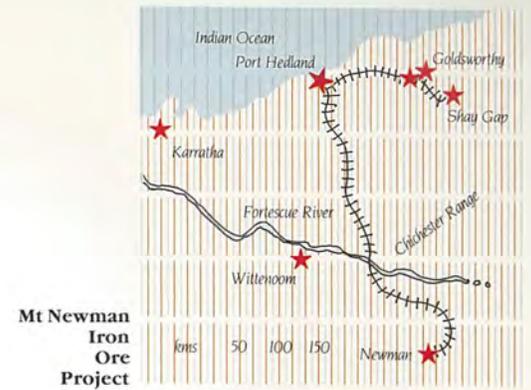
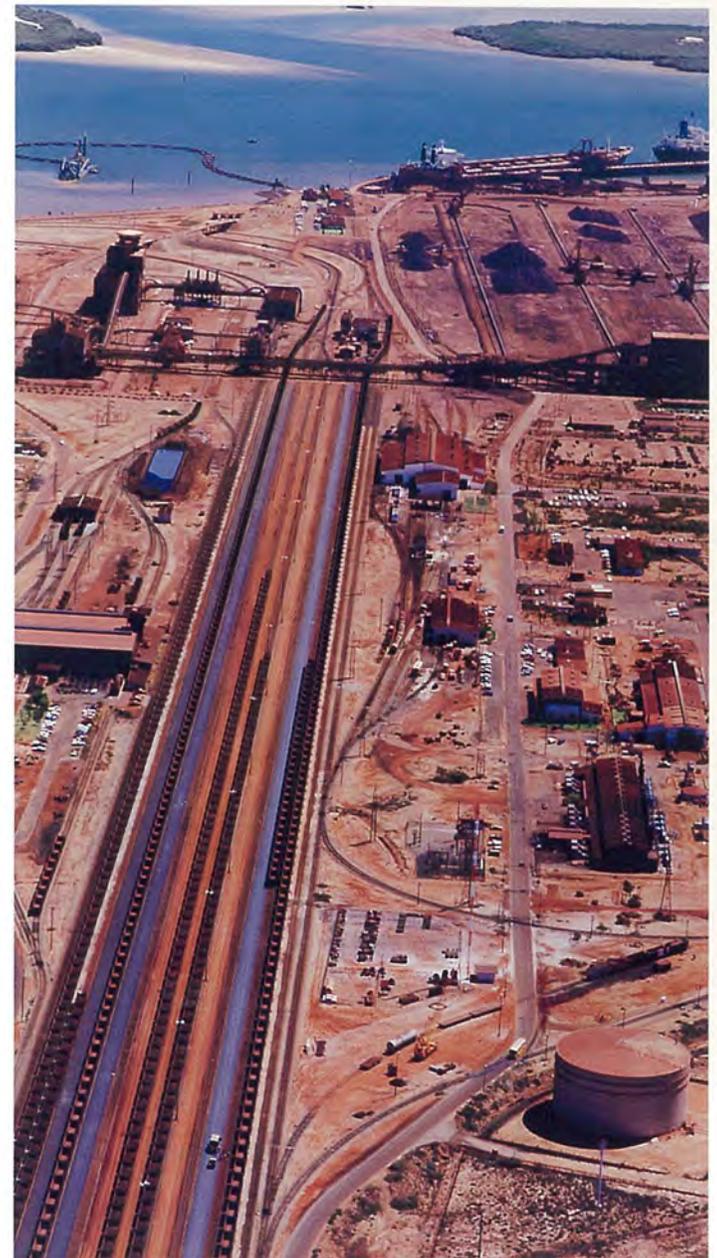
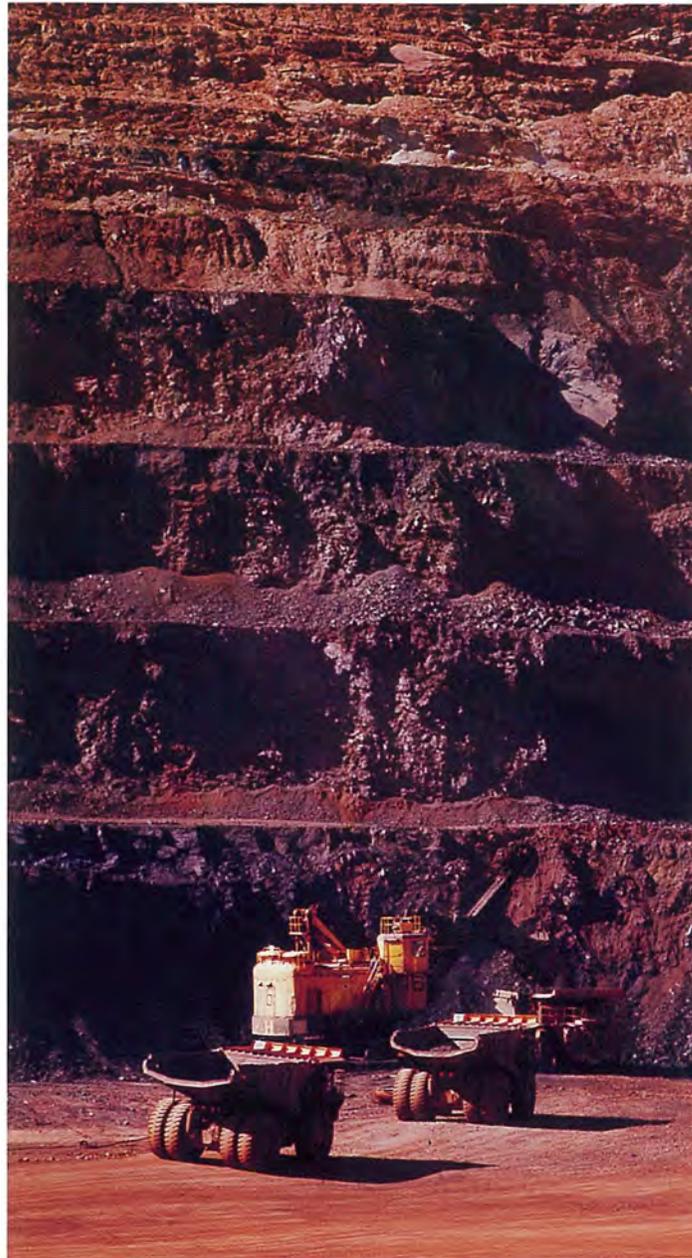
The 426 km railroad linking Newman with the shipping terminal at Port Hedland is one of the world's largest heavy haul rail operations. Round trip time for the 180-car trains (left) is 19½ hours.

Two mainline locos are needed to wind through the Chichester Range for the drop down to the coast. At the terminal (far right) two car-dumping stations empty each train in 2-3 hours.

The ore then goes for tertiary crushing and screening and to stockpiles. At the two-berth wharf, two rail-mounted shiploaders can each pour over 8000 tonnes an hour into the bulk carriers.

Overall production capacity of the Mt Newman Project is over 40,000,000 tonnes of high grade hematite a year. Most shipments are to Japanese mills, with sales also to other Asian and to European steelmakers.

BHP also has a half-interest in the 168 km railway and port facilities linking the Robe River iron ore deposits and Cape Lambert. This project, operated by Cliffs Robe River Iron Associates, is mining an area adjacent to the Deepdale iron ore reserves held by BHP. Purchase of the interest in the ore-handling facility followed an agreement under which a portion of the Deepdale reserves were transferred to CRRIA.







Koolan, one of the several islands in the Buccaneer Archipelago, lies just off the north west coast of Australia (left) with Derby the nearest mainland town. Worked since 1964, the iron ore deposit there is nearing the end of its economic life. On nearby Cockatoo Island, another iron ore mine has already been closed.

The surrounding straits are notorious for strong currents and 10m tidal ranges, but the seascope views from the island are memorable (right).

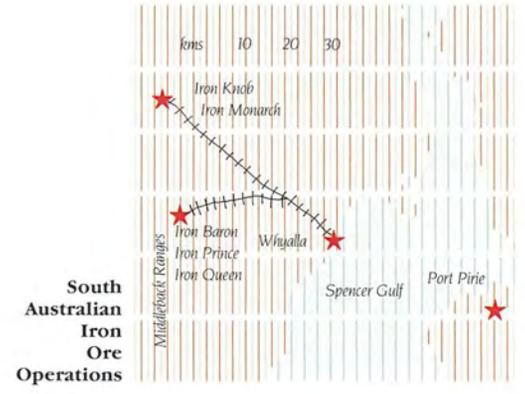
Worked on a three-shift basis, the Koolan mine can produce about 3,000,000 tonnes of ore a year. The product is high-grade hematite with only very minor impurities.

The workings run along the mainland side of the island facing Yampi Sound, the narrow waterway between the two. Crushing plant and storage bin stand above the jetty, which has 15.8m depth alongside at low water.

The travelling shiploader can serve vessels up to 130,000 dwt at a rate of 3000 tonnes per hour.

The well-established settlement on the island has nearly 160 houses and flats. The golf course is notable for a very long 9th hole: it is the island's airstrip.





The Iron Monarch ironstone quarry (left) has an assured place in BHP history. A magnificent deposit of rich hematite, it was this that led the company into steelmaking and thence into a pattern of remarkable growth in earlier years.

Today, Iron Monarch and the quarries in the Middleback Ranges just to the south supply the Whyalla steelplant, with some fines shipped to Port Kembla.

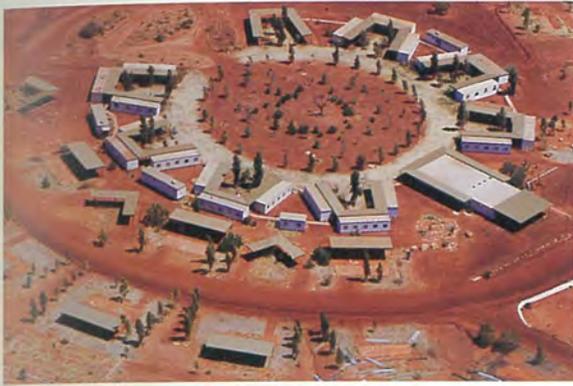
These South Australian mines, together with the dolomite deposit at Ardrossan on the western side of the Gulf St Vincent, are administered from Whyalla, and organisationally form part of the steel division.

The Worsley alumina refinery (right), a 1,000,000 tonne a year operation, is a Western Australian joint venture with the US-based Reynolds group holding 40 per cent and BHP as a 20 per cent participant. The project developed from BHP's interest in a Darling Ranges deposit of bauxite from the early '70s, and now includes Shell Australia (30 per cent) and a group of Japanese interests (10 per cent).

Bauxite mined in the Darling Ranges is carried by conveyor belt (above right) to the refinery at Worsley, 57 km north east of Bunbury. Reynolds technology is used at the plant, from which participants take the alumina product in ratio to their share in the venture. BHP sells its alumina on the open market.







The Telfer Project is an open-cut gold producer (left) based on two dome structures. The main dome currently being worked averages better than 8 gm to the tonne, with lower values in the other dome and in additional reserves yet to be assessed.

Ore is treated at the mine by conventional cyanidation process to produce crude gold bullion, which then goes to the Perth Mint for final refining. Present rate of throughput at the site is about 1500 tonnes of ore a day.

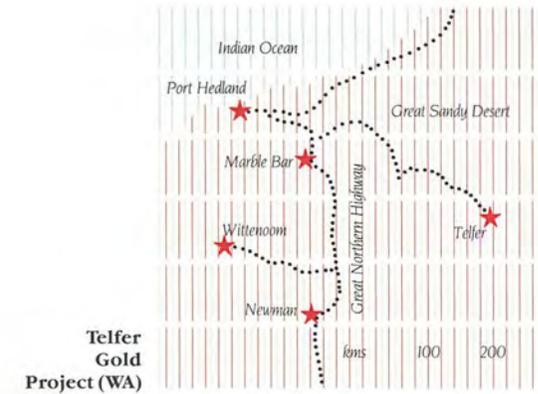
Houses for the Telfer Village (above), two kilometers north east of the mine, were pre-fabricated in Perth but all buildings have been made cyclone-proof to withstand winds up to 160 km/hour.

Careful planting of trees and shrubs through the township has made this a very different environment to that of the surrounding Great Sandy Desert country.

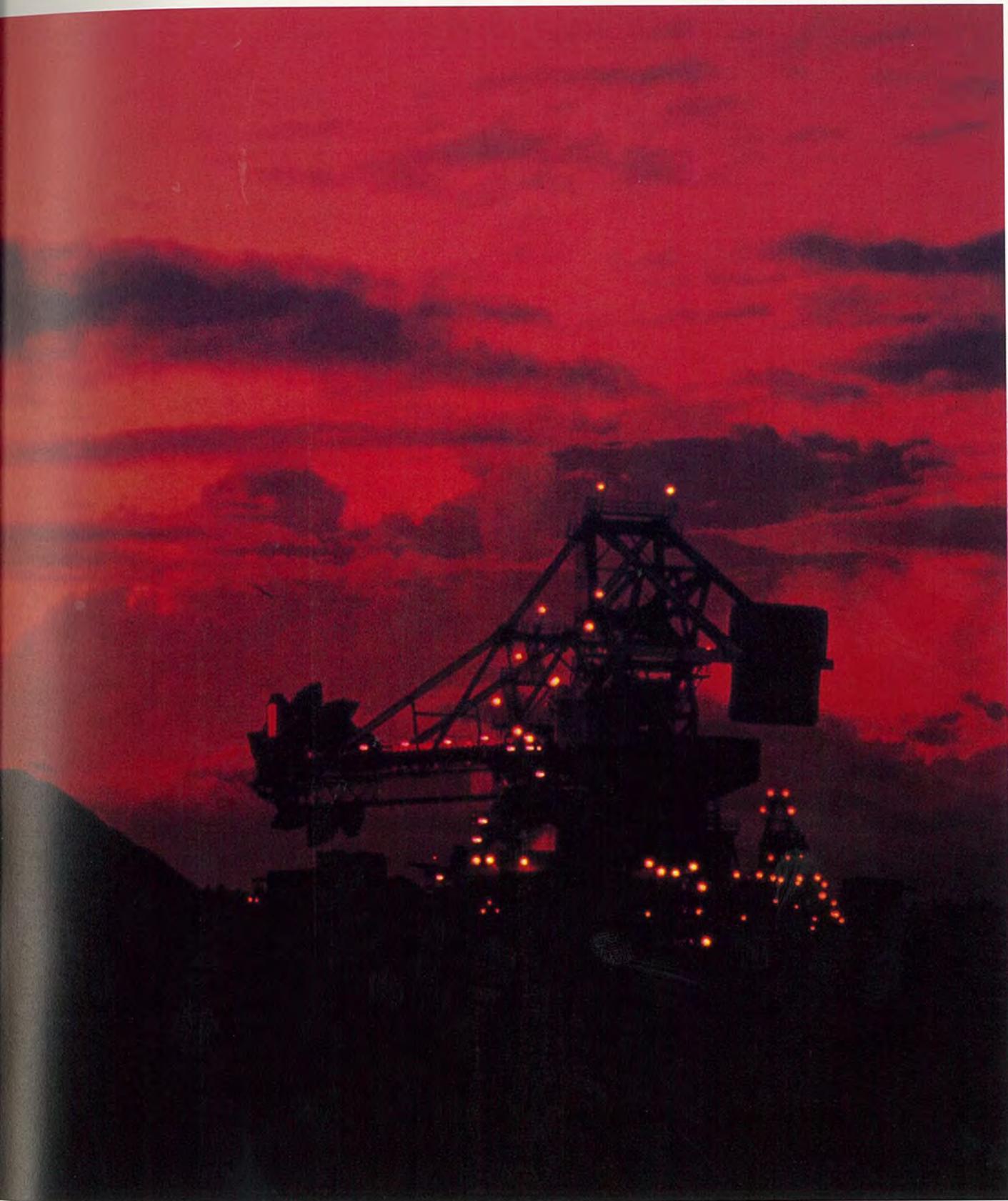
The group's ferro-alloy smelting activities are based at Bell Bay Tas, where wholly-owned Tasmanian Electro Metallurgical Co Pty Ltd (Temco) has four Elkem furnaces producing ferro-manganese, silico-manganese and ferro-silicon. About half the output is used within Australia and the other half sold overseas.

A programme of upgrading three of the four furnaces, now in hand, will lift capacity to about 190,000 tonnes a year.

The Temco plant (right) lies on the Tamar River estuary, near George Town. Manganese ore is shipped in from Groote Eylandt and silicon obtained locally.







The BHP group is the most significant shipper of Australian coal to world markets. High quality coking coal, blending and steaming grades are produced from open cut and underground mines in Queensland and New South Wales, with extensive reserves for future development.

The group's Utah Division manages two joint ventures in Queensland's Bowen Basin comprising six open cuts and an underground colliery with a combined capacity to produce some 26,000,000 tonnes a year. (BHP's interest is 35 per cent in the larger venture and 47 per cent in the other). These mines supply about one fifth of Japan's import requirements of coking coal and about 15 per cent of Europe's total imports, besides shipments to other countries.

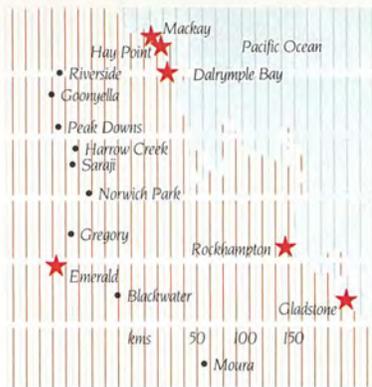
Another group subsidiary, Thiess Dampier Mitsui Coal Pty Ltd (58 per cent owned) ships coking and energy coal from open cut and underground mines also in the Bowen Basin.

In New South Wales, thirteen underground collieries around Newcastle and Port Kembla supply coking coal to the group's steelworks, while the Newcastle mines also produce energy grades for export. In addition, BHP's Saxonvale open cut near Newcastle produces steaming grades for overseas markets.

One of Australia's major coal shipping terminals, the Koorangang loader at Newcastle (left), is operated by the group, which holds a 30 per cent interest in the venture. Designed and built by BHP Engineering, it is envisaged that Koorangang may be expanded to an annual capacity of 50,000,000 tonnes.



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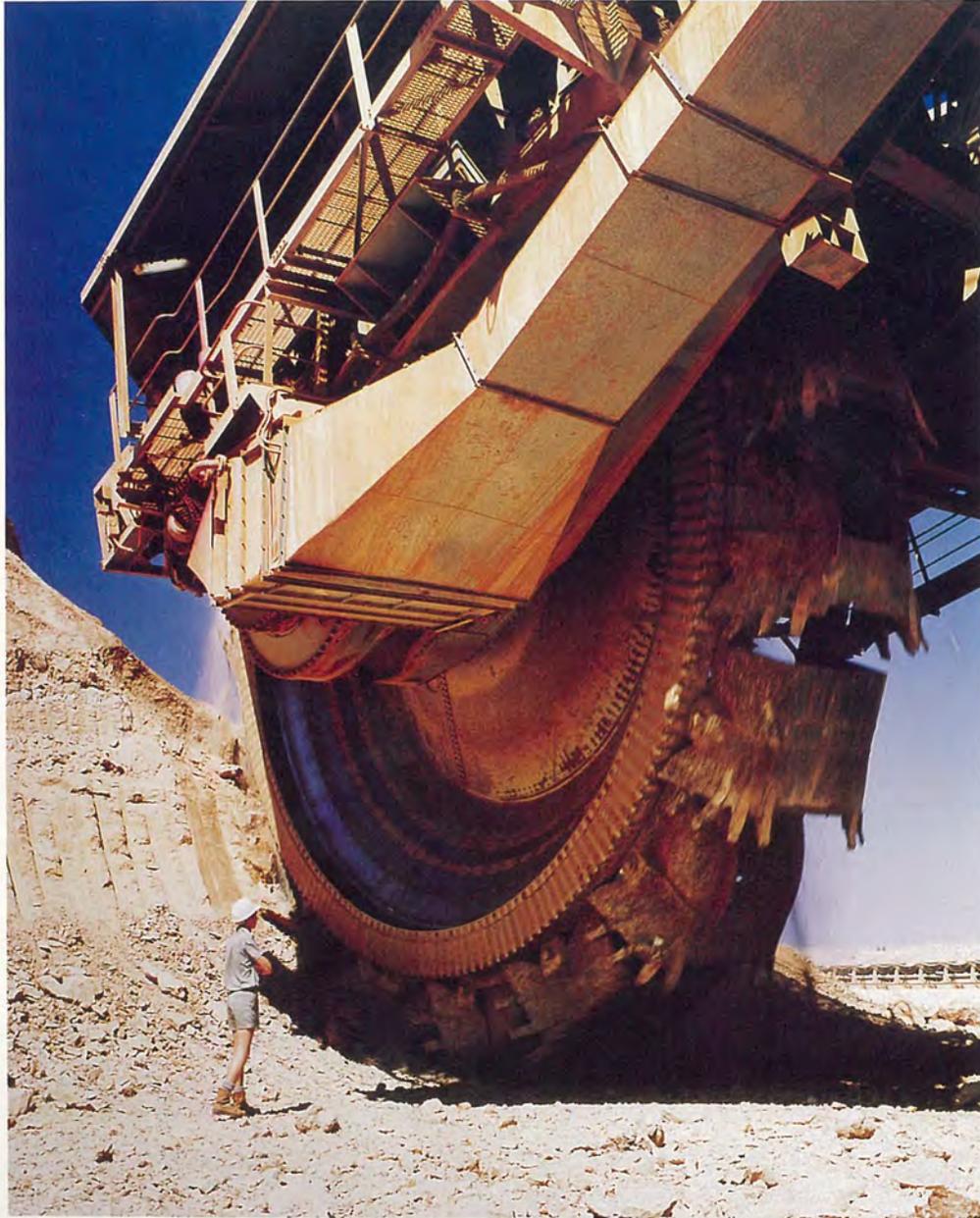
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Peak Downs, with a nominal 5,400,000 tonnes a year, is the largest of the group in capacity terms.

Goonyella differs from the other open cuts in that overburden depths call for pre-stripping to allow the draglines to operate economically. A bucket-wheel excavator drawing 1200 kW is used (left) to remove material as an initial operation.

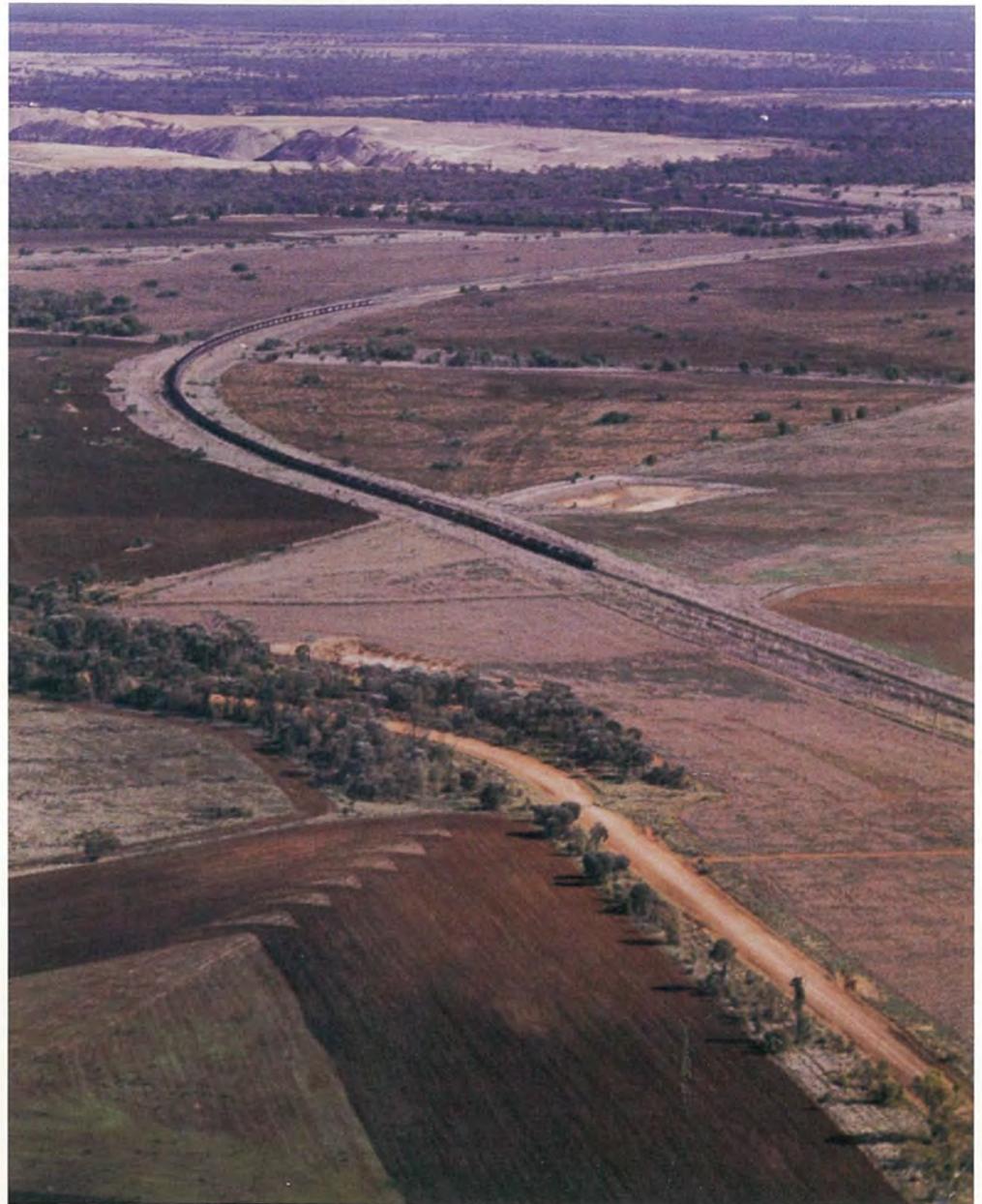
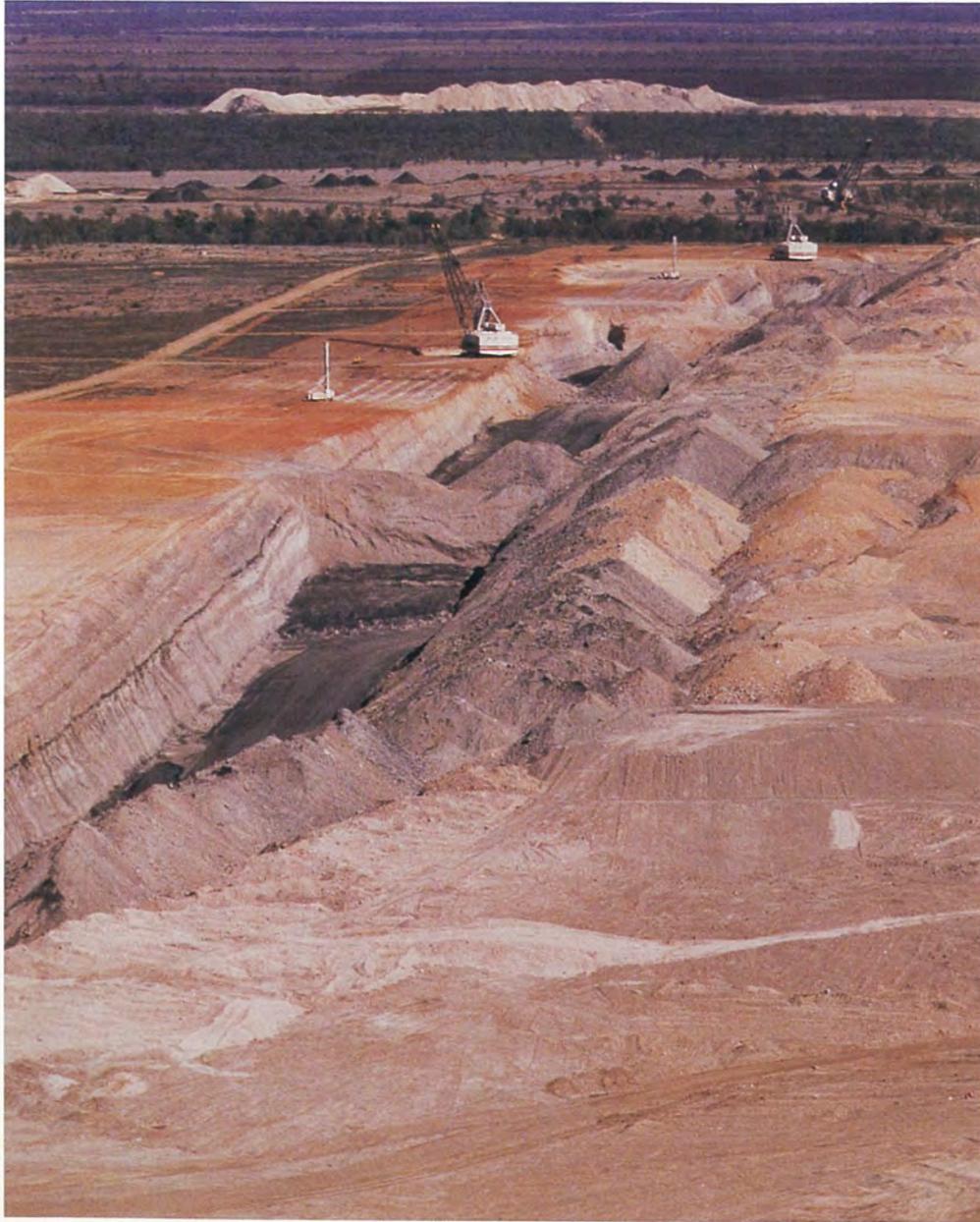
Blackwater, which was Utah's first colliery in the area (it commenced production in 1967) also has a seam of steaming coal. The lease terms provide that this is supplied to a state government power station for the incremental cost of mining it. The coking coal product is railed to the Clinton terminal near Gladstone.

Harrow Creek is a trial underground operation, used for investigations into the feasibility of mining at depths greater than 120m. The limited tonnage of coal produced is processed at nearby Peak Downs.

Most miners from the Utah-developed collieries live in the sparkling new towns of Moranbah (right) or Dysart, places where the list of outdoor leisure activities available for adults or children reads like a sports store catalogue. Blackwater, further south, is the other big town for the Bowen Basin miners.

Moranbah and Dysart were both built by the mining companies during the early '70s, but are now open towns with a combined population of around 12,000 people.





The Gregory open cut (far left) lies on the western side of the Bowen Basin 60 km north east of Emerald. The Lilyvale seam is there about 3.5m thick and provides a coking coal of good blending characteristics. Output is railed down a spur line (left) to join the main track to the coast, where the Clinton terminal near Gladstone is used for shipment.

Gregory was opened by BHP in 1980 and now forms part of the Utah-managed joint ventures. Most of the miners live at Emerald, with some at Capella further north.

Of the steel division collieries in New South Wales, four serve the Newcastle works while nine are spread along the Illawarra escarpment overlooking Port Kembla (far right). The larger pits use longwall coal cutting (picture at right is in the Appin mine, one of the southern group) and all have conveyor transport to bins. Four seams are worked in the northern group of mines, two in the south.



The escarpment setting for the southern mines is one of the great attractions of the south coast area, with lush forest covering the slopes. A large part of the area has been dedicated as an environmental reserve.

Coking coal output is supplied only to the group's steelworks. Steaming coal produced from the northern mines is washed at a plant at Teralba near Newcastle and then sold overseas.

Group coal interests awaiting development include the Bargo project (30 per cent held) on the western side of the Illawarra escarpment, able to produce both coking and steaming grades, and with recoverable reserves of about 150,000,000 tonnes with varying yields.

The group also has a half interest in a complex deposit near Boggabri, 350 km north west of Newcastle. This prospect is at an early stage of development awaiting market availability.







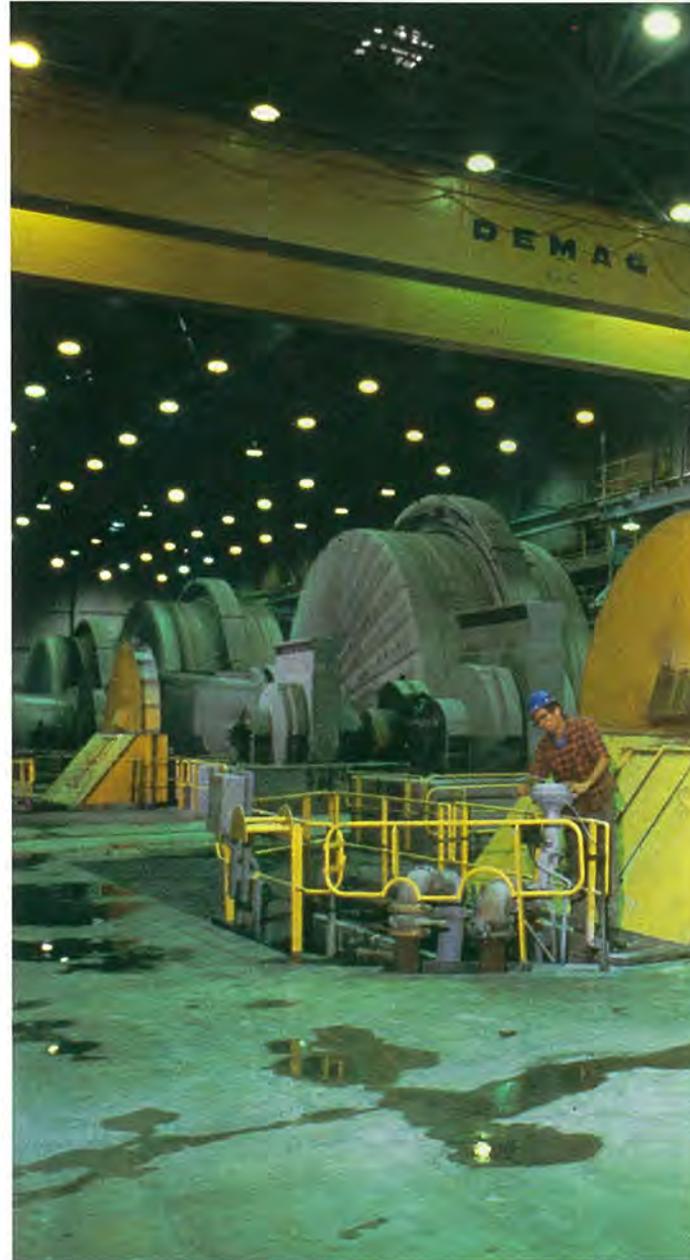
The Island Copper porphyry orebody on Vancouver Island is mined as an open cut with electric shovels (left). All of the available ore is now below the sea level. A new in-pit crusher and conveyor system now being introduced is expected to enable mining operations to continue to more than 430m below the surface.

Meantime, ore is hauled from the mine in 170-tonne diesel-electric tippers at a rate of 44,000 tonnes a day. Specialised workshops ensure optimum availability of vehicles (above).

At a minesite plant, crushed ore is ground in large semi-autogenous mills (right) each able to handle about 450 tonnes per hour. Flotation processes then produce copper sulphide concentrate and molybdenum sulphide concentrate which are shipped to customers in Japan and Taiwan from the Utah-built port on Rupert Inlet.

At capacity the mine produces annually a copper concentrate containing some 115,000,000 pounds of copper, 50,000 ounces of gold and 400,000 ounces of silver, with a moly concentrate containing 3,500,000 pounds of molybdenum and quantities of rhenium.

Most of the workforce of 780 live in the attractive town of Port Hardy, some 25km distant.



Outside

Australia, the major mining interests of the BHP group include iron ore in Brazil, coal in USA and copper in Canada, Chile and Papua New Guinea.

The Utah Division manages and has a 49 per cent interest in the Samarco project in Brazil's Iron Quadrangle in Minas Gerais state. This large-scale operation, based on an extensive orebody averaging 53 per cent iron, includes a 396 km slurry pipeline carrying ore to a pellet plant and shiploader, at Point Ubu on the coast.

In the US state of New Mexico, two Utah-owned mines, Navajo and San Juan, supply steaming coal to big power plants serving western and south-western consumers. A third surface mine, La Plata, will soon begin operations to supplement deliveries from San Juan. In eastern USA, Utah's Sierra Coal Company produces energy coal from surface and underground workings for shipment to markets in USA and Europe. Utah also has substantial undeveloped coal prospects in South Africa and Indonesia, and in USA and Canada.

The Island Copper mine, a wholly-owned Utah operation, is on the northern end of Vancouver Island, British Columbia. Ore from a large open-cut is treated and shipped to customers as copper sulphide concentrate or molybdenum sulphide concentrate.

The largest undeveloped deposit of high-grade copper known in the world today was discovered in 1981 by a partnership of Utah and Getty Oil in the Atacama Desert, 180 km inland from Chile's coast. Utah is managing the development of this Escondida project, which has indicated reserves of over 1.7 billion tonnes grading 1.6 per cent copper.

BHP's other copper interest is a 30 per cent share of Ok Tedi Mining Ltd, which company recently opened a rich gold/copper deposit in the Star Mountains in Papua New Guinea's western province. Still in its first development stage, Ok Tedi is initially mining the gold content of the capping overlying the main orebody.



The Escondida copper project in Chile (left) was discovered in 1981 by a Utah/Getty Oil 50/50 partnership. It lies in the Atacama Desert, 3000m above sea level and 180km inland.

Development drilling and an underground bulk sampling programme are now complete. For planning purposes, it is expected that the projected open pit will yield 545,000,000 tonnes of ore averaging 2.16 per cent copper, with some gold, silver and molybdenum. Preliminary engineering and cost estimates suggest that Escondida will be a highly competitive producer.

Current feasibility plans are based on an annual production rate of 600,000,000 pounds of copper.

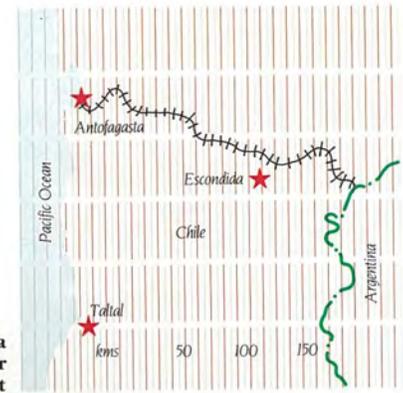
The petroleum production and exploration operations of Energy Resources Group Inc. were brought into the Utah Division following ERG's acquisition by the BHP group.

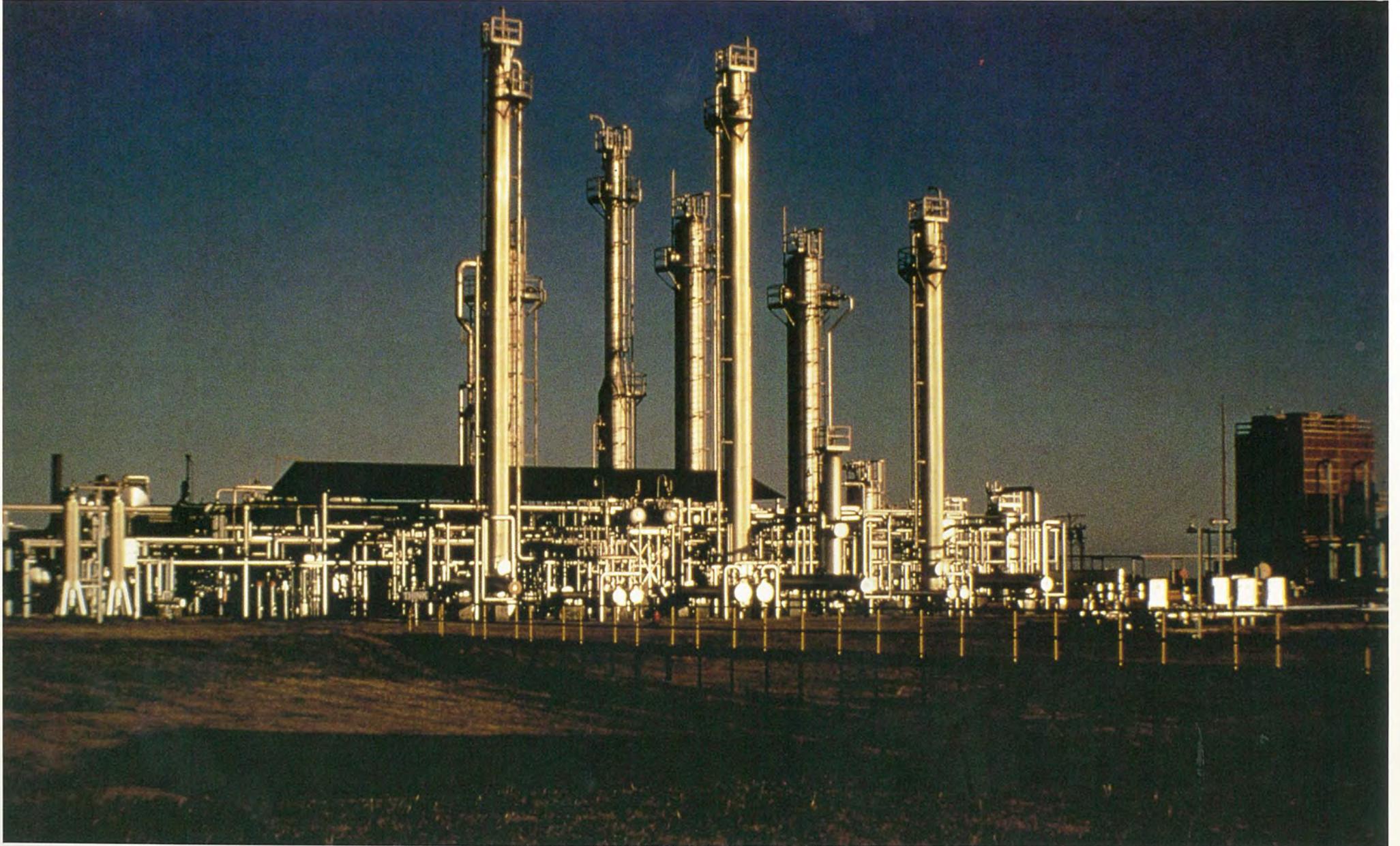
Current ERG production from locations spread around 15 US states is about 40 per cent oil and the remainder natural gas. Explorations programmes are widespread, from Canada to the Gulf of Mexico.

Pictures left show the variety of conditions experienced, even within one state. The Teton Mountains, in the Thrustbelt area of the state of Utah, form the backdrop for an ERG team working on seismic evaluation (right) while the Wasatch Mountains (above) present a very different environment, spectacular but fragile, for another exploration programme in the same state.



Escondida
Copper
Project





ERG production facilities are widespread and varied.

In Harper County Kansas, for instance, the company draws ownership returns from the Spivey Grabs natural gas liquid processing plant (left) in ratio to the delivery volume to the plant during the preceding year. The plant strips butane, low-octane gasoline and propane from the wet gas stream, with ERG's share currently about 15 per cent.

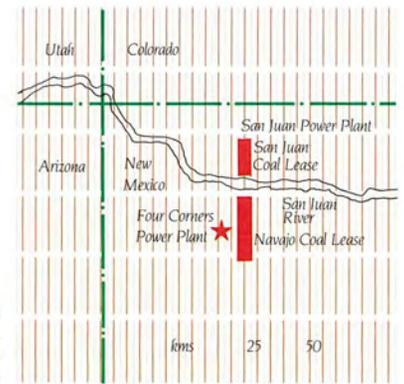
In the Gulf of Mexico near Corpus Christi Texas, ERG has a production platform in the Matagorda Island area (above left). Drilled in 1982 to 10,500 ft, the well tested possible open flows totalling 16,500 cu ft per day.

In state waters offshore Nueces Country Texas, an ERG production platform was built following successful gas discoveries in 1976 (right). (The rig in the background is drilling on an adjoining tract).

Speaking after the acquisition of ERG Inc, BHP's managing director Brian Loton said: "The North American environment . . . is the sort we want to see more of . . ."



Western
USA
Coal
Operations



Utah's Navajo mine (it lies within the Navajo Indian reservation in New Mexico) is one of the largest coal producers in USA.

In production since 1963, Navajo has an annual capacity of 8,000,000 tonnes of product, with total recoverable reserves estimated at over 1,000,000,000 tonnes.

Stripping is by four electric draglines and coal haulage by trucks and a mine railway system (left). Two electric locos and 44 hopper cars service the 20km railway delivering run-of-mine coal to the processing plant.

All Navajo output is contracted to the Four Corners Power Plant, a 2085 megawatt facility, and one of the major power producers in the south west.

Twelve kilometres to the north lies the San Juan mine, also a strip mining operation, with capacity to ship 5,000,000 tonnes a year. This mine supplies the 1560 megawatt San Juan Generating Station (right).

Two draglines are used, with truck haulage from mine to plant.

A new mine, La Plata, is now being developed to deliver an additional 1,500,000 tonnes a year to the San Juan Station. This mine, some 35km to the north, will be a truck and shovel operation.

Home for most of these 700 western miners is in Farmington, just over 30km to the west of Navajo.







Utah's eastern steam coal operations lie in Kentucky and West Virginia, where Sierra Coal Company produces coal from both open cut and underground deposits (left). One surface mine is company owned, and six others and one deep mine are on contract. About three quarters of current output is from contract operators.

Sierra also has an active coal brokerage business.

Coal haulage is by dump truck (right) to the Skyline preparation plant, able to handle 1,000,000 tonnes a year of washed coal.

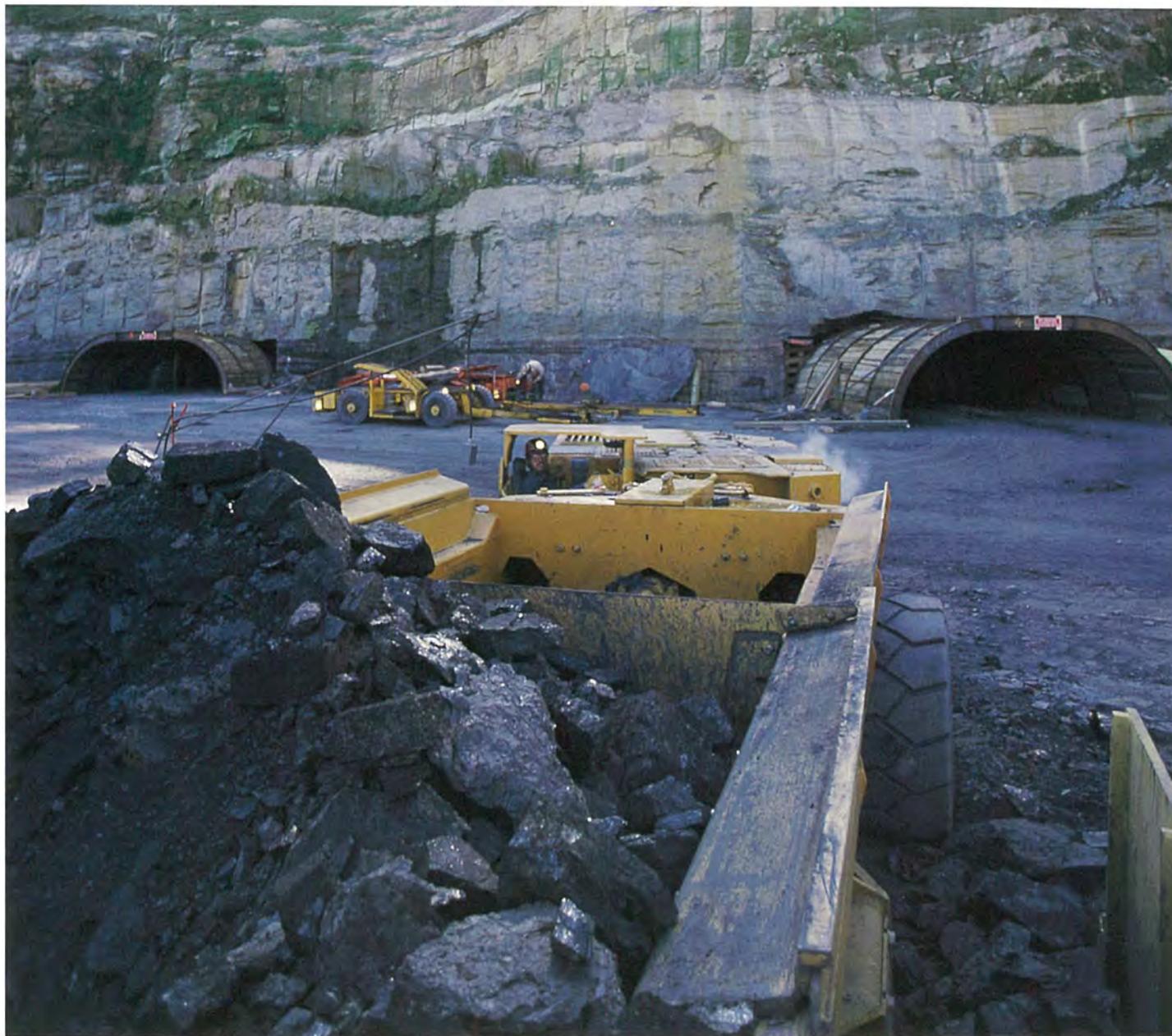
Delivery to customers in the US is by rail, and to overseas buyers through the Dominion Terminal coal port facility and Newport News, Virginia (above). This plant, which is 30 per cent Utah owned, can handle throughput up to 14,000,000 tonnes a year.

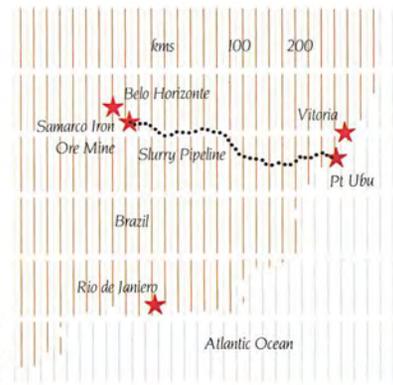
All told, Sierra controls about 300,000,000 tonnes of low-sulphur to medium-sulphur coal.



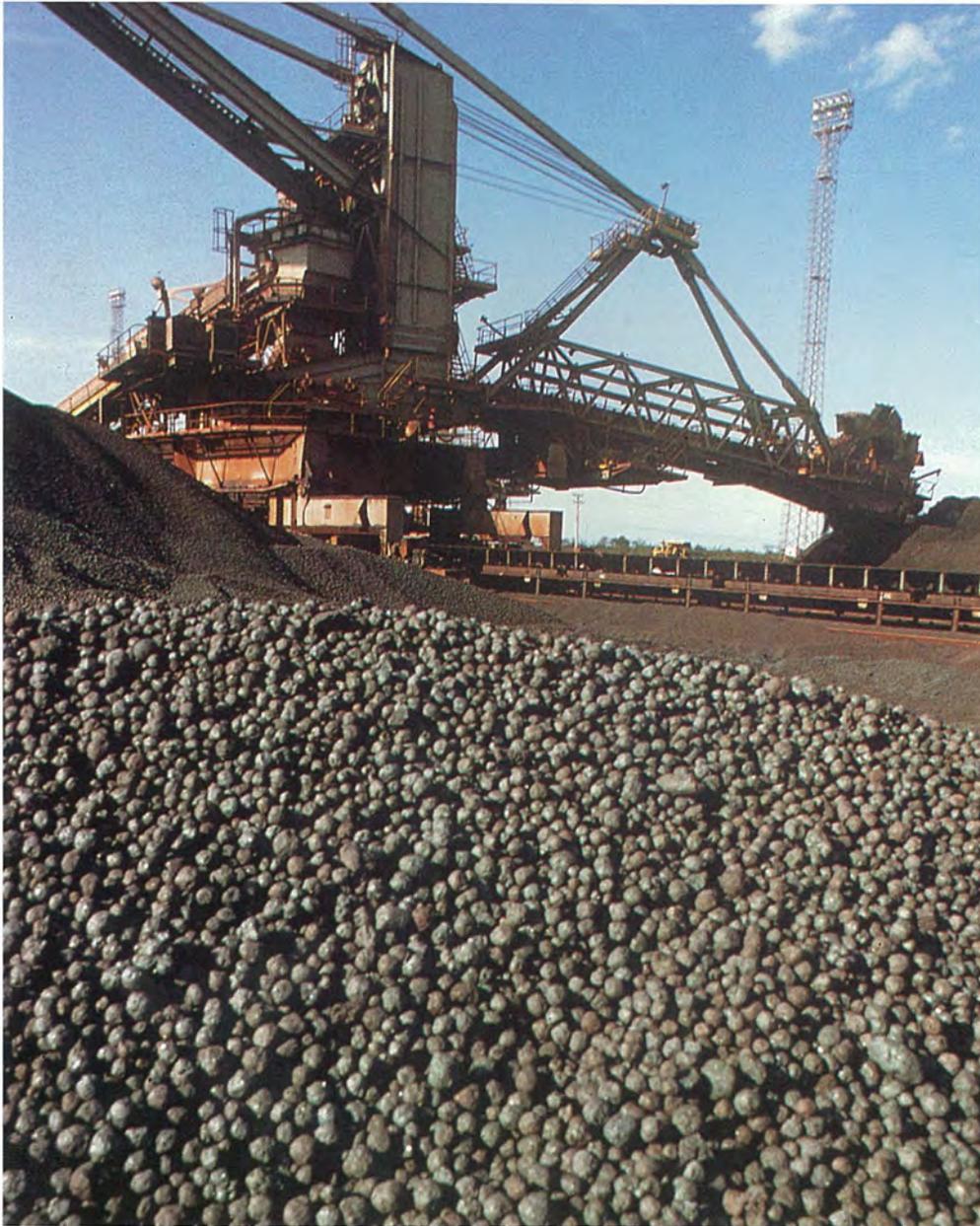
Utah also has extensive coal reserves in South Africa, Indonesia and North America. These include the 75 per cent owned Delmas reserve, a steaming coal deposit well placed to serve industries in the Transvaal. Plans already completed suggest a mine producing up to 20,000,000 tonnes a year depending on market conditions.

Two deposits on the island of Kalimantan, which could support output of up to 5,000,000 tonnes annually, are currently being investigated. Other reserves are held in several US states and in British Columbia.





**Samarco
Iron
Ore
Project**



The Samarco iron ore project (49 per cent owned by Utah, 51 per cent by the Brazilian iron ore producer Samitri) is based on a deposit at Germano, 120km east of Belo Horizonte.

The ore is surface mined from 12m benches. Conveyor belts run from collection points in the mine to the processing plant where the ore is crushed, screened and separated by flotation. Concentrate at 67.5 per cent iron is then pumped down the world's longest slurry pipeline to Point Ubu, dropping 1000m to sea level on the way.

Iron is shipped as slurry or as pellets (left) produced at the Point Ubu plant which has a 5,000,000 tonne annual capacity.



Utah also has a 75 per cent share in and manages a New Zealand iron sand dredging operation, shipping a titaniferous product to Japanese customers.

The Ok Tedi project started up in 1984, a mining venture based on a rich gold/copper deposit in what must be some of the most difficult country in the world.

Mt Fubilan, of which the orebody forms the core (right) is at an altitude of 1630m and is only some 18km from the border with Irian Jaya.

The nearby village of Tabubil, itself at 634m, has become the base for the mine, connected by a 134km road to the Fly River port of Kiunga, the largest regional centre.



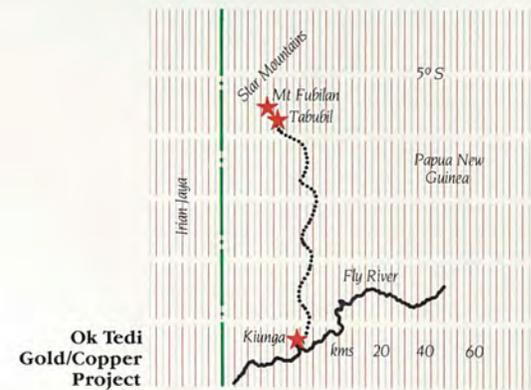


The Star Mountains in the far north-west of PNG's western province form part of the spine of the highland region, only about five degrees south of the equator. (left). Dense rain-forest covers the slopes.

Supplies are shipped up the convoluted Fly River to Kiunga (right) and then trucked into Tabubil. Nearly 400 houses have already been built at the town by the mining company, which is also responsible for providing schools, health centres and other facilities.

During the early stages of the mine's development, the dore bullion product is flown out of Tabubil to Port Moresby. Further development involving production of copper concentrate will entail trucking the product to Kiunga for transhipment to barges. New wharves and handling facilities are being built at the river port.

Ok Tedi Mining Ltd is a PNG-registered company of which BHP holds 30 per cent, with another 30 per cent held by a subsidiary of Standard Oil of Indiana, 20 per cent by a group of German metal companies, and 20 per cent by the PNG Government.





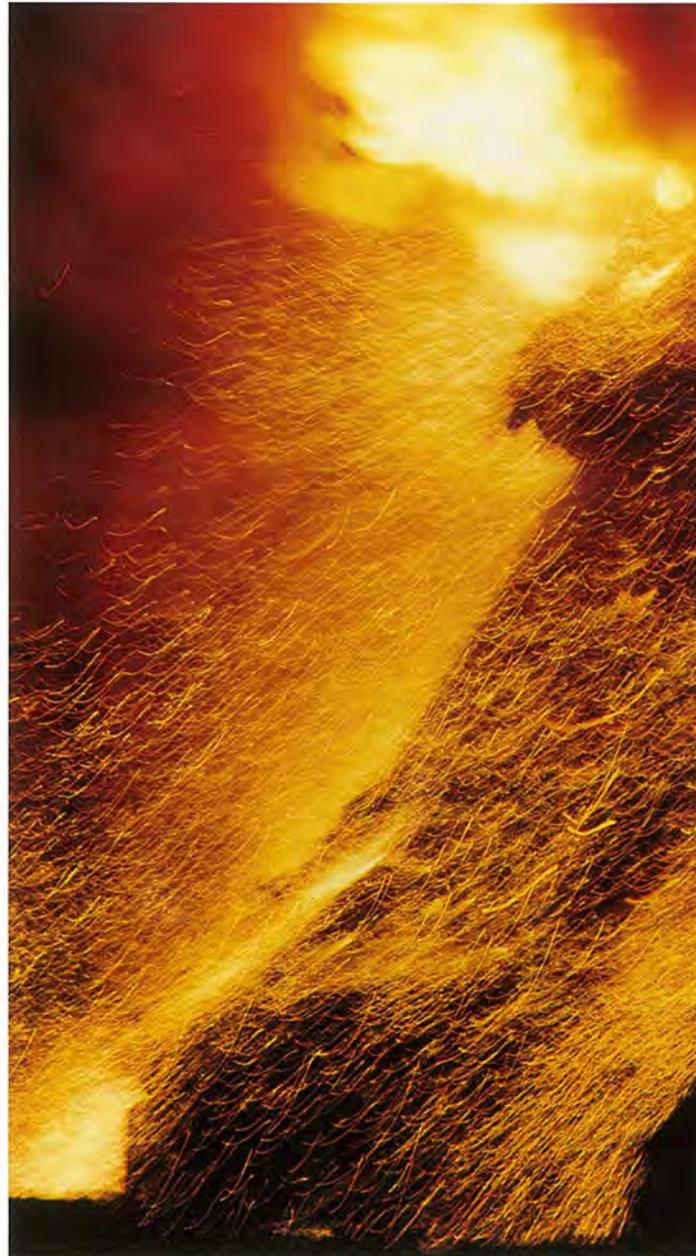


The Port Kembla works of Australian Iron & Steel Pty Ltd, (left) the largest employer in the BHP group, sprawls along a section of the narrow strip of land between the coal-rich Illawarra Ranges and the sea, south of Sydney.

This whole Wollongong area owes much of its development to the post-war expansion of the steelplant and the consequent growth of satellite industries in the district. The harbour in which huge bulk carriers now discharge iron ore or load export coal is man-made, and the steelplant itself stands on what was once a marshy lagoon.

Magnificent beaches and a lush hinterland provide a unique setting for a major centre of heavy industry, while the flavour of life still reflects the multi-cultural origins of the people of the district. The post-war migration programme brought new settlers here by the thousand from virtually every country of Europe, joined more recently by others from Asia.

Now maturing as a community, with its own university, colleges and thriving regional shopping malls, Wollongong remains a place of young people.



Steel

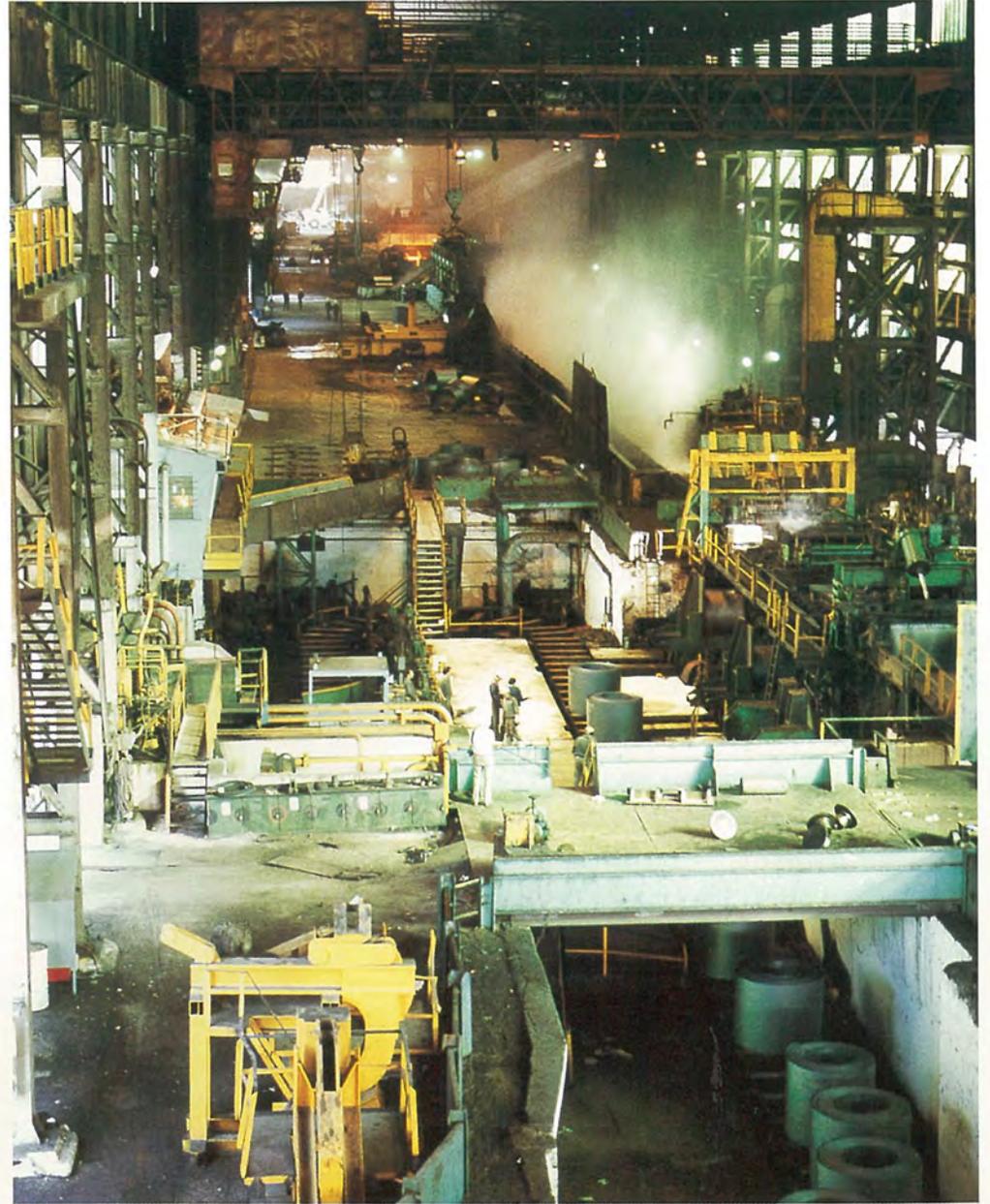
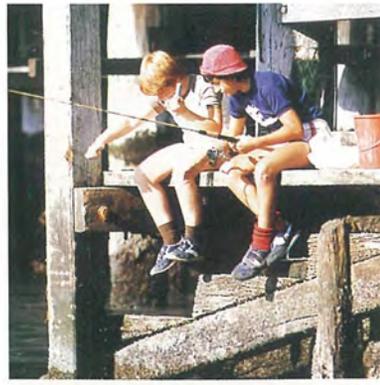
made at BHP's three integrated plants provides the key input for much of Australia's manufacturing and construction industries. The group's raw steelmaking capacity is now 6,600,000 tonnes a year, all made in BOS vessels and much of the output continuously cast. Besides supplying the bulk of the domestic market the Steel Division and John Lysaght Australia (JLA), the sheet steel subsidiary, normally export 20-30 per cent of their production.

The largest plant at Port Kembla NSW chiefly makes plates, hot rolled strip, tinplate and other flat products, including feedstock for JLA. From the Newcastle NSW works comes a full range of merchant bars, rods, steel strapping and pipe feedstock. The Whyalla SA mills roll mainly heavy structurals and rails.

There is also a merchant mill at Kwinana WA and a rod mill at Geelong Vic; a blast furnace and sinter plant at Kwinana await market recovery to resume operations.

JLA operates major rolling mills, galvanising lines and paint lines at Port Kembla and at Westernport Vic, with the latter plant including a modern hot strip mill. JLA subsidiaries produce a range of steel building materials and furniture, and have roll-forming and warehousing operations throughout South East Asia and the Pacific basin.

Given the high degree of integration in BHP's steelmaking (the group is almost completely self-sufficient for raw materials) transport, and particularly sea transport, forms an important part of the Steel Division. The BHP fleet carries not only raw materials to the steelplants, but also lifts other bulk cargoes around the Australian coast and in international trades.





Establishment of the flat products plant at Port Kembla, with the hot strip mill (left) as its centre was one of the major events of Australia's post-war expansion. Coils produced by the mill become the feedstock for the range of sheet steels used by the automobile, consumer appliance and other manufacturing industries, and also for Port Kembla's two electrolytic tinplate lines.

Tinplate produced on the latter units finds many uses, but particularly as the cans and containers essential in the food and allied industries.

Output of Port Kembla's plate and merchant mills goes largely to the engineering and construction industries.

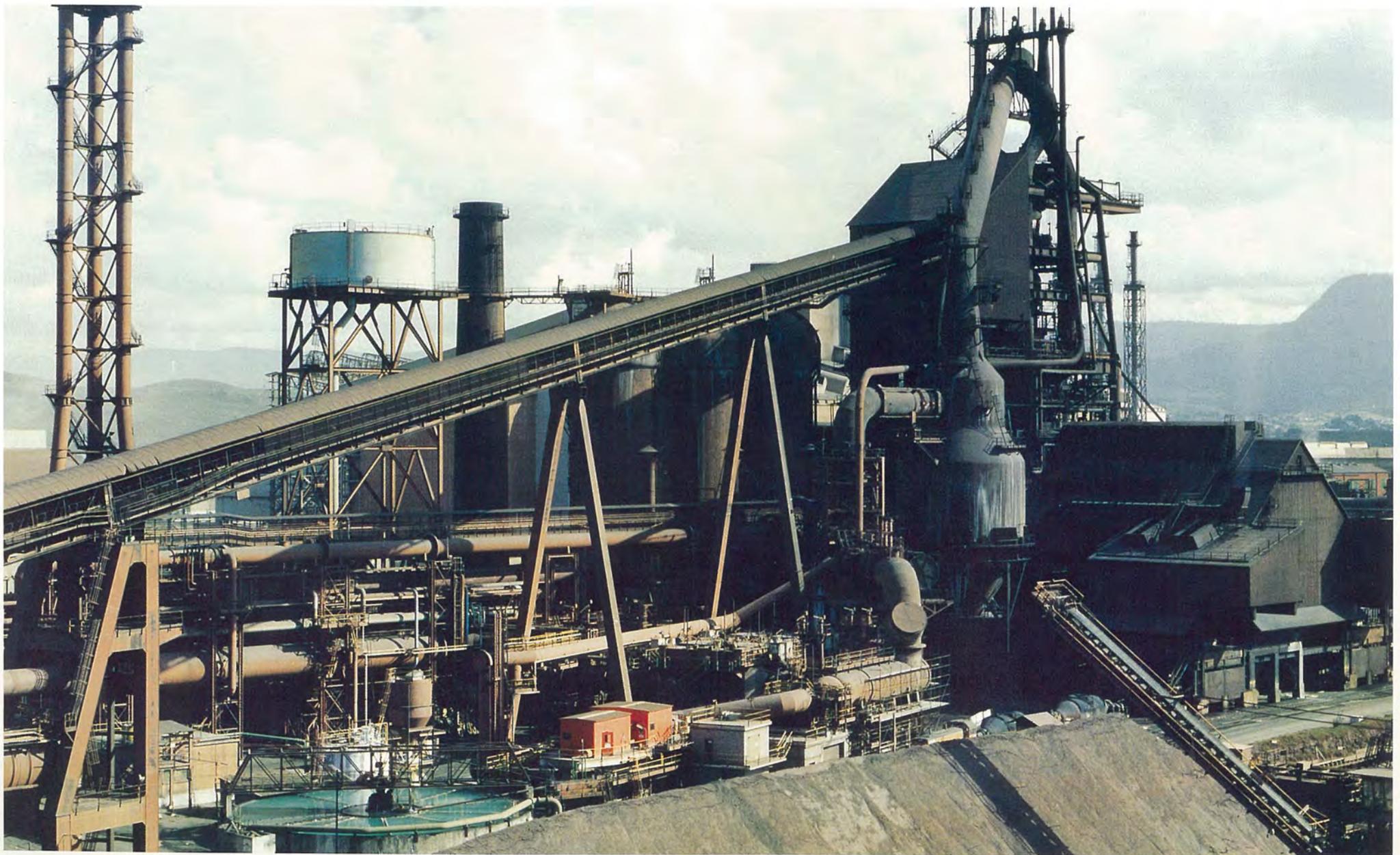
Bulk carriers bringing iron ore and other raw materials to the steelworks berth at an inner harbour (above right) where some 15.8m of water depth is available. (The 105,500 dwt ship in the picture is one of the BHP fleet). Coal is delivered by rail from the escarpment collieries.

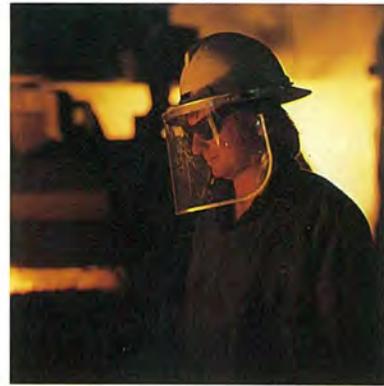
At the works, coke is made in four batteries of ovens with a total capacity of about 6400 tonnes a day, and the two sinter plants have a combined annual capacity of some 6,600,000 tonnes.

Steel is made in three BOS converters of 270-tonne capacity each (picture below right gives a glimpse inside one vessel) with an electric arc steelmaking shop making stainless and special grades. Argon from the plant's tonnage oxygen plant is used for vacuum degassing and molten steel stirring.

At the centre of the plant's tight production and quality control system is a very large data processing development, including three IBM 3081 computers. Current planning includes the integration of the system from shop floor through all administrative and marketing levels. Some of the microprocessors in use have been designed in the group's own research establishments.







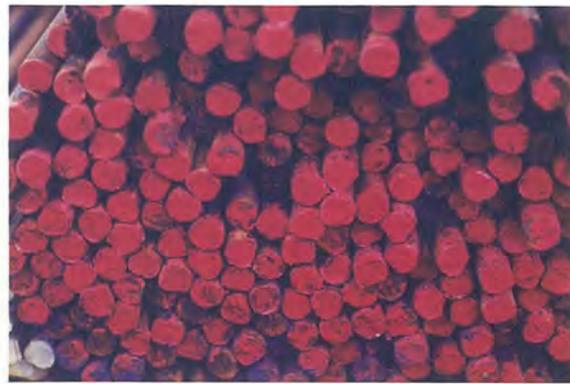
Port Kembla's No. 5 blast furnace (left), the largest in the group, with its bell-less feed system and twin casting floors, has a 12.5m hearth and a nominal daily capacity of 5700 tonnes. Record actual production is a monthly average of over 6000 tonnes of iron a day.

As part of the industry plan, BHP pledged to commit \$800,000,000 in new investment in steelmaking over a four-year period. The main thrust of this will be to improve productivity, efficiency and product quality.

The plant's slab caster (right) with an annual capacity of 1,100,000 tonnes is to be duplicated in a works development plan currently in hand.

Total workforce at Port Kembla is now about 14,000, down substantially from the peak figures of a few years ago. This is in line with the general rationalisation in the Australian steel industry from 1983, in the course of which a government/industry plan was adopted with an industry authority to monitor progress.







The Newcastle steelworks (left), the original plant built by BHP, lies along the south bank of the River Hunter, virtually surrounded by other industrial development.

With two blast furnaces operating, the plant's nominal capacity is 1,600,000 tonnes a year, with employment around 7000.

Steel is made in two 200 tonne BOS converters (picture at right shows a furnaceman taking a sample for testing).

Two merchant mills, one with alternating vertical and horizontal stands, produce a range of sections for engineering and general manufacturing industries.

A four-strand rod mill rolls all the feedstock required for the wire-drawing industry, while a skelp and strip mill provides feedstock for pipe and tube manufacture. A large proportion of output from both these mills goes to the nearby plants of subsidiary and associated companies of the group.

Newcastle remains one of Australia's largest centres of heavy industry, besides being a major port for the export of coal and other products.

There is now a remarkable diversity in the whole Hunter Valley district, with large-scale collieries and power stations contrasting with dairy farms and orchards, while on the surrounding slopes are to be found some of Australia's most notable wineries.





Whyalla lies on the western shore of South Australia's Spencer Gulf (left). The road running to the top of the picture goes to Iron Knob, there to join the Eyre Highway which crosses the Nullabor Plain to Perth. Outside the city, this is saltbush country, and even the waters of the gulf are so heavily saline that they support a solar salt industry.

The centre's two blast furnaces (one currently is in operation) are on the harbour on the right of the picture, with the steelplant behind it and the city itself on the south side of the railway line, the left of the picture.

Whyalla's steel product range includes structural beams and columns, and rails, steel sleepers and accessories, particularly the specialised types needed for heavy-haul railway use.

Steel is made in a BOS shop (right) with two 120-tonne vessels. The regular export of semi-finished steel has been a feature of the plant's operations for some years.

The works draws its iron ore from the Iron Monarch and Middleback Range deposits, just over 60km inland from the coast. Coal is shipped in from the east coast works.

Still very much a BHP environment, Whyalla is withal an open city, South Australia's second largest, with a lifestyle shaped by the sun and open spaces.





John Lysaght (Australia) Ltd, a wholly owned BHP subsidiary since 1979, is an international business in its own right, with operations in ten countries outside Australia.

There are two major sheet-steel manufacturing plants, one at Port Kembla and the other at Westernport Vic (left). Galvanised and other coated sheet from these works is sold direct to customers, and also supplied to JLA divisional and subsidiary outlets which market a complete range of sheet steels, building components, steel furniture and storage equipment.

JLA has been particularly successful with a range of zinalume products, using a zinc/aluminium coating. Originally developed by Bethlehem Steel of USA, this material has now been established in the market by the joint effort of the two companies.

The JLA plant at Port Kembla takes hot rolled coil feedstock from the adjoining steelworks for further treatment and processing in galvanising, zinalume and paint lines. The product range includes PVC laminated sheet and other specialised material, handled through an extensive warehousing operation (right).

There are 25 JLA service centres scattered around Australia, with a research centre at Port Kembla particularly involved in new product design and in developing process control and automation techniques.





At Westernport, the JLA plant includes a technically advanced hot strip mill (left), cold mill and temper mill, with other treatment units and product lines. Slab feedstock is shipped around the coast from Port Kembla steelworks to the plant's own berth.

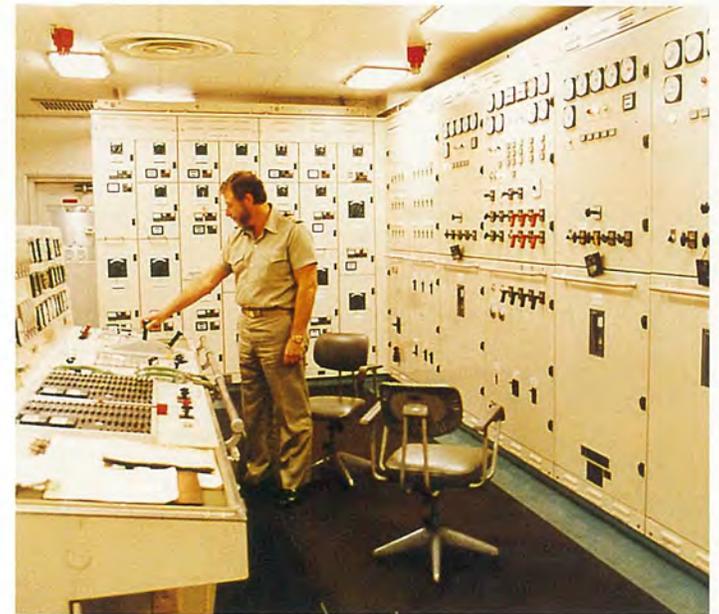
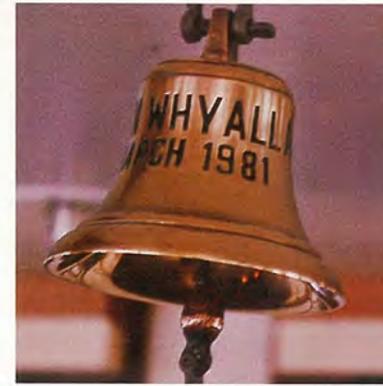
BHP Transport, which is a part of the steel division for organisational purposes but which operates both within and outside the group, has an increasing international role.

Ships of the fleet use a triangular trade pattern in delivering bulk cargoes to Japan and South Korea, then returning to load iron ore from Western Australia for the east coast steelworks. In addition, bulk cargoes and shipments of products are lifted around the Australian coast.



The fleet already includes five diesel-driven vessels over 100,000 dwt capacity. (Picture at right are on board Iron Whyalla, 141,435 dwt and 283m in length, with Captain Derek Bolus at lower right).

Three new ships are on order. Two building in Japan will be of 147,000 dwt each, and another building in South Korea will be of 220,000 dwt. This largest vessel with a length of 315m and a 55m beam will draw only 15m, and is designed to lift up to 210,000 tonnes of coal in each shipment from Queensland ports.



SIZE 25
OPER. PL
MACH. AS
LENGTH 337

Steel in the form of wire is one of those applications of the material that is often unseen and usually unremarked, either because it is hidden or because it is not recognised. The companies of the Australian Wire Industries group, however, use about 500,000 tonnes of steel a year in plants spread around five cities to supply markets both within Australia and overseas.

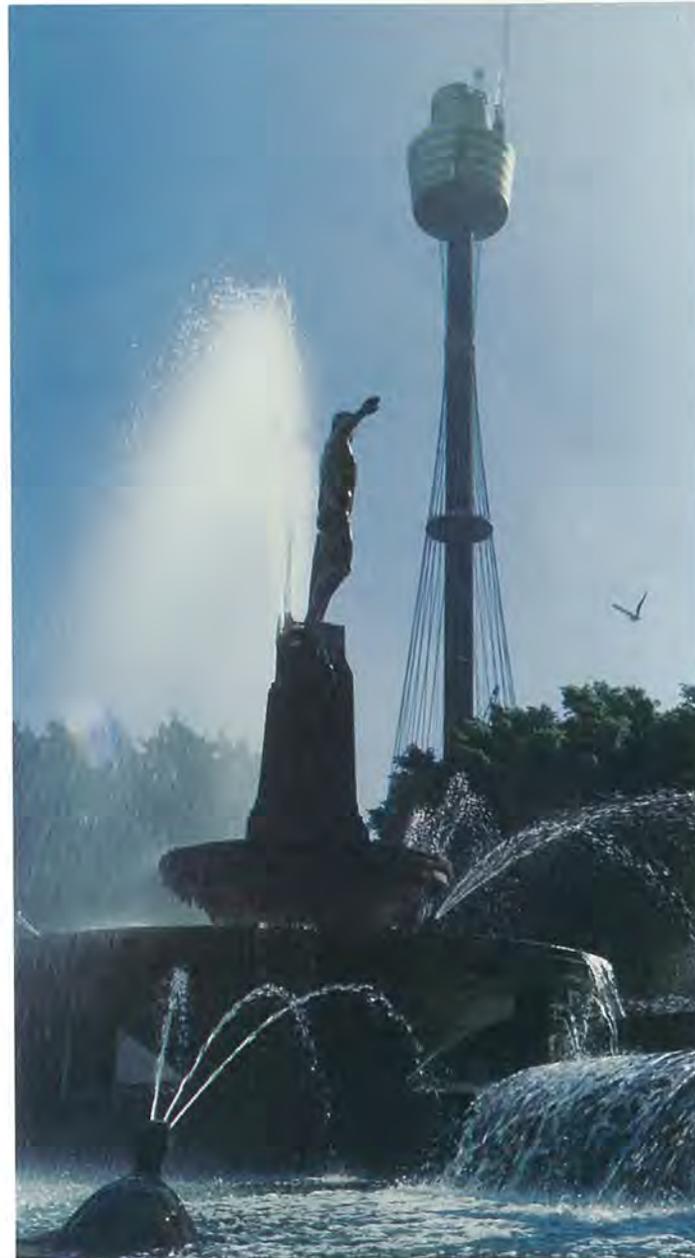
The range of products extends from the fine brass-coated high tensile wire used in the manufacture of belted radial tyres (left) to the special wire rope supports for Sydney Tower (right), part of the Centrepoint development.

Fencing products made by AWI under the Waratah brand are an essential part of the familiar scenes around Australian farms and gardens. Wire netting, welded fabric, chain wire mesh and plastic coated wire are widely sold, along with Fibresteel for concrete reinforcing.

Nails, staples, ties and fasteners of many types are made at several centres, to find a great diversity of uses.

Australian wire ropes haul logs out of Asian forests, while Australian wire springs support car passengers and sleeping people, all enjoying the comfort obtained.

Steel wire, AWI wire, is very much a part of modern life.



BHP

is the ubiquitous presence on the Australian manufacturing scene, not only for its steel input.

The group's wiremills operated by Australian Wire Industries Pty Ltd comprise one of the world's largest manufacturers of wire products, while Rheem Australia Ltd, (66.9 per cent owned) makes containers, appliances, packaging and plastic products throughout the country and in New Zealand and Indonesia. Australian Industrial Refractories Ltd is the group's refractory brick producer.

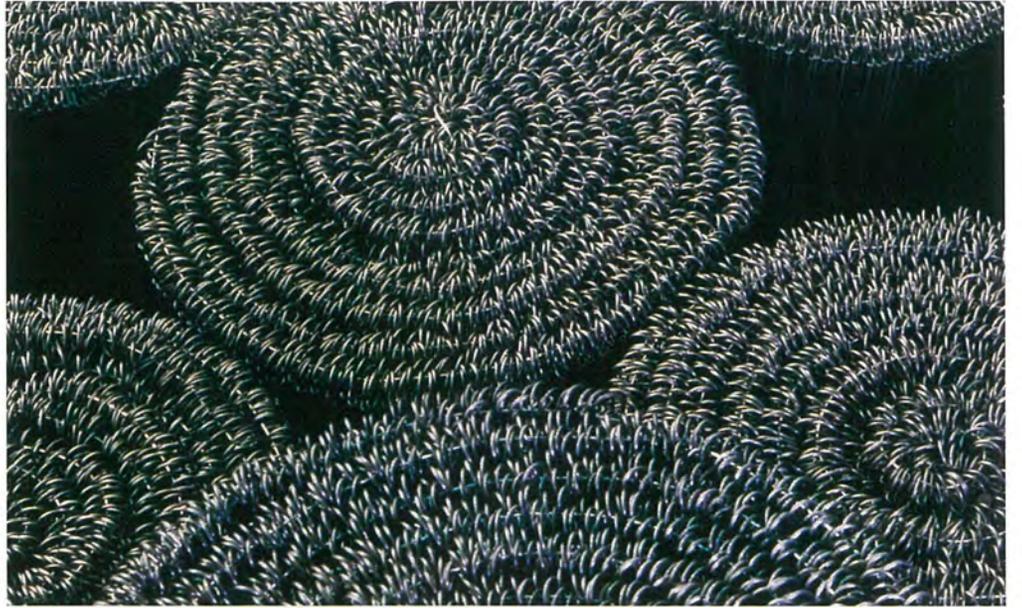
BHP Engineering, besides working within the group, undertakes large-scale construction projects as an international competitor.

In addition, six companies in which BHP has a substantial investment are among the leaders in their respective fields, and each represents a partnership with companies that are world leaders in their various industries.

Tubemakers of Australia Ltd (49.75 per cent owned) is the country's biggest producer of steel pipes and tubes, while Comsteel Vickers Ltd (38 per cent) produces special and stainless steels, railway wheels and heavy equipment.

Koppers Australia Pty Ltd (42.5 per cent) refines by-product tars for timber preservation, protective enamels and other industrial applications. Seco Titan Pty Ltd (50 per cent) makes tungsten carbide tools and tips.

Blue Circle Southern Cement Ltd (40.9 per cent) is one of Australia's largest cement manufacturers, and Commonwealth Aircraft Corporation Ltd (33 per cent) makes aircraft components, defence equipment and high technology products.



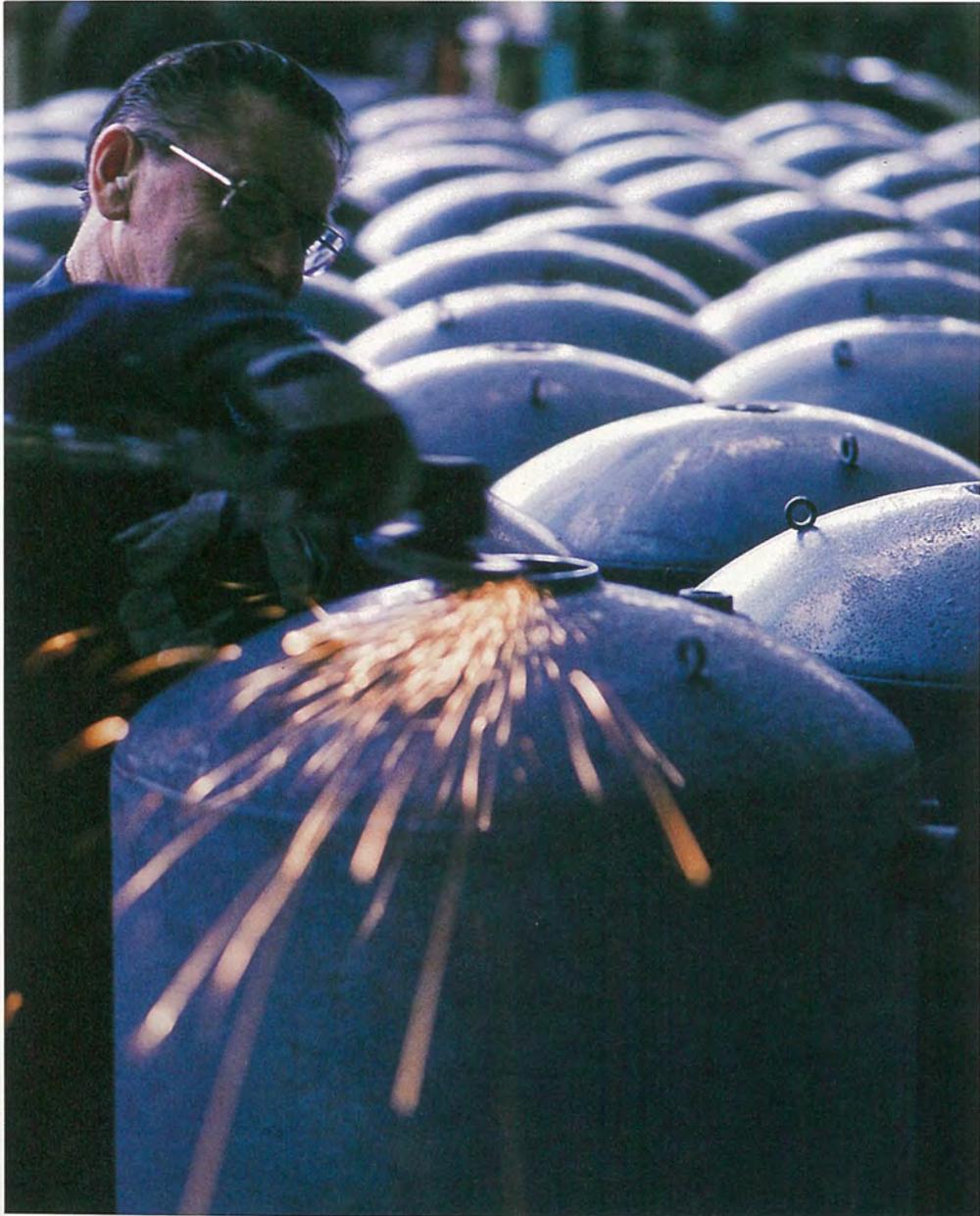
The technology of wire-drawing is complex and highly-specialised. AWI (itself one of the largest in the world industry) has been in the forefront of technical innovation. For instance, a system of using gas flames to wipe surplus zinc from wire passing through the galvanising process was introduced by the company and has been widely licensed for use by other manufacturers.

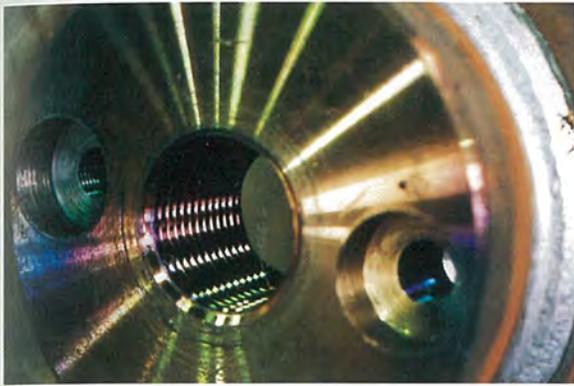
Each application for the many types of wire products (some are shown in the pictures at left) calls for a particular metallurgical or other control.

Australian Industrial Refractories Ltd (wholly-owned) with plants at Mayfield, Thirroul and Unanderra NSW is the largest producer of refractories in the country, supplying BHP steelplants and other industries. Overall annual capacity is about 140,000 tonnes.

Products include firebrick, high alumina, basic pyrophyllite and zircon refractories made in a variety of shapes and also as castables, moulding materials and cements. Picture at right shows operations at the zircon pyrophyllite plant at Mayfield with pyrophyllite bricks being taken from the press in the background to the tunnel kiln cars for firing.







Rheem Australia Ltd (67 per cent owned) is a company diversified on a scale that runs from Coca Cola to transit concrete mixers, from street lighting poles to toothpaste tubes and dishwashers. Central to the company's range of products, however, are containers of all types, tracing back to the steel drums it was formed to manufacture.

Hot water units are today perhaps the most familiar Rheem branded products. They are made (far left) for virtually every purpose using all types of fuel including solar energy. Less well identified are the many types of plastic squeeze tubes (left) made by the company's woven and extruded products division.

Precision engineering is essential for the successful manufacture of such things as the hot water tanks (right) and pressure vessels (lower right) in the Rheem product catalogue. Robotics find a place (above right) in many of the operations involved.



As with other parts of the BHP group, Rheem has developed offshore investments. Company controlled subsidiaries in both New Zealand and Indonesia make Rheem appliances, containers, packaging and engineering products for local markets.

Rheem is listed on Australian stock exchanges.





BHP Engineering acts as consultant, designer and project manager for construction jobs both within the group and for outside clients. Experience gained in the company's own large-scale developments has brought together an engineering team with the special skills required for such work, ranging from advanced photogrammetry and computer-aided design to site and procurement management. The unit is also able to draw on the resources of the group's research establishments.

Major projects currently in hand include the design and supply of a 2000-tonne a day cement plant, with computer-based operation and control, to be built at Shunchang in China's Fujian Province.

Engineering jobs recently completed include the Kooragang coal loader at Newcastle the first stage of which (left and page 28) was completed in 18 months from the signing of the consortium agreements involved.

Earlier, BHP Engineering had built the Saxonvale open cut near Newcastle, the Riverside mine in Queensland (page 30) and the Clinton coal facility at Gladstone (far right). Associated with the building of Clinton was the design and construction of the Callemondah marshalling yards (right) for the Queensland Railways. Inset picture above right gives a bird's eye view of the whole Gladstone complex.

BHP Engineering is geared to compete on the world scene.

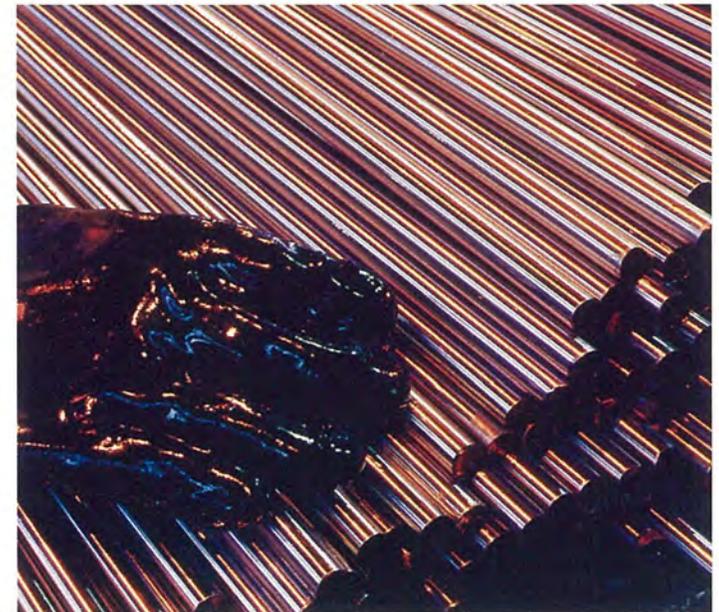
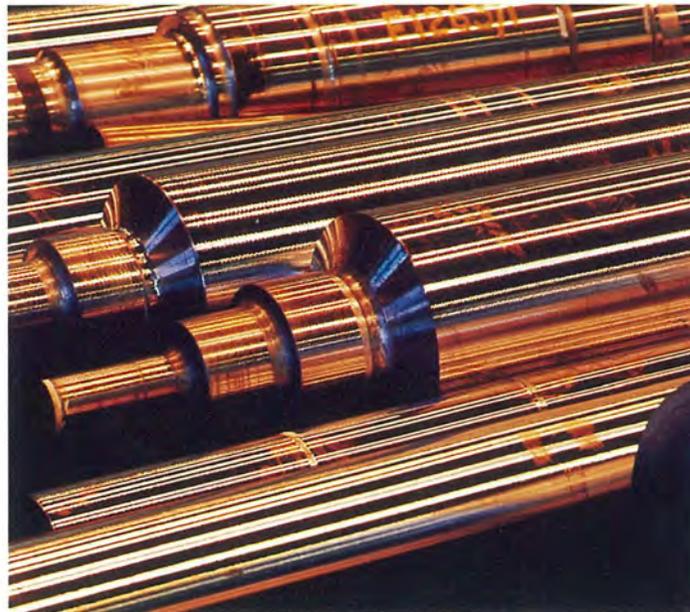


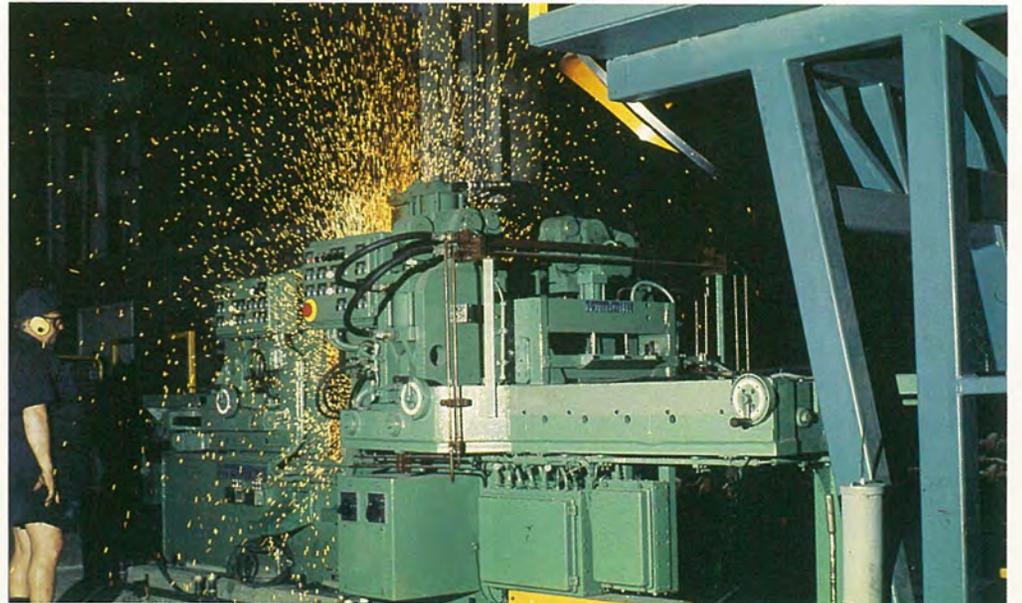
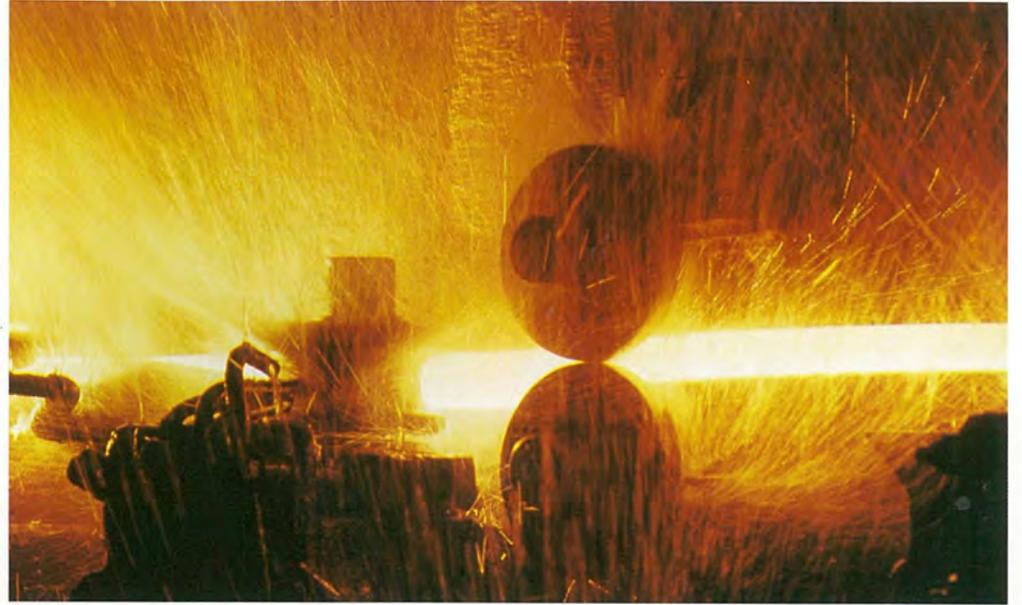


Comsteel Vickers Ltd (38 per cent owned) is the special steel manufacturer associated with the group. The company represents a recent merger of Vickers Australia Ltd's heavy engineering activities with those of Commonwealth Steel Company Ltd, at its plant at Waratah, near Newcastle.

Comsteel's products from the Waratah plant include railway wheels (left), axles (below right) and rail accessories all of which find markets throughout Australia and overseas. Also at the plant are electric arc furnaces and large-scale forging presses (above right). Heat treatment and other processes are available to produce a range of alloy steels for special applications (right).

The merged company now commands high-quality skills and extensive experience in the manufacture of major units of equipment used in the construction, engineering, mining and transportation industries.







Four other investments by BHP in Australian manufacturing, each in very different fields, also involve shared interests with world leaders in the industries concerned.

Blue Circle Southern Cement Ltd (40.9 per cent owned) is a major producer. One of the company's plants, at Berrima NSW, has been recently expanded with the building of a new kiln about to make about 700,000 tonnes of clinker a year. The satellite cooler on the kiln (far left) represents the industry's most advanced technology. The other major shareholder in BCSC is the Blue Circle group of the UK.

Tubemakers of Australia Ltd (49.8 per cent owned) has pipe and tube mills (left) at Newcastle and Kembla Grange NSW and at Adelaide, with distribution centres throughout Australia and in the USA. Other shareholders in TOA are member companies of the Sumitomo group of Japan.

Both BCSC and TOA are listed on Australian stock exchanges.

Commonwealth Aircraft Corporation Ltd (33.3 per cent owned) makes aircraft, defence equipment and high technology products at a plant at Fishermen's Bend Vic. (Pictures above and right show assembly and finishing of a wing section for a Royal Australian Air Force Mirage fighter). CAC operations include manufacture of high-performance jet engines for service aircraft. Other shareholders include North Broken Hill Ltd (20 per cent), ICI Ltd (15 per cent) and Rolls Royce Ltd of UK (10 per cent).

Koppers Australia Pty Ltd (42.5 per cent owned) forms part of the world operation of the US-based Koppers group, specialists in tar distillation. By-product tar from the steelworks coke ovens is treated at the company's Newcastle plant (far right) to yield chemicals for timber preservation, protective enamels, electrode pitch and other products.







BHP

has its head office in Melbourne Vic.

The company's board of twelve directors is assisted by three committees (Finance, Audit and Executive). The group is managed through five operating divisions, three of them (Steel, Minerals, Petroleum) Melbourne-based, one (JLA) is in Sydney and another (Utah) in San Francisco.

Corporate functions include research programmes carried on at establishments at Clayton Vic and Shortland NSW in association with laboratories at the major operating centres. Activities range from pure research in support of new developments to optimisation tests and modelling systems to improve operational performance.

Overall employment in operations managed by the group stands at 63,000. Personnel policies in force call for the creation of mutual trust while emphasising the expectation of excellence in performance. In-house and external training programmes for all levels are constantly maintained and management development is actively pursued. Specialist professional staff throughout the group monitor and advise on occupational health and safety standards.

BHP shares are listed on all Australian stock exchanges and in London. Over 80 per cent of the company's shareholders have registered addresses in Australia. Some 57 per cent of shareholders have 1000 shares or fewer, less than 2 per cent hold more than 20,000 shares.

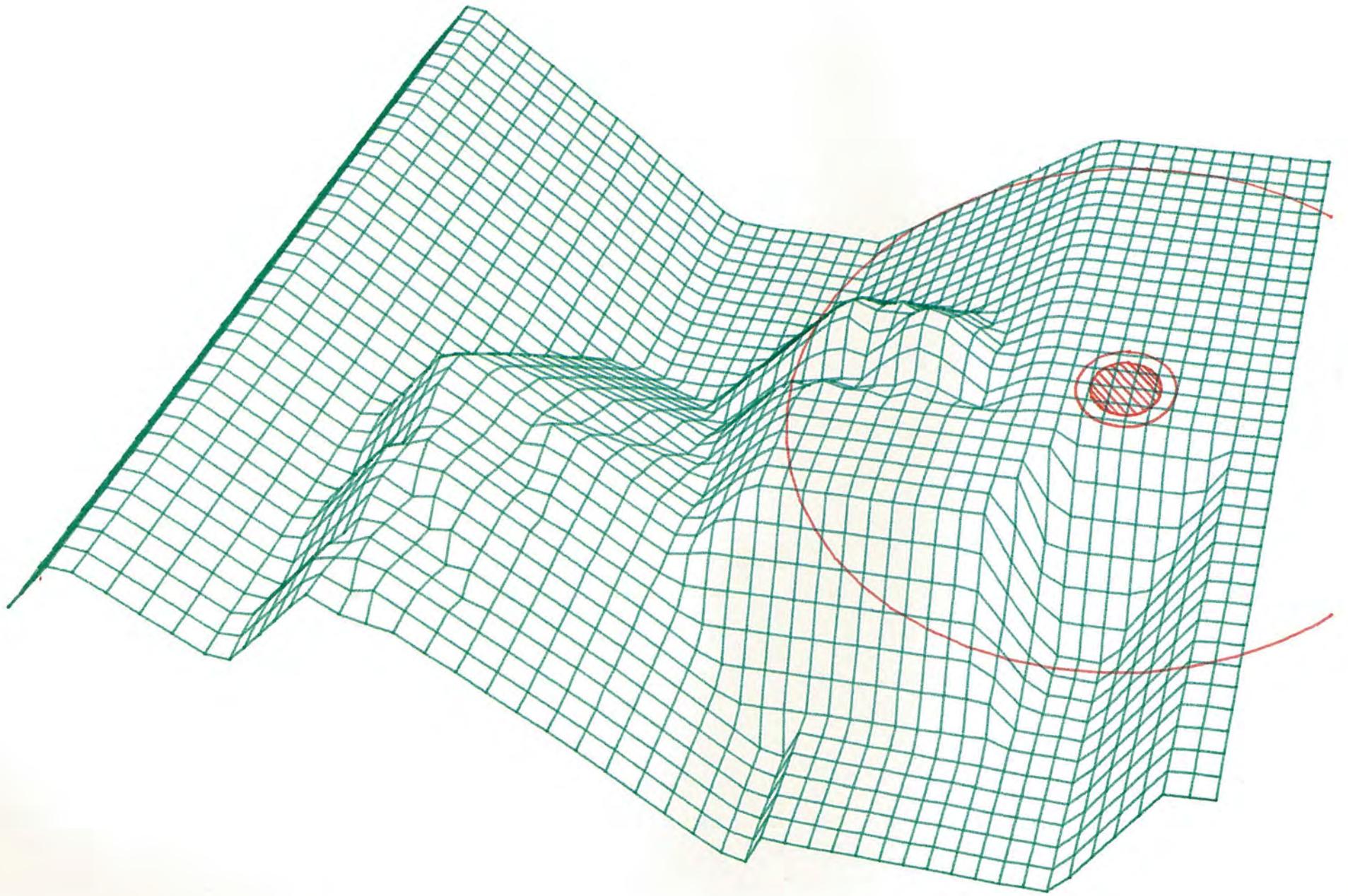
Below:
BHP Board of Directors,
left to right, with the date
joining the board and
executive appointment
shown in parentheses:

L. Gordon Darling CMG
(1953); Sir David Zeidler
CBE (1978); W.D.
McPherson AO (1965);
D.S. Adam (1977)
(General Manager
Corporate Affairs and
Corporate Solicitor);
Alexander M. Wilson
(1984) (Chairman and
Chief Executive Officer,
Utah International Inc);

B.T. Loton (1976)
(Managing Director); Sir
James Balderstone (1971)
(Chairman of Directors);
J.A.L. Hooke CBE (1981);
J.B. Gough OBE (1984);
J.B. Reid AO (1972); Alex
W. Ogilvy (1974); K.W.
Steel AC OBE (1978).

Left: "Burn Off": by
Robert Juniper, Oils, 176 x
183 cms. This painting is
from the BHP House
collection of works by
Contemporary Australian
artists.





Computer simulation of dragline operations in open cut coal mines is a typical research project in BHP Research laboratories. After 2.5 man/years of work at the Melbourne Laboratory, a programme originally bought from McDonnell Douglas Electronics of the US has been developed into an operational technique being applied at the Moura and Riverside mines in Queensland.

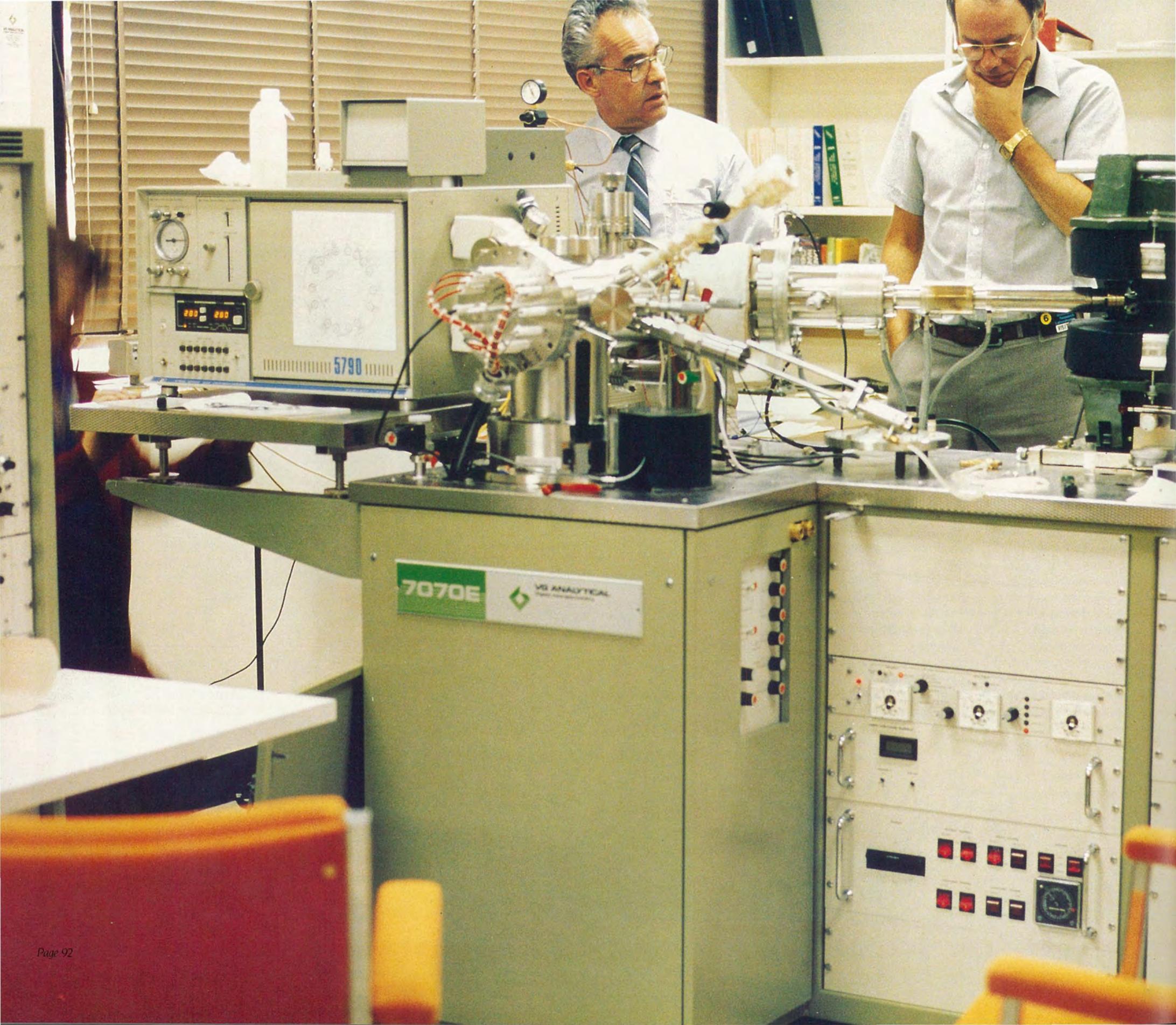
The programme simulates on a cycle-by-cycle basis the digging action and movements of the dragline as it progresses along the pit. The simulation is very detailed enabling subtle changes in stripping procedure or dragline characteristics to be studied. One hour of computer time represents about 24 hours of actual machine operation, so that the analysis of procedure, performance and mine planning can be completed without interrupting production.

As an example, in one pit at Moura the model showed how a change in working bench height could result in a 5 per cent productivity gain. On Moura's largest dragline, every one per cent of productivity gained represents about 15,000 tonnes of extra coal a year.

Picture at left shows a typical computer-generated perspective of a pit produced by the model. The shaded area on the right of the figure represents the dragline base, with the circle representing the operating radius.

Testing of components and structures is another major role of the Melbourne Laboratory. At right, lab officer Michael Elliott places a tensile specimen in a 1000 kN Instron machine in a commissioning exercise.



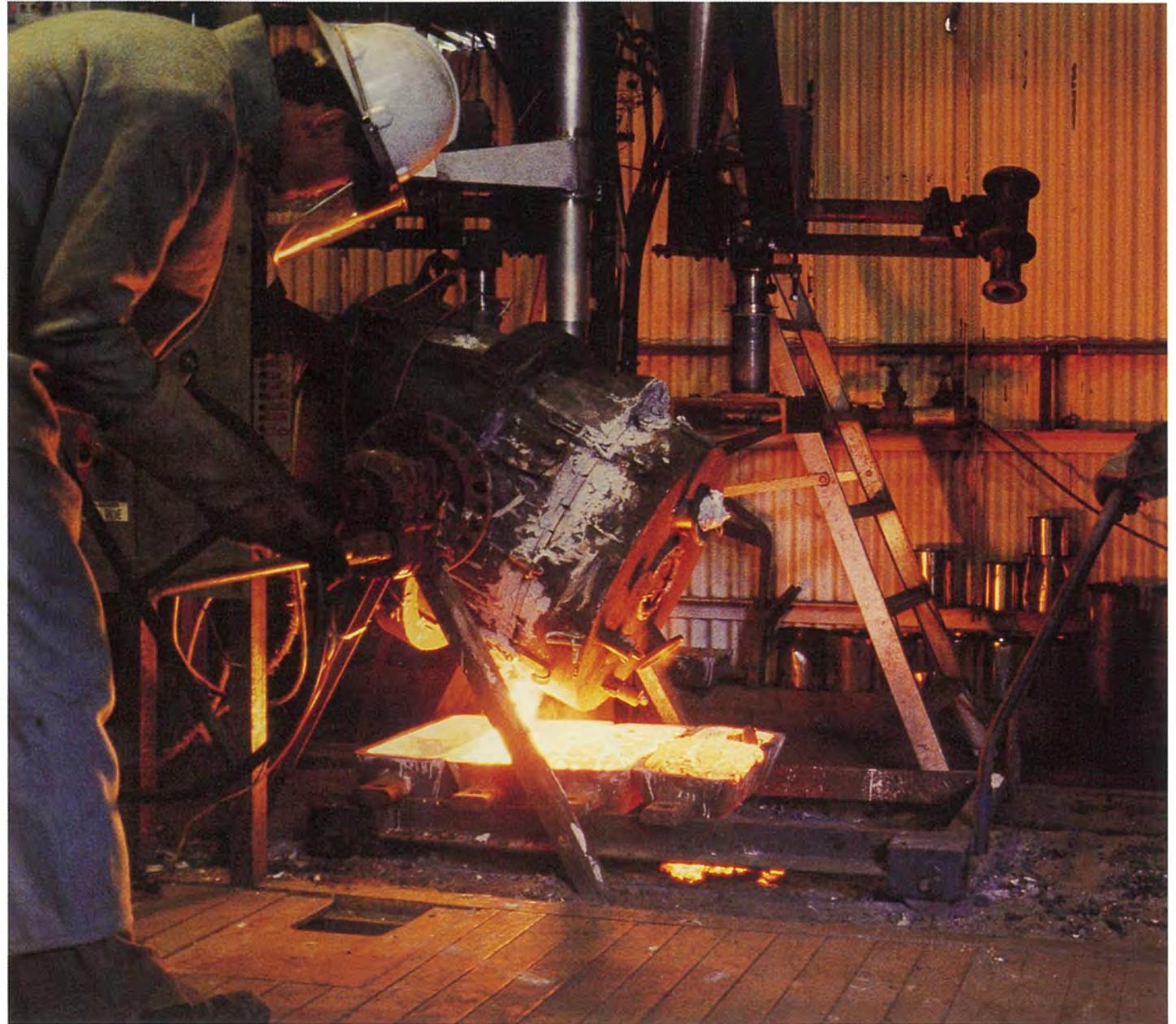


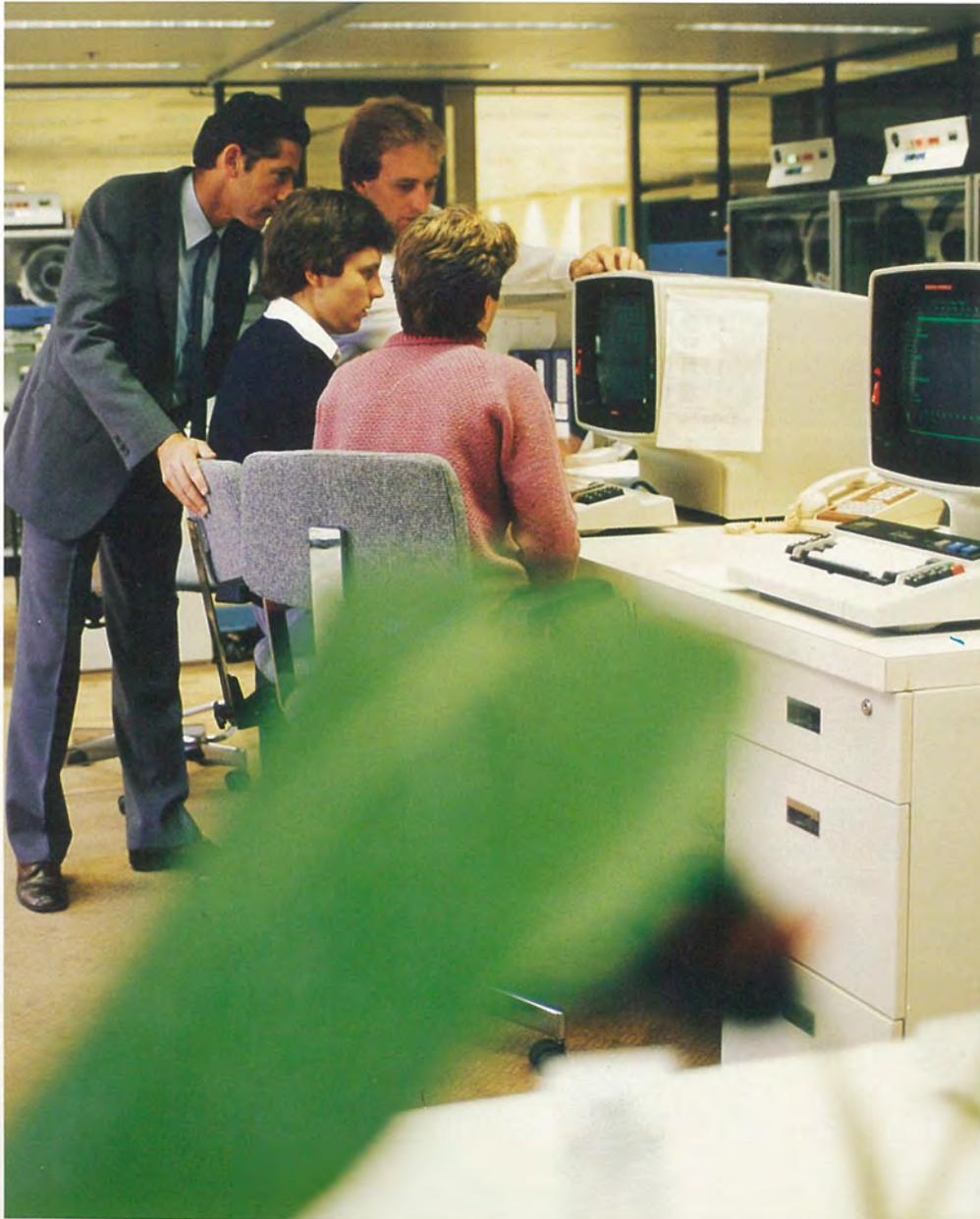


Testing and analysis of petroleum products, together with extensive work on coal and natural gas conversion to transport fuel is carried on at the Melbourne Laboratory. A full-scale pilot plant producing high-octane gasoline from coal has been used in a series of studies to establish the industrial processes involved.

Analysis of the products of such experimental work, together with analysis of crude oils to assist petroleum geologists, is undertaken with a gas-chromatograph mass spectrometer, shown at left. In the picture, Bill Mannens of MRL staff (left) works with John Bill, from the instrument's manufacturers, on the installation of the GC-MS.

Programmes at the Central Research Laboratories at Shortland NSW have a bias towards raw material preparation and process technology. Picture at right shows experimental work at plasma smelting, a highly specialised process for the recovery of metals from ores, now under development in several parts of the world.





The BHP group's determination to maintain and extend a competitive advantage in each of its various markets, set out in the company's formal objectives, can be traced through the pattern of corporate activities in the head office in Melbourne.

Management of information systems is a case in point. Over 1000 people are directly involved in the many aspects of data processing throughout the organisation, matching technical innovations with developing management needs. The broad policy is to integrate the full range of information systems, including the traditional computer applications, office practices and communications. Pictures left and right show typical terminal installations through the head office building.

Training programmes directed from the head office also place a heavy emphasis on a competitive approach, with a significant proportion of the overall workforce participating. At any one time about 6000 people are involved in some form of educational programme. . . apprenticeships, traineeships, and various methods of promoting operator skills, safety, supervisory techniques and management development. Picture below left shows a head office training session.





At the office Station
14th May 1885

To the Board of Directors
Broken Hill Mining Company.

(6)

Sir,

I hereby offer my services
to the Broken Hill Mining Company
as General Manager at a salary
of £500 per annum for the first
six months from date & at the
rate of £450 per annum for
the remaining six months
ending 31st May 1886, House
accommodation wood water
necessary horse feed & horse feed
to be found by the Company.
My present engagement to be
for the term of twelve months
subject to be broken by a

Time Past:
The Story So Far





How
the quiet
boundary
rider
found
treasure
in the
hill



"A hill of mullock" was how visiting prospectors described the black rocks along the ridges of the broken rise (preceding pages) to the men of Mt Gipps station. Within three years of the Broken Hill claims first being pegged however, nearby Silverton was eclipsed in the scramble to open up the new find.

Early mining operations were somewhat haphazard (left) but BHP's first six months resulted in a net yield of £7442. The company's first three years yielded £1,579,377.

It must have been with a sense of mounting excitement that William Jamieson, in that borrowed suit, settled into his seat for the lurching 18-hour coach trip from Silverton to Terowie. It was Sunday 21 June 1885. The previous night Jamieson and the others had drafted their mining company's first formal prospectus for an issue of shares. Packages of that sparse but confident document, printed overnight at the offices of *The Silver Age* in Silverton, were now piled in the coach boot behind Jamieson. Ahead of him, in Adelaide, was the all-unfamiliar task of floating on Australia's share markets a public company, to be called *The Broken Hill Proprietary Company Limited*. The events leading up to Jamieson's hastily-arranged journey were colourful indeed.

The early 1880's were exciting years in the Australian colonies. Cities were prosperous, people were marvelling at such novelties as bicycles and the telephone, while the *Sydney Morning Herald* printing rooms were being fitted with the new electric light. A team of powerful Australians had brought home the ashes of English cricket.

Melbourne was "sabbatarian", but withal the "Metropolis of the Southern Hemisphere" (according to one visitor) and moving towards a land boom. Gas-lit Bourke Street was hearing Salvation Army tambourines for the first time. Sydney's pavements may have been wretched, but the harbour-side homes showed grace and distinction. The rail link between Melbourne and Sydney had recently been completed, giving a little more thrust to ideas for other forms of union.

The total population of the colonies had just passed the two million mark, with unease in some quarters at the recently renewed influx of Chinese migrants. Strikes were frequent. Trade union congresses were pursuing the goals of direct representation in the parliaments, together with a wide range of social issues.

At Ballarat Vic the Phoenix Foundry celebrated the

building of its 100th locomotive with justifiable pride. At Port Kembla NSW the opening of the new harbour was celebrated by the loading of the steamer *Arawata* with coal won from the lush Illawarra escarpment. But at Lithgow NSW James Rutherford destroyed his pioneering blast furnace with explosives, so that he would not be tempted into further loss-making competition with imported iron.

Outside the cities and towns there were harsher patterns of fortune and failure. Such inventions as the stump-jump plough from the Smith Brothers of Ardrossan SA were putting hundreds of South Australian acres under flourishing grain crops. But pastoralists along the great inland rivers were plagued with drought and sheep died by the thousand. There were new gold rushes around Temora NSW of no great scale, while near Rockhampton Qld the Morgan brothers were guarding the secret of what was to become Australia's richest gold mine.

A decade earlier, many prospectors from the gold areas of Victoria and eastern New South Wales turned to the arid country west of the Darling River, near the border with South Australia. Squatters were already running sheep among the saltbush there, sending their fleece down the rivers when the water levels allowed steamboat traffic. The government in Adelaide was pushing ahead with rail links to the rivers to forestall similar Victorian plans. Sydney was too far off to be interested in such trade.

Explorers following the rivers had brought out reports of white quartz in the nearby ranges, and with gold still the lure, many a man humped his swag out into the barren hills. In 1876 payable silver ore was found near Thackaringa, where there was a grog-shop on the track between Menindie, the Darling River port, and Terowie, rail head of the South Australian line. Little notice was taken at the time, although the Pioneer Mine established on the find became the first successful silver producer in the Barrier Ranges.

In 1881 there was a new cry of "Gold!" from an alluvial field found some 150 miles to the north at





American mining engineer John Provis, brought in by BHP, declared in 1886 that the Broken Hill vein was very large, extending with interruptions for nine miles. By then the McCulloch shaft (left) was the deepest working, at 316 feet from the surface.

Meantime, Charles Rasp (left in above row of portraits) had abandoned his boundary rider's hut (above), married in Adelaide in July 1886 and set up home there.



George McCulloch (centre of row) moved to Melbourne first, then to London.

Philip Charley (right in row) went on a world tour and then settled in the Hawkesbury River district of NSW.



Mt Browne. The promising yields resulted in a new influx of diggers to the Barrier, but soon it was realised that the search should be for silver. Within a very short time, rich outcrops of chlorides were found around Thackaringa and nearby Umberumberka. Small-scale mines spread over the hills, with all the stories of fortunes made and lost by hard work, luck or speculation.

Umberumberka under canvas quickly became the town of Silverton, with banks, hotels, breweries and even a newspaper. Within a few years, the population of the district jumped to 5000. Fortunes in silver slugs there may have been, but creature comforts were few. The drought was hitting hard, with water in the town selling for 6d a bucket when brackish from the soaks, 1/- if from Mingary across the South Australian border. Supplies of all types were brought overland from Terowie, while teams carted out the ore on its way to England for smelting. Afghan hawkers heading for the sheep runs along the Darling called at the town to offer cloth, cooking gear and boots. Fights there were aplenty, and many the new arrival who gave all he had for a worthless claim doctored to defraud. One Richard O'Connell was the police officer and warden's clerk for the district; his cottage was near the homestead of the Mt Gipps pastoral run, owned by McCulloch Sellars & Co of Melbourne. Sir James McCulloch, a former premier of Victoria (his was the first Australian government to legislate for income tax), was a principal of the firm. His nephew, George McCulloch, 35, was an experienced station manager who had worked in South America before coming to Australia. He had been manager at Mt Gipps for eight years when, in 1883, he faced a new problem on his drought-ravaged sheep run.

Charles Rasp, the boundary rider, had come in to say he wanted to throw in his job. An impulsive man of powerful temperament, McCulloch was shrewd enough to want to keep a good hand, and Rasp was certainly that.

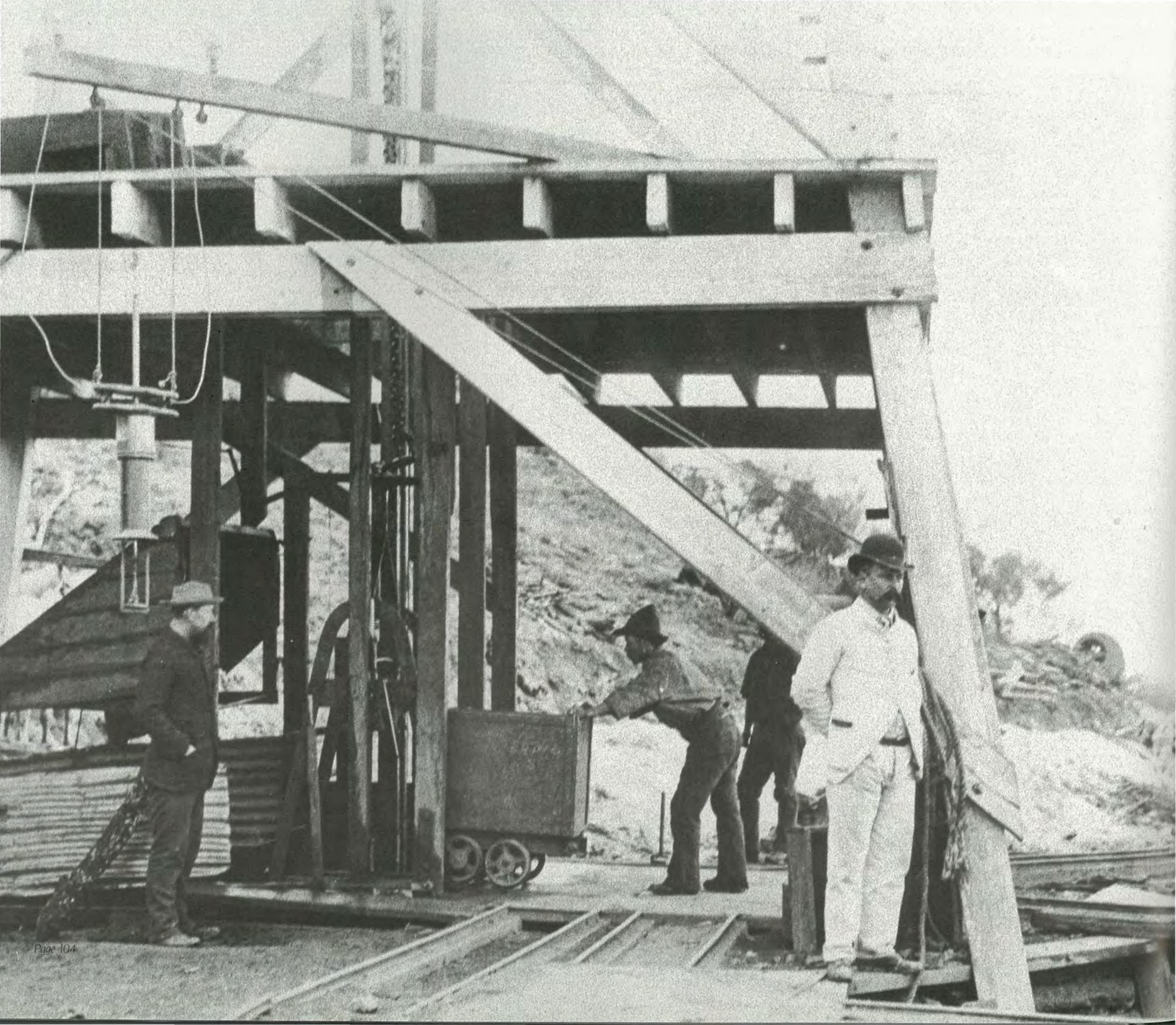
He was quiet, better educated than most around, and an experienced bushman. Rasp had come to Australia from Germany in 1869 when a young man of 23. He was a chemist by training but for 14 years had worked on stations along the Upper Murray and the Darling. So, in the homestead's evening light, bit by bit, McCulloch got from Rasp his story.

In spite of the manager's well-known objection to anyone pegging claims on the Mt Gipps property (not that it was regarded as particularly prospective) Rasp and the two dam-sinkers working at the station had pegged out about 40 acres on the broken hill some twelve miles away. A claim had been lodged with O'Connell, the policeman-warden. The three men believed that the black capping on the hill was oxide of tin, and as evidence Rasp was able to quote from his *Prospectors' Guide*, a booklet published by the South Australian Department of Mines and something of a fossicker's bible.

In short order, McCulloch proposed his plan. He and all the others at the station would join to form a syndicate, all of the hill would be pegged, and between them they would be able to keep others out and to find the money to develop the find. Rasp and the two contractors, McCulloch pointed out, would not be able to find the money themselves. So it was agreed, and the first Broken Hill syndicate was formed, the members being:

- George McCulloch, Mt Gipps station manager
- Charles Rasp, boundary rider
- George Urquhart, sheep overseer
- George Lind, storekeeper
- Philip Charley, jackaroo
- David James, contractor
- James Poole, his mate.

By 21 September 1883, the syndicate had agreed that each should find £70, starting with £1 each a week to pay for the leases and for a shaft to be sunk, undertakings that were in fact never met. But Blocks 10 to 16 had been pegged and claimed, stretching about two miles, and





Ore skips were first loaded and wheeled by hand, producing the scene at the top of McCulloch's shaft (left) caught by J. Duncan Pierce, a remarkable photographer of the day. But operations soon became more complex.

One consequence was that William Jamieson (above left) the company's first general manager resigned in favour of a more experienced miner. Jamieson was an Aberdeen man who had been a government surveyor in the Barrier district. Later he sat on the BHP board for 20 years.

William R. Wilson (above right) was a knowledgeable mining promoter. As manager of the Barrier Ranges Silver Mining Association he tried to buy a half stake in the original Broken Hill syndicate, and failing in that, went on to be an early and influential director of the company. His visit to USA in 1886 resulted in the recruiting of H.H. Schlapp as metallurgist and W.H. Patton as general manager, and he first urged adoption of open cut mining techniques.

covering almost all of the broken hill. In Silverton, the miners called it the "hill of mullock".

Rising some 150 feet from the scrubby plain, the hill ran south-west to north-east dominating the Mt Gipps landscape. Thick mulga covered the slopes with wallabies abounding, and along the ridges weathered outcrops of rock stood black and uninviting. But even after the claims were made, station life was still controlled by the drought, although Rasp was able to make occasional trips to Adelaide with specimens for assay. Of tin there was no trace, but there were frequent shows of lead. A shaft started on Block 13 (it was little more than a posthole) showed only slight signs of silver.

It was in May 1884 that the drought broke and the whole district took on new life. Prospectors went back into the hills, McCulloch grimly counted his sheep losses, and the syndicate decided that each member should hold two shares each and be free to sell provided first offer was made to other members. Sell several did, although there were few buyers for the hill of mullock. But money was found to employ more contractors for the shaft, although by unlucky chance the site on Block 13 could hardly have been a worse choice. In June, a New South Wales government geologist visited the broken hill briefly and reported that it was indeed a lode of lead. Between August and September the blocks were surveyed and confirmed, and the syndicate members got some needed encouragement when a Victorian geologist classed the hill as "one of the most important on the field". It was not until early in the following year that the pace quickened.

Young Philip Charley, the Mt Gipps jackaroo, had worked for a Melbourne law firm until a suspicion of tuberculosis made a change of climate essential. The firm's links with McCulloch's made possible the job as jackaroo, so that as a teenager he had found himself riding with Rasp

around the broken hill. Charley was one of the four original members of the syndicate who had held his share, and in January 1885, just back from a holiday in Melbourne, it was only natural that he should ride out at once to check progress on the shaft on Block 13.

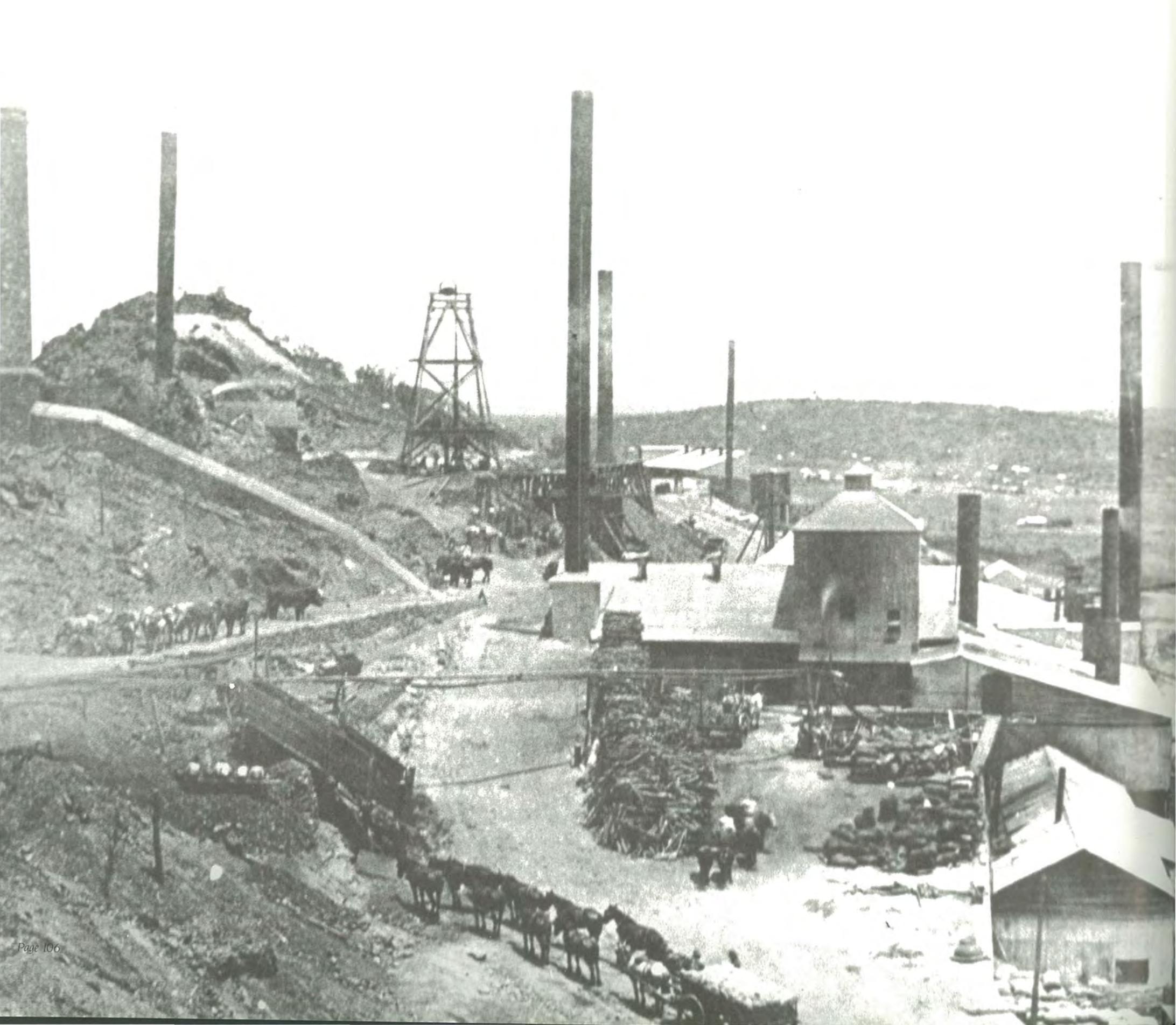
Nothing but carbonate of lead, the contractors assured him. But Charley had seen enough around Silverton to recognise what he saw in the dumped rocks around the shaft. "Chlorides! Chlorides!" was his cry. William Jamieson, a government surveyor who had bought into the syndicate, soon organised a careful examination of the shaft; the samples obtained yielded values of 700-800 oz of silver to the ton. Here indeed was success to rival that of Silverton!

With new heart, the partners planned a drive to the west to intersect the lode from the bottom level of the shaft. In Silverton, interest began to stir as the word got around, and such people as K. Brodribb and D.W. Harvey Patterson, local station owners, bought in. Bowes Kelly, a former station manager, and W.R. Wilson, manager of the Barrier Ranges Silver Mining Association, also joined. Indeed, Wilson tried to buy half the property on behalf of his association and may have succeeded had not a local miner chanced upon still richer chlorides on the lease. That find led the syndicate to surface outcrops along the ridges which assayed around 1000 oz to the ton. The treasure house on the hill had been opened.

By April 1885 mining operations began in earnest. Jamieson, a Scot from Aberdeen who had earlier had some gold mining experience in Australia, resigned from government service to become general manager. He set up camp on the hill itself and hired an underground manager (one Sam Sleep), an assayer and more miners. By mid-1885, land near the hill was being sold as town sites for £25 an acre.

In June 1885, the syndicate members (who by then numbered 14), met at the Mt Gipps station and decided that, to find the money needed to develop the mine, an







By 1888, BHP had eight furnaces operating in its smelting plant (left) drawing ironstone flux from the orebody itself and using coal shipped in from NSW. Ten years later it was decided to abandon smelting at the minesite in favour of Port Pirie, where refineries had already been established.

issue of shares was their next step. McCulloch, Jamieson, Kelly and Wilson were appointed a committee to see to it. They met in Wilson's office in Silverton on a Saturday night and there, largely with his guidance, drafted a prospectus. William Jamieson was to go at once to Adelaide to arrange matters. There was no time for him to ride back to his hillside camp for a change of clothes; fortunately, Wilson had a new suit which fitted passing well, so off went Jamieson in those borrowed clothes.

That first prospectus was never issued. The Adelaide solicitor to whom Jamieson went revised it so extensively that it was reprinted for issue on Monday 29 June. The public were offered 2000 shares with a £20 nominal value, issued at £9 each as paid-up to £19 (a frequent inducement of the mining-boom days). Each syndicate member was to receive 1000 shares. In Sydney, Adelaide and Silverton the offered shares were snapped up, but in sceptical Melbourne only 164 were taken. That meant all the more for Silverton where they were readily placed.

The Broken Hill Proprietary Company Limited was duly incorporated on Thursday 13 August 1885.

Of the £18,000 raised by the issue, £3000 was paid to the syndicate members and £15,000 placed on call for mine development. Had Jamieson delayed his coach trip to Adelaide by only a day or so, part of Australia's history may have been very different: the £15,000 placed on call with Dalgety and Co was never needed, for back on the broken hill, there had indeed been startling developments.

Before he left, Jamieson had sent Harry Campbell, an aboriginal from his small workforce, to prospect outcrops further along the hill. Campbell came back with lumps of silver chloride from the weathered rocks that assayed as high as 18,000 ounces to the ton! At once, Sam Sleep had men opening up the ground near the southern boundary of Block 12. Right along this part of the line of lode, ore

Office of Mines,
Melbourne, 14th August 1885.
C. W. LANG
Secretary
"THE COMPANIES STATUTE 1864."
HEREBY certify that the "Broken Hill Proprietary
Limited" has been this day registered by me, and the
said company is incorporated, and is limited by sha
dated this thirteenth day of August 1885.
R. GIBB
Registrar-General's Office,
Melbourne.
"THE COMPANIES STATUTE 1864."
HEREBY certify that the "Broken Hill Proprietary
Limited" has been this day registered by me, and the
said company is incorporated, and is limited by sha
dated this thirteenth day of August 1885.

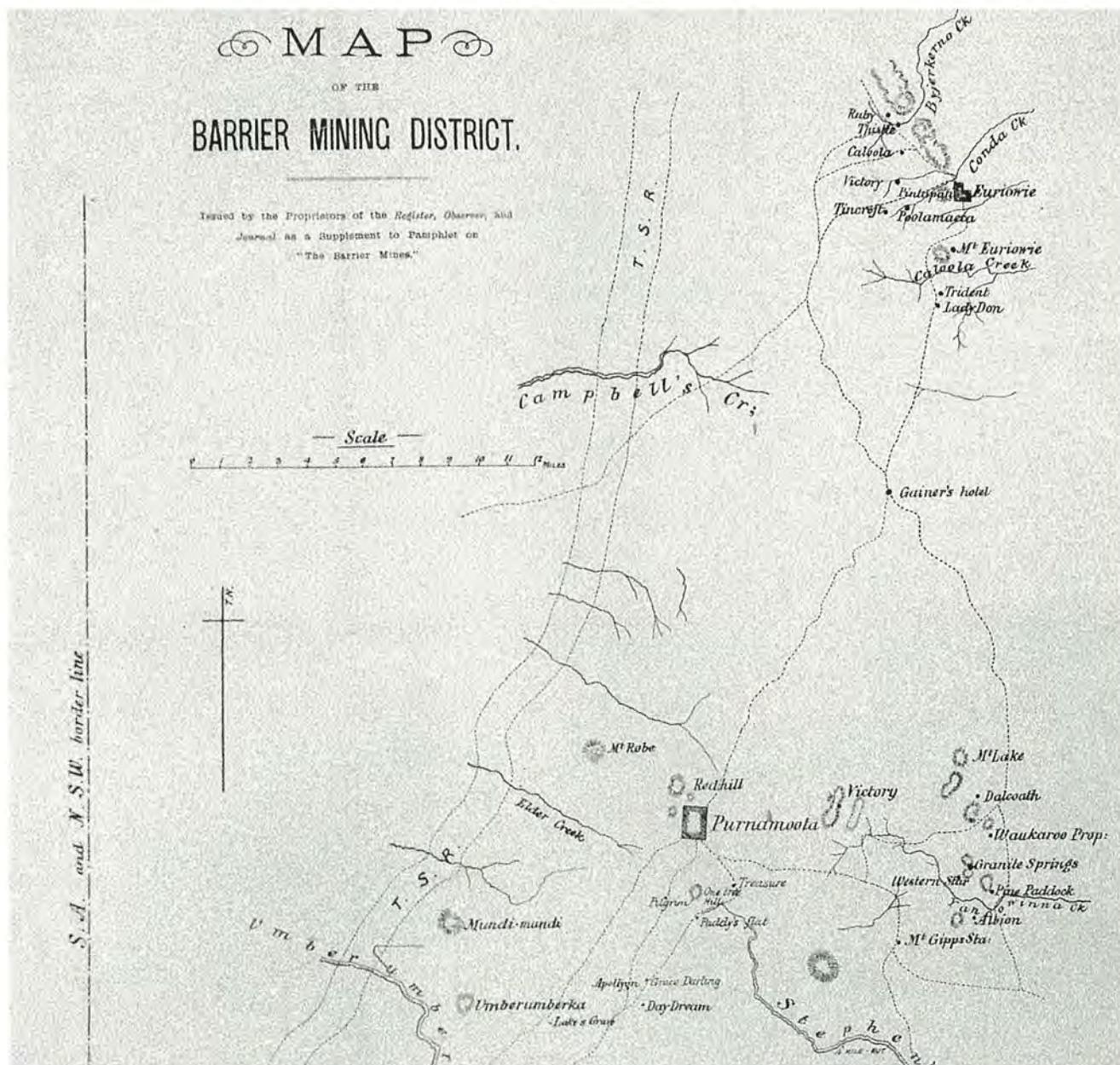
averaged up to 3000 ounces to the ton. All over the Barrier, there was wild excitement.

Plans were made at once for new shafts and for two smelters. Meanwhile, a first shipment of 48 tons of ore sent to Melbourne for smelting yielded over 35,000 ounces of silver. This was sold for £7442/12/11, BHP's first revenue. The fine silver was exhibited to Melbourne sceptics in a Collins Street bank.

The first ordinary general meeting of the company was held in Melbourne on 15 December 1885. There, A.R. Blackwood, newly elected as first chairman, was able to congratulate shareholders on their investment in a silver mine of remarkable richness. The world price of silver at the time, just over 4/- an ounce, was drifting downwards as more and more countries turned to gold alone as a monetary standard. But the fledgling BHP mine benefitted hugely when in 1890 the US Congress seeking to support the country's own silver mines, obliged the US Treasury to buy quotas monthly. Silver's price went up to 4/6 an ounce. The years 1891 and 1892 saw BHP's dividends soar over the £1,000,000 mark; it was to be 55 years and two world wars later before the company was able to repeat such a distribution. In 1893, the US and Indian treasuries dropped out of the market, and by 1894, prices averaged about 2/6 an ounce. At Broken Hill, there were profound consequences.

Back on the hill, early progress had been headlong. Jamieson resigned in December 1885 ("I am a new chum in the game of mining", he said in his letter of resignation) in favour of William Wilson's brother Samuel, who was more experienced. Men flocked in and roads were made; coke, limestone, timbers and supplies of every sort were found, and within 18 months of formation, BHP produced one million ounces of silver. By the end of 1886, there were 3000 people in the town. New South Wales officialdom had pronounced that it would be called "Willyama", but to the locals it was Broken Hill, and so it became.

A first house on the hill had been built for Jamieson,



but the next building was a pub, re-erected from Silverton. Town surveys were pushed aside as tents, huts, shops and shanties grew in great disorder without benefit of title. There was drinking aplenty, typhoid was common and water scarce. Out at the mine, the company appointed Dr L.L. Seabrook as medical officer, although there was little he could do to protect the miners from their inclinations and the conditions around them.

Mining operations quickly became dangerous. Shafts were being worked piecemeal, drives were not properly timbered and roofs caved in. Ground subsided and shafts distorted. The directors — and Samuel Wilson — realised that the mine needed much more skilful management.

In September 1887, W.H. Patton came from the Comstock mine in Nevada USA to be general manager and one of the most richly rewarded men in the country. Earlier that year, H.H. Schlapp had come from Colorado to take charge of metallurgical operations. Patton introduced square-set timbering within the stopes, filling huge workings with pine shipped from Oregon and so enabling the great width of the orebody to be worked safely and economically. Such mining methods, however, set the scene for the future problems of underground fires, while creeps in the ground still occurred.

Meanwhile, over the whole Broken Hill field, progress was indeed stirring. The BHP board floated off three separate companies, the Broken Hill Proprietary Block 14 Company, the British Broken Hill Company (with blocks 15 and 16), and the Block 10 Company. The Proprietary itself held blocks 11, 12 and 13, the richest parts of the line of lode. BHP shares peaked in February 1888 at £410, in a wild boom on Australian share markets. It could not last, and by May, BHP shares were down around £250.

In February 1889, the shareholders approved a capital reorganisation; shares were split from £20 to £2 nominal value and in September were made fully paid up. On 2 January 1890 they were split again to a 8/- nominal value.

Broken Hill rapidly eclipsed Silverton. In January 1888,



William H. Patton (above) was known for his extensive experience on the famous Comstock silver lodes in the USA when invited to become general manager at Broken Hill. In his short term (September 1887 to July 1890) he introduced systematic square set timbering which was initially highly successful in working the wide orebody. The scheme, however later proved to have disadvantages.

In the meantime, the 1887 opening of the Silverton tramway (which linked Broken Hill with the SA rail system) revolutionised delivery of the mine's supplies and shipment of ore to the coast. In the process, the bullock teams (below right) lost their place in long distance haulage.

the Duke of Manchester opened a line from Cockburn, now the railhead on the South Australian border, to Silverton and on to Broken Hill. It was to become one of the most successful private lines in Australia's history. John Hill had to sell his 35 horses and 5 coaches, and by year's end, Broken Hill had 10,000 people, 47 hotels, 9 banks, 2 stock exchanges, a brewery and only 5 policemen. Water was still a problem. There was another drought, and it was not until December 1890 that the New South Wales parliament authorised a locally-formed company to put in an adequate supply scheme.

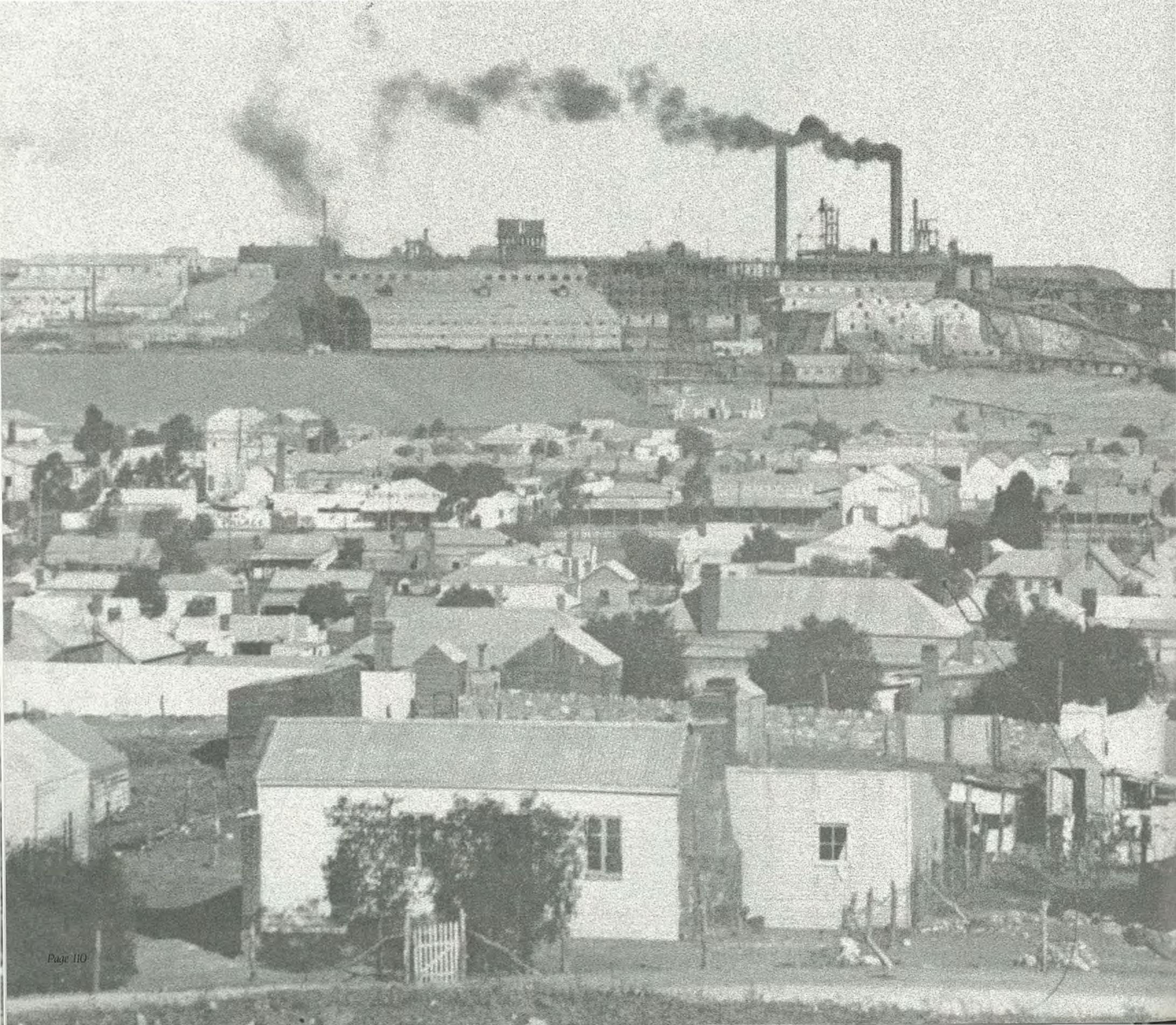
That first decade ended with an impressive record of success and with problems looming. Ground subsidence at the mine had become so prevalent that by 1891, John Howell the then general manager began an open cut to relieve underground pressure. By 1895 open cut operations extended over much of the lease, forming a huge quarry. With the price of silver sliding downwards, every effort was needed to reduce costs, but increasingly, it was the problem of treating the ore that claimed attention.

The ore mined in the early years was leached and the silver and lead were readily won from it. But below the level of natural oxidation (depths varying up to 600 feet) the sulphur and zinc content increased sharply. Mines around the BHP leases were the first to encounter the difficulty that this material presented, for the silver and lead could not readily be separated, while in smelting, the zinc in the ore clogged the furnaces. The result was that large amounts of valuable metals were left in tailings in huge piles around the mines. The secret of unravelling the metallurgical puzzle that the sulphide ores presented had to be found, otherwise even BHP's future was clouded.

Meanwhile labour relations in the town had taken a new turn. BHP had faced its first strike in 1889 when unions won recognition. The following year when a maritime strike in all Australian ports interrupted Broken Hill operations,

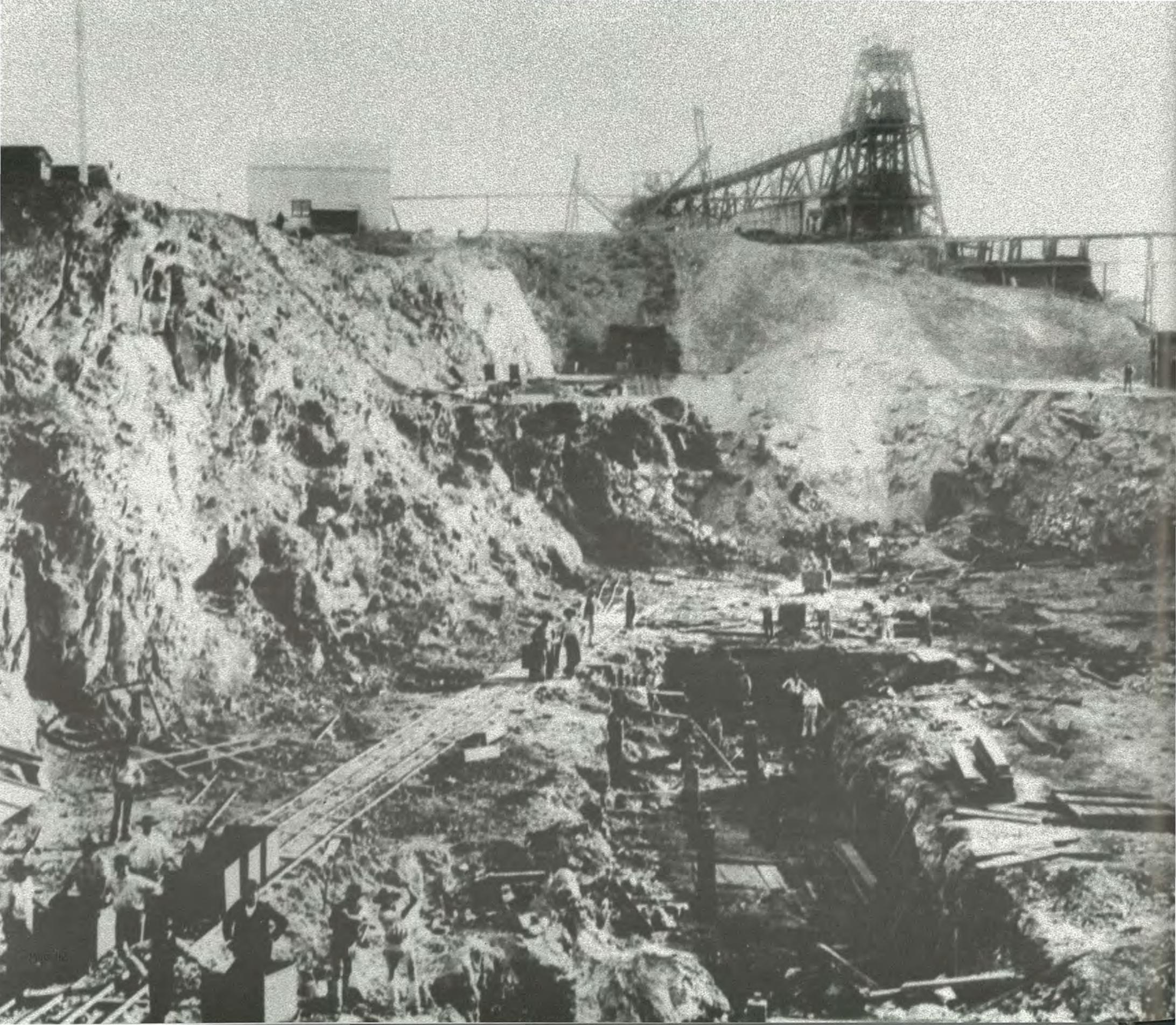
there were fresh strikes at the mines as well, from which the unions won reduced hours and an agreement to ban stoping work by contract. But in 1892, with costs bearing heavily and some mines facing closure, the managements moved to re-introduce contract work, and a four-month strike resulted. The mines were picketed, scuffles broke out, police reinforcements were brought in. Eight miners' leaders were arrested, six being sentenced to jail on conspiracy charges. But at a time of national depression, the companies were able to recruit men from outside the town, and in November the miners capitulated. The contract system continued in the mines and for that matter, remained general in the Australian mining industry. But whatever the logic of the situation at the time, a bitter new element had been brought into life at Broken Hill.







The day
the new
general
manager
made the
metals
float



While the mining plant spread rapidly along the dominant hill, the town itself grew at the foot of the slopes (preceding pages). Most early houses were of galvanised iron, with their walls unlined; in spite of the climate, verandahs were exceptional.

BHP's open cut was begun in 1892, partly to relieve pressure on the underground workings. As the work went on (left) almost a mile of the original skyline disappeared in Australia's first large-scale quarrying operation.

By the early 1890s, a scant ten years after Rasp, James and Poole had pegged out that 40 acres of Mt Gipps station, there had been assembled along the slopes of the broken hill possibly the costliest collection of mining plant in the country. Fifteen companies had set up mining operations there. From uncertain beginnings, the technical achievements were already considerable, with far greater soon to come.

The discoverers, the men of the outback, had largely disappeared from the scene. Rasp married the girl he had befriended on his trips to the Adelaide assay office, and lived in comfortable style in that city. McCulloch took his seat on the BHP board (he was chairman briefly in 1893) but later retired to London where he became a notable collector of contemporary paintings. Philip Charley was also on the board (at the age of 21) but soon resigned to move to the Hawkesbury River district NSW, where he bred stock and lived a gentleman's life. David James moved to Kapunda SA, bred race horses and won a Melbourne Cup and a seat in the state parliament. The other three of the original syndicate sold out long before the dividends flowed.

The new men directing BHP were entrepreneurs and managers rather than miners or technicians. Harvey Patterson, Bowes Kelly (who was to have three terms as chairman) and Kenric Brodribb were founding shareholders and original directors of the new public company. W.R. Wilson and William Jamieson, two other founding shareholders, joined the board later, and with Duncan McBryde and W.P. McGregor, remained as directors for several years.

William Knox, the Melbourne accountant who was the first company secretary, added to the Scottish flavour. (Knox took the job for £1 a week, having told Patterson who appointed him that he hoped he would get a little more in the future. In the event, he later took McCulloch's seat on the board, became a leading industrialist and was first Federal MP for the seat of Kooyong. Frank Dickenson,

sharebroker and earlier Knox's assistant, took his place as secretary and held the job for 30 years.)

It was this hard-headed group that had decided that the technical problems facing the company were substantial, and that such acknowledged experts as Patton and Schlapp should be brought from the United States to Broken Hill. Patton managed operations from September 1887 to July 1890, and was succeeded by John Howell, another experienced American. It fell to Howell to implement the imaginative plan for an open cut, originally suggested by W.R. Wilson and a form of mining virtually unknown in Australia at the time. In 1893 Schlapp resigned and was replaced by Alexander Stewart, from the Tharsis mine in Spain, who was particularly experienced in open cut work. Two years later Howell also resigned and was replaced by Stewart.

Given the background and experience of these mining men and the managers from the other mines which had quickly been established at Broken Hill, it was only to be expected that a high standard of professional mining engineering should emerge at the Barrier, very different to the early rough working. What is now the Australasian Institute of Mining and Metallurgy was founded about 1892 by one Uriah Dudley of the Umberumberka mine from among Broken Hill's mining engineers. Howell and Schlapp were two of the three founding vice-presidents.

The original intention to ship supplies in and products out through Port Adelaide quickly gave way to a choice of Port Pirie on the Spencer Gulf. There was no break of gauge in the line to the latter and freight charges were lower. Land was accordingly bought at the little wheat port, the first of many later moves involving an astonishing flow of economic and industrial development from the Barrier to the rest of Australia. First smelters had been built on the minesite, and eventually there were 15 furnaces there producing about 4500 tons of smelted ore a week. But



transport costs suggested that Port Pirie would be a more logical refinery site, given the need to ship in coke as a fuel; with increasing interest in marketing bullion rather than concentrate, rapid development followed. The first refinery, designed by Schlapp with a capacity of 400-500 tons a week, was in operation at the coast by 1889. At the same time, a concentrator was installed at the mine. By 1890, the company was selling one quarter of its output as pure lead or fine silver, one quarter as specified bullion, and the remainder as smelted ore.

In 1893 as part of an expansion plan, BHP bought the four smelters which had been built at Port Pirie by the British Broken Hill Company. Two years later, all mine output could be sold as bullion, and by 1897 all smelting operations had been moved to the port where more land had been taken up. This build-up of operations at the coast made necessary the finding of a new source of iron ore for fluxing. Earlier, ironstone from the Barrier orebody itself had been adequate, but the whole scale was now very much larger.

Across Spencer Gulf from Port Pirie the saltbush plain stretched some 30 miles or so to the line of the low Middleback Ranges, running roughly parallel with the shore. Just to the north of the range stood twin hills, rising sharply out of the reddish countryside, and known for many years to contain rich iron. In 1891 a company had been formed by local people to develop Iron Knob and Iron Monarch, but markets for ironstone were lacking, and the area seemed wild and inaccessible, useful only to the few sheep able to survive the semi-arid climate there. In 1896, BHP metallurgist Walter Koehler and H.C. Warren walked about the hills, and realised the value that their rich deposits represented. The original lease having been forfeited, BHP pegged the whole area and after a dispute before the mining warden, took over the claims in 1899.

In the following year the South Australian parliament

It was the British Broken Hill Company that in 1889 first built refineries at the little town of Port Pirie which quickly became the busy centre for the mines' supply lines (above left).

After BHP bought the plant and transferred all smelting operations to the coast, it was Port Pirie's need for ironstone as a flux that led to the development of the Iron Knob-Iron Monarch deposit (left), on the opposite side of Spencer Gulf.

Guillaume Delprat (above) who became BHP general manager in 1899, was increasingly keen to establish a new steel venture based on this rich iron ore, particularly after a successful trial smelting of the iron behind one of Port Pirie's sheds in 1905.



authorised the building by BHP of a tramway to the coast and a port at Hummock Hill, where now stands the city of Whyalla. By 1901 high-grade ironstone was being carried down the new line and transhipped to barges for delivery to the refineries across the gulf. From that time on the extent and quality of those iron deposits began to figure in the thinking of the BHP board and management.

Coke was also needed for the expanding Port Pirie works. As early as 1896 BHP had bought 24 acres of land along the Hunter River at Waratah near Newcastle, NSW. But later it was thought that the southern NSW coalfields would be a better source, and in 1900 work started on building coke ovens at Bellambi near Bulli. Within a year coal contracts had been arranged and the company's beehive ovens were producing all the coke Port Pirie needed.

Chairman McBryde had felt impelled in 1895 to warn shareholders that the future of the Big Mine depended on the successful treatment of sulphide ores. The oxidised sections of the orebody were becoming exhausted, while actual mining conditions continued difficult. Worse was to follow, for the continued decline in metal prices meant that dividends were to fall further. In Australia generally, there was only slow recovery from the economic crisis of 1893, when 14 banks had crashed and city land booms collapsed, leading to many business bankruptcies and widespread unemployment.

The Broken Hill miners had a new problem to face. In July 1895 fire broke out in old timbered workings at the bottom of the open cut on Block 11. It burned for years. There was another serious fire in Block 12 two years later which was contained, but only after three men died. This section re-ignited in 1902, and was eventually bricked off.

Overall there were sombre tones midway through the company's second decade which contrasted sharply with the exuberance of the first ten years. As a result, total

dividends for the second period fell to little more than a third of those for the first. But progress in ore-processing provided a heartening base for recovery, and there was another prospect emerging.

In 1897 after much investigation, the commissioning of several reports, and trials which showed only passable results, a plan to treat the sulphides was finally adopted. The original concentrator built in 1889 had to be moved five years later because of ground subsidence. Arrangements were made to build a new plant in association with the British company. In October 1897 this larger mill was commissioned and quickly enlarged to a capacity of 10,000 tons a week. The ore was crushed and then jigged in water to separate sulphide of zinc from the heavier sulphide of lead, which latter could be smelted at Port Pirie. At this point a new and lively mind was brought to bear on the problem of winning the zinc remaining in the huge and growing mountains of untreated material dumped along the hill.

The Delprats were Basque folk, originally living in the high country of northern Spain. The family having moved to Holland, one Felix Delprat became a major-general and was for many years war minister in the Dutch Government. One of his sons, Guillaume Daniel, studied engineering in Scotland and sciences in Holland, later becoming a consulting engineer working on mines in Spain, Canada and Norway. A brilliant student, fluent in languages and a man of energy and charm, Guillaume quickly made his mark in mining and metallurgy. A paper of his published in the transactions of the American Institute of Mining Engineers brought his name before the BHP board, and in 1898 he was offered the appointment of assistant general manager at Broken Hill. At the time, Delprat with his wife Henrietta and their five daughters were enjoying their life at Cordoba in Spain. Guillaume was 41; he accepted the challenge that the new world represented, and went on to



become one of the most important figures in Australian mining and industrial development.

Alexander Stewart resigned as general manager at Broken Hill in 1899 and Delprat took his place. With metal prices falling and company profits well down, the new man set to work with characteristic enthusiasm to deal with problems that would have daunted most.

As a first step, Delprat devised a sintering process to reduce the sulphur content of the very fine slimes. As 1902 began, there were about 35,000 tons of this material in the dumps with more coming each week from the concentrator. Dried out and cut into rough bricks, the lumps were piled on firewood and ignited, so that the sulphur burnt out slowly. The matted remainder could be smelted to recover the lead and silver it contained. It was a start.

But it was recovery of zinc from the tailings which proved a more intractable problem. There had been recent experiments on the Barrier with magnetic separation, but Delprat was sceptical of the prospects of such processes. He became interested instead in the spontaneous combustion noted in some of the mine tailings when they became wet. In Spain, such combustion formed the basis of processes used to dissolve copper from pyrites.

It was while experimenting with the use of salt-cake as a substitute wetting agent (water still being so scarce that it could hardly be considered for a large-scale project) that Delprat and A.D. Carmichael, the mine metallurgist, discovered what at first seemed a strange phenomenon. The mixture of salt-cake and tailings in water produced a bubbling scum which clung to the surface. Nothing they could do would make the scum sink or mix. Eventually, Delprat saw the point; instead of any form of dissolution, there had been a process of separation. It took a couple of days more work in the mine laboratory to establish the fundamentals of the process: any salt or acid in the solution acted on the sulphides in the tailings to produce a gas, bubbles of which attached to particles of the sulphides (zinc

or otherwise) and carried them to the surface. So the metals were made to float, enabling them to be skimmed off, and leaving the waste material to sink to the bottom.

Delprat was able to report to the company's Melbourne office that better than 90 per cent of the zinc blende in the tailings could be recovered with this product assaying nearly 40 per cent pure zinc. At a time when zinc was coming into increased demand for galvanising and other uses, the prospects were dazzling.

At Delprat's urging, immediate patent applications were lodged, only to find that a Melbourne brewer, one Charles V. Potter, had applied for a similar patent a year earlier. A court hearing eventually validated BHP's application, although by then the company had reached an agreement with Potter to adopt the use of sulphuric acid for the process as he had first suggested. In the meantime, a first flotation plant went into successful operation in 1904 and the outlook for the Broken Hill mines had been revolutionised.

At the time, about three quarters of all ore raised from the Barrier mines was being dumped as waste from the concentrators, in spite of the rich silver, lead and zinc content of this material. By 1904, these dumps were estimated at about 5,700,000 tons, nearly half being the Big Mine's share. Even at the depressed prices ruling at the time, Delprat's process gave promise of more than £30,000,000 worth of products being won from the gritty heaps.

Variations of the flotation process were soon developed, with metallurgists working in secret the length of the Barrier to improve its productivity. Delprat and Carmichael had shown mining men the world over a new path to profits, and incidentally had set Australia on course to become the world's largest base metal producer. Zinc became an important export quite quickly; shipments of the concentrate rose from just over 1200 tons in 1902 to



The early years of the new century saw substantial progress at both Broken Hill and Port Pirie. While the new flotation processes were revolutionising the productivity of the mines, fine new public buildings and even a steam tram service (left) changed the face of Argent Street.

Port Pirie became one of the world's busiest ports for base metal shipments (above).

20,754 tons just one year later. By 1911 Broken Hill was producing over 500,000 tons.

BHP's first sales of zinc concentrate were made in 1904, but it was soon realised that the company itself would have to produce zinc metal to take full advantage of the rising market. Zinc smelting processes at the time were regarded as technically difficult. Early experiments at Port Pirie were unsuccessful, and Delprat, touring America and Europe to look for solutions to the difficulties, found the established firms unforthcoming. He learned enough, however, to settle on a particular process, and by 1908 the first of ten distillation furnaces was operating at Port Pirie. By 1912 the whole of the Australian market was being supplied with zinc, and regular sales were being made to Japan.

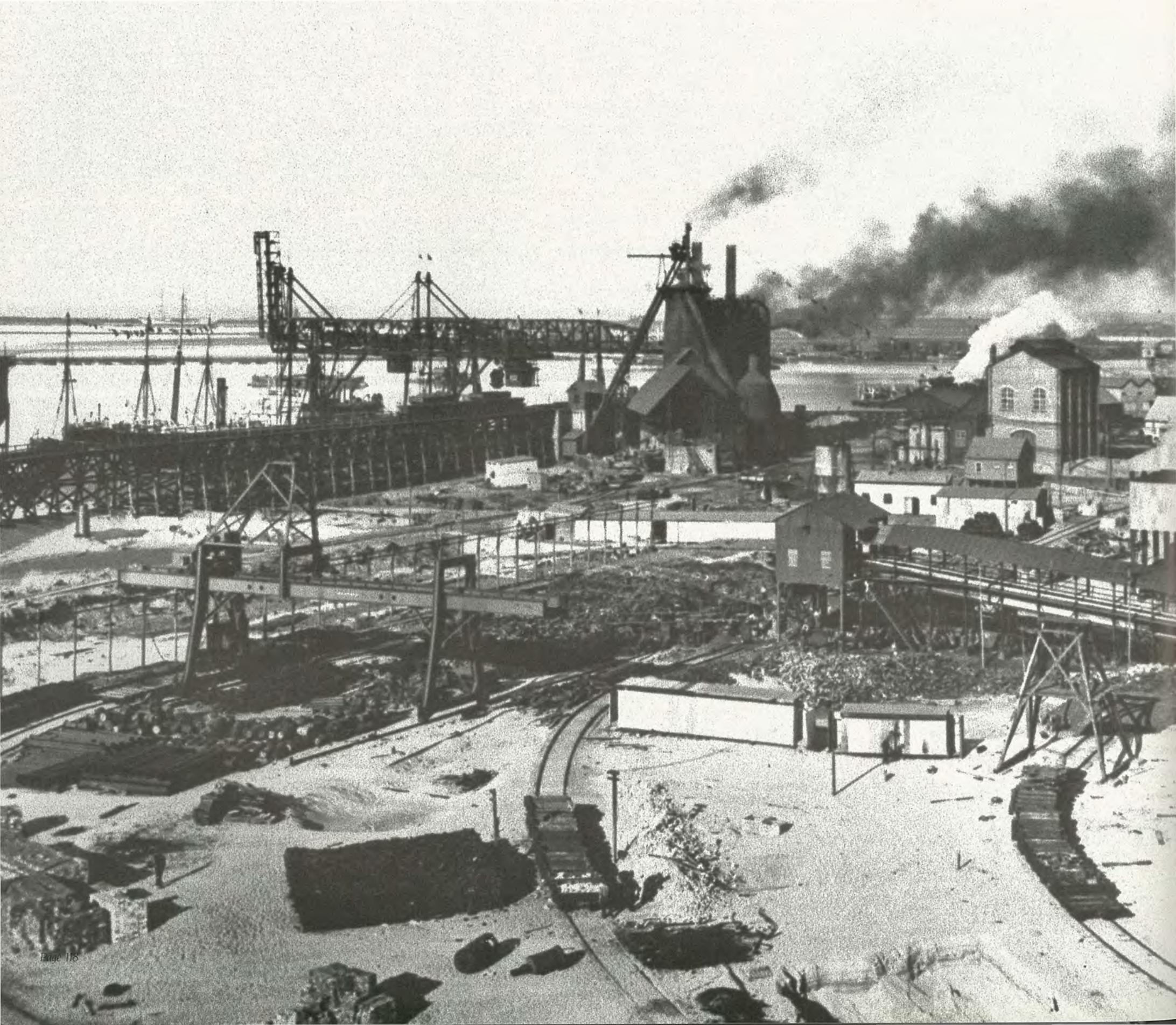
The original Delprat-Potter flotation process did not differentiate between the various contained metals, but floated them as a whole. This meant that its usefulness was effectively limited to ore in which one sulphide predominated. BHP metallurgists, notably E.J. Horwood, L. Bradford and E.T. Henderson, went on over the next ten years to develop the use of various reagents in the flotation systems. These enabled the lead, zinc and silver to be separated readily and economically; the problem of the sulphides had finally been overcome.

The first years of Australia's federation saw the company's profits at their lowest level since 1886, although output from the mine rose steadily. However, BHP turned increasingly to smelting and refining, including the handling of concentrates from other Barrier mines. In the years up to federation, the people of Broken Hill had coped with extraordinary hardships. Titles to town land had been decided virtually by fisticuffs (the state authorities found it all too much) and drought and fire had ravaged lives. But by the end of the century, the town was incorporated and (after several false starts) an all-important workable water supply had been assured.

Working (and living) conditions continued to be below standard, and labour relations were not improved when in 1903 the unions failed in a bid before the newly-established Arbitration Court to win higher wages and shorter hours. When BHP's leases ran out in 1905 some union officials tried to persuade the New South Wales government not to renew them. But under a later agreement with the unions wages were increased from 1907, although within months metal prices fell sharply.

Twenty years on the company's board had left Harvey Patterson, by then serving as chairman, as ebullient as ever. Giving his 1905 shareholders' meeting in Melbourne a retrospect of success, he noted that up to then BHP had produced nearly 13,000,000 tons of ore, with substantial mine life remaining. Some £8,000,000 had been paid to shareholders as dividends (there were then nearly 8000 shareholder accounts) and, added Chairman Patterson, he was gratified to see that a London newspaper had described the mine as "the best managed in the world".

It was only a few weeks after this somewhat euphoric occasion that General Manager Delprat reported to Chairman Patterson and his fellow directors that a trial parcel of Iron Knob ore had been successfully smelted at Port Pirie, and the iron produced had been sold at five guineas a ton.





Then
it was
steel's turn
and
it all
ran like
clockwork



In just two years from January 1913 David Baker (above right) and his construction crew raised by ten feet the tidal site for the new steelworks at Newcastle, drove timber piling up to 30 feet long, and built a wharf, blast furnace, steelmaking shop and rolling mill (left to right, preceding pages). The blast furnace was blown in on 8 March 1915, first steel tapped on 9 April and first rails rolled on 24 April.

Chairman John Darling (above left) who had done much to make these successes possible did not live to see them.

Meanwhile, the Eskbank works at Lithgow (left) had been sold to Sydney ironfounders George and Charles Hoskins. Charles later bought out his brother's share in the firm.

Guillaume Delprat was passionate in urging that BHP should go into steel. "Do we prefer certain death", he wrote to his chairman in April 1912, "to a course which carries little more than ordinary business risk? But which holds out prospects of a future more prosperous than the prosperous past....?" A consulting engineer from Philadelphia USA, one David Baker, was already on his way across the Pacific with his daughter. Delprat had engaged him as BHP's adviser on the recommendation of a US Steel Corporation executive. Australia's only existing iron and steel works at Lithgow NSW was being refurbished by new owners. And just one month earlier the first Labor-controlled New South Wales house of assembly had passed a bill to establish a state-owned works; the state government's adviser was pointing to the need for large-scale operations to be successful in the steel industry. The interplay of these forces was closely watched by the men at BHP.

The working of iron in the Australian colonies began around 1850, in the Nattai district NSW. By July 1864 the Fitz Roy Iron Works was in production at Mittagong under the management of Welshman Enoch Hughes, who had earlier established Australia's first iron rolling mill in Melbourne.

During the '60s and '70s, with widespread gold discoveries and increased population in the colonies, there was rapid development in foundry work, both iron and non-ferrous. Iron and steel imports rose, three iron smelting ventures were started in Tasmania, two in South Australia and one (for a time the most promising) in Victoria. That plant, at Lal Lal near Ballarat, was in production from 1878 to 1884 for the successful Phoenix Foundries, but as proved to be the case with all the others, it was found that local smelting could not compete in the market with imported iron.

Smelting at Mittagong finally stopped in 1876, but in the meantime, Enoch Hughes had interested a colorful

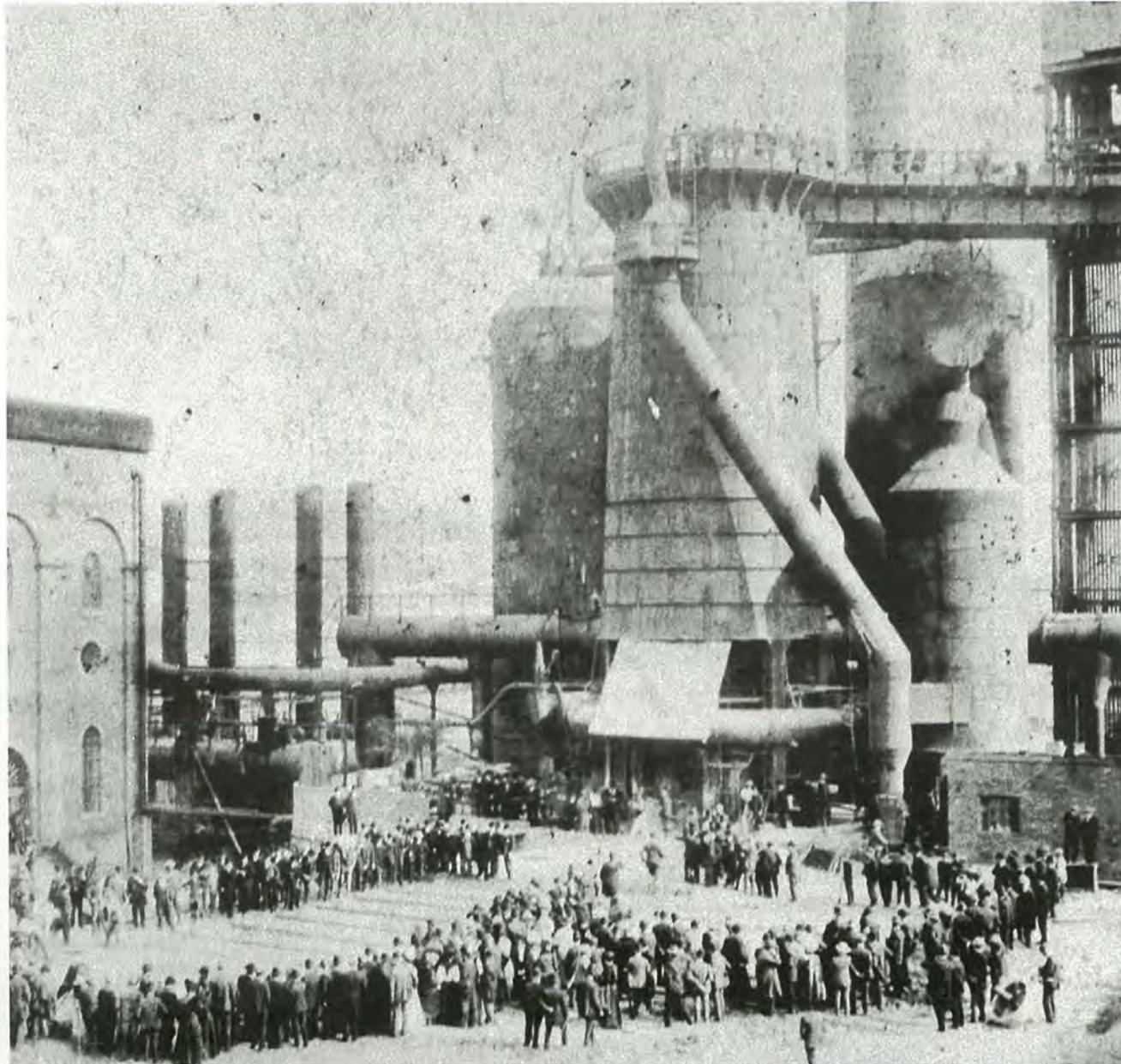


American, James Rutherford, and his partner Canadian Dan Williams, in building a new Eskbank Iron Works at Lithgow in the hills nearly 100 miles west of Sydney.

Rutherford was an experienced businessman. Drawn to Australia for the gold rush, he became the largest shareholder and manager of the New South Wales section of Cobb and Co's coaching firm, based in Bathurst. But in spite of his efforts, the Lithgow ironworks could not support enough capital to put this second venture on a sound basis. The re-rolling of old iron became the works' mainstay, undertaken by a co-operative of the Eskbank workmen.

Three years later an English newcomer, William Sandford, made a new start at Lithgow. He had come to Australia to set up a wire-netting plant at Chiswick on the Paramatta River for John Lysaght, who was already a big shipper of iron and steel from his Bristol works to the Australian colonies. In 1886, Sandford tried unsuccessfully to persuade Lysaght to buy the Eskbank works, and then went there himself to manage the co-operative. Finally, having obtained a lease from Rutherford, he took over the works, expanding the foundry and rolling plant to take advantage of the boom then current. In 1892 he bought the whole plant, colliery and ore leases included.

These developments formed part of the overall growth in the metal trades which was a feature of the last years of the century. It was a time of emerging consciousness of the possibilities of nationhood, with growing support for the concept of an Australian Commonwealth. In the 30 years to 1900, population in the six colonies had more than doubled to 3,800,000 and rail track laid had extended from 800 to 13,500 miles. Pastoral and agricultural industries grew and diversified, new mines were opened, and engineering and metal-working shops were prominent in the new manufacturing industries. John Lysaght's Australian subsidiaries were expanding, and such firms as G. & C.



Hoskins, Titan Engineering, Austral Nail, Clyde Engineering and A. Goninan and Co were getting established in New South Wales and Victoria.

It was the men in the metal trades who gave what was possibly the strongest support for a policy of protection for local industry. Imports of iron and iron products enjoying relatively cheap freights from Britain (much of the pig iron was shipped as ballast) were still rising, and to Sandford and many others, federation and protection were seen as going hand-in-hand. The Intercolonial Protectionist Conference held in Sydney in April 1900 urged "that bonuses should be granted by the Australian Commonwealth for the initiation of new industries . . . and that the manufacture of iron and steel from native ores and fluxes should be thus assisted . . ." Within the trades union movement many saw the maintenance of working standards as linked with protection of industry itself, leading eventually to the concept of the "New Protection" enshrined in early decisions of the Federal Arbitration courts. But when it came to action, political Labor's support for tariffs and bounties proved less than whole-hearted, and although the party held the balance of power in the first Federal Parliament, early efforts to establish effective protection of industry were side-tracked.

In the meantime Sandford, encouraged by the promise of federation as he saw it, had built new rolling mills and in 1899 ordered Australia's first steelmaking plant: a five-ton open hearth furnace. It was small even by the standards of the day, and the Lithgow furnacemen were inexperienced, but Eskbank was making steel. In 1901, the works produced some 10,000 tons of products, and in the following years, two more steel furnaces were added. But costs were still too high, capital was inadequate, and still the hoped-for protection could not be obtained.

Then in 1905 Sandford was able to interest the New South Wales Government in his plight. The premier refused to buy the works as offered, but did arrange a seven-year

The Eskbank works included a new blast furnace built to an English design with a 19-foot bosh, which had cost about £100,000, substantially more than expected. It had been officially opened by the NSW premier in May 1907 (left) but its cost had crippled the Lithgow company.

William Sandford (second from left in picture above) then failed in his bid to raise funds by a share issue, and his bankers foreclosed.

The iron ore used at Eskbank from local deposits was of indifferent grade. BHP meanwhile had completed a loading berth at Hummock Hill (above) which would soon be shipping high-grade ore to the Newcastle plant.



contract for Eskbank to supply the state's iron and steel products. The contract was conditional on the building at Lithgow of a blast furnace, and on 90 per cent of the pig iron used being made from Australian ore. It was 1907 before the new furnace was installed. It had been built in England, had a capacity of 1200 tons a week, but its £100,000 cost crippled Sandford's company. The state government then considered providing financial help, but before negotiations could be completed, Sandford's bank foreclosed on the company's £135,000 overdraft, and in 1908 sold the whole operation to Sydney ironfounders G. & C. Hoskins.

George and Charles Hoskins had become large-scale manufacturers of cast iron pipe supplying the needs of state irrigation and water supply projects. For their outlay of £202,000, they had bought the Lithgow rolling mills and finishing shops on a 20-acre site, the blast furnace with its attendant equipment on a separate 50-acre site about a mile away, the Eskbank colliery, some other real estate and leases to iron ore deposits chiefly at Carcoar nearly 100 miles further west.

The New South Wales Government contract had been transferred to the new owners and in 1907 Federal Parliament finally agreed to payment of bounties on iron and steel made from Australian ore. Thus encouraged, Hoskins set about re-organising the plant. A new 50-ton steel furnace was built and rolling mills replaced or modernised. But a series of union disputes culminating in protracted strikes meant that with the election of a New South Wales Labor government in 1910 (the state's first) the issue of nationalisation was immediately raised. State ownership of the industry had already been party policy for several years. When Premier J.S.T. McGowan visited England soon after his election he was to find an expert to advise on the establishment of a state-owned iron and steel enterprise. McGowan appointed one F.W. Paul, then manager of the Steel Company of Scotland, who set out at once about his new task.

Meeting at Port Pirie in June 1911, the BHP board accepted Delprat's argument that the prospects of steel should be investigated. The idea had hung in their minds for ten years, after Harvey Patterson had remarked that it was a shame that "such splendid ore" as that from Iron Monarch should find use only as a flux. Already some 680,000 tons had been taken from the South Australian deposit enabling its excellent quality to be confirmed; a government report estimated that there was at least 21,000,000 tons more, rich in iron and low in phosphorous. Delprat visited 21 steelplants in Britain, USA and Europe. While in USA, he commissioned David Baker, the Philadelphia engineering consultant, to go to Australia to prepare a report for the board. With the general manager's return home in 1912 events moved rapidly.

Baker was "enthused" by the quality and extent of the Iron Monarch deposit. He noted the ready availability of good coking coal, reviewed possible locations and recommended Newcastle. "There is no question", he said in his 1912 report to BHP, "but that the consumption of this country demands a steel plant . . . I know of no place in the world where pig iron is made at such low cost . . . From the detailed figures I have worked out it indicates at a very conservative estimate a promise of large profits". In making his estimates, Baker took no account of government bounties or protection.

In the meantime, the New South Wales government's consultant had dismayed the Labor ministers. While agreeing that there was scope for a state-owned industry, Paul put the investment necessary at about £1,500,000, far higher than the politicians had expected. However a bill providing for a state-owned plant was passed by the house of assembly in March 1912, only to be rejected by the upper house. Then in May of that year, Delprat went to Sydney to see state treasurer J.H. Cann, whom he knew. He outlined BHP's plans for a Newcastle plant, described the scale envisaged, and, writing to follow up the visit explained that the company was in doubt whether to erect





The 1909 strike at Broken Hill was notable for a series of demonstrations, some of them violent, marches through the town and picketing of the mine entrances. Lines of police were constantly being formed around the gates (left) to protect staff coming and going. At one stage, union leaders asked the newly-elected federal Labor government for army protection against the state police, but the request was refused.

Above: the steelmaking shop at Newcastle under construction in 1914. The dredging of the river provided fill for the low-lying surroundings.

the proposed works in New South Wales or South Australia, with some advantage seen in the former. Would the government "view with displeasure our establishing this industry in New South Wales, having regard to their own reported determination to erect a similar works there?"

Newcastle wanted the new investment, Lithgow's labour disputes had been settled for the moment thereby reducing the pressure for nationalisation, and the political hazards of a state-owned initiative on such a scale were substantial. Premier McGowan and his ministers hesitated only briefly before assuring BHP of the government's "encouragement and consideration". By November 1912, the Newcastle Iron and Steelworks Bill had been drafted, examined by a select committee and passed by both houses. In the following month the resulting agreement between government and company was signed. Angry recriminations within the Labor party followed, but from then on, steel nationalisation as an issue was mere rhetoric. In the meantime, on 27 September, Harvey Patterson had chaired a special general meeting of shareholders in the Equitable Building in Melbourne's Collins Street which approved the move into steel and authorised an issue of new shares to finance the venture.

The new century had brought mixed returns to BHP shareholders. After a first two lean years, profits and dividends rose progressively to a remarkable 1907; metal prices by then were favourable, and a new industrial agreement operating from the previous year had enabled output at the Big Mine to be lifted to 600,000 tons and profits to rise to a 12-year peak. By then the company was employing some 5000 men, about 3500 of them at Broken Hill. But just when output had reached such a zenith, there was a sharp fall in silver, lead and zinc prices and new chairman John Darling warned at the year's end that costs would have to be cut. By the end of 1908 (and of the agreement with the unions) silver and lead prices were no

longer covering BHP's costs, and the company announced that from January 1909 the mine would operate only at wage rates ruling two years earlier.

Only the Block 10 Company joined BHP in this stand. The other Barrier companies working different sections of the lode were for the most part able to make at least some return at ruling metal prices and wage rates then current. So BHP withdrew from the Mine Managers' Association, the Barrier employers' organisation, and faced a drawn-out strike involving about half the Broken Hill workforce. On the union side, the principle of a standard wage structure for all the mines was regarded as vital.

In fact, the unions had expected that the drop in metal prices would lead to conflict. Membership had been tightened, particularly at Port Pirie, so that the smelters there closed with the mine. In March 1909, Mr Justice Higgins in the Arbitration Court ruled in favour of the unions. He confirmed the existing agreement and said that he faced the possibility that the mine might remain closed. Port Pirie works were later re-opened on the basis of the standard rates, and eventually some men were taken back at the mine treatment plants. But from 1909 no ore was won at the Big Mine until 1911 when lead prices were again rising.

The 1909 strike was marked by ugly scenes at Broken Hill. Extra police had been sent to the town by the New South Wales government (apparently at its own initiative) and many saw this as provocative. Picketing of the Big Mine on a scale objected to by the company led to scuffles with police and stoning of company officers and mounted troopers. There were inflammatory speeches and even explosions. One strikers' march in January led to hand-to-hand fighting with police and the arrest of five union leaders including Tom Mann, an English socialist who had been invited to join the miners. Labour relations on the Barrier were to take on a new, more militant flavour from then on. One slogan carried in the strike's processions read: "Behold, the workers think!"



The formal opening of the Newcastle works on 2 June 1915 was a memorable occasion. An official party led by Governor General Sir Ronald Munro-Ferguson (left) inspected the new plant, took part in a brief inauguration ceremony held in the rolling mill, and then went to lunch in a flag-decked marquee. BHP had reason to celebrate: the order book was full.

Production had actually begun in March with the first tapping of the blast furnace (below). One of the hands on that occasion is said to have been so frightened that he disappeared for two days.



In preparation for entry into steel, BHP in 1912 had issued over 220,000 new shares at 8s each, bringing the total number of issued shares to 1,500,000. The newly established Commonwealth Bank had acted as underwriter. Then additional funds were needed, and in 1914 and 1915 debentures totalling £1,000,000 were issued at 6 per cent interest and at a small discount. Again, each issue was underwritten by the Commonwealth Bank.

In August 1912, Delprat cabled Baker who had returned to USA, asking him to take charge at Newcastle. It was March 1913 before the new manager arrived in Australia, but within a few days orders for the new plant were being sent to America and Britain. Baker himself went at once to Newcastle where work to drain the swampy riverside site and dredge the channel had already begun. He lodged at the Great Northern Hotel, caught a penny tram each morning to the Carrington terminus and then walked the mile often through winter rain to his construction office. It required imagination to visualise what was to appear during the ensuing months on the 260 acres of dreary mudflats stretching on all sides.

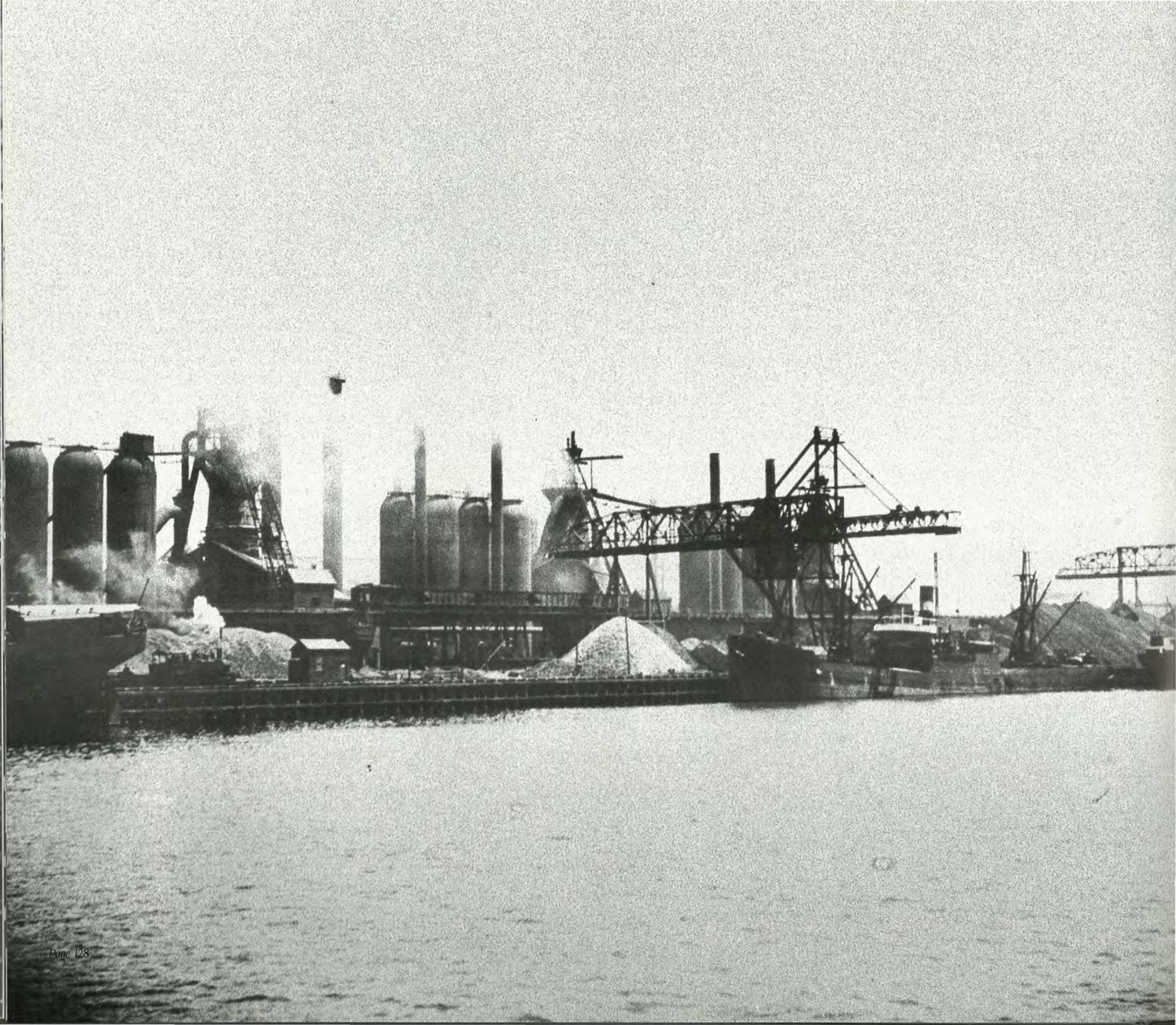
Both Delprat and Baker based their planning of the new plant's capacity on the extent of Australia's steel imports for 1910. In that year, some 580,000 tons of iron and steel were shipped in, nearly 150,000 tons of that total as steel rails. First major plant items were to be one 350-ton blast furnace, three 65-ton open hearth steel furnaces, a bloom mill and heavy rail mill, with by-product coke ovens and all necessary materials-handling equipment. Such a plant would produce about 120,000 tons of rail each year with additional output of blooms and billets. This was large-scale equipment for the day, and it certainly was for the site: to support such installations 225 piles had to be driven to depths of over 30 feet. The state government had undertaken to dredge a channel to the works, 500 feet wide and 25 feet deep at low water.

These plans were carried through with few hitches and despite bad weather with remarkable speed. By June 1914 all major equipment was on the site, the wharves had been built and expanded ore production and shipping facilities were in place at Iron Monarch and Hummock Hill. But there was a sad occasion before these efforts were crowned. John Darling, the Adelaide businessman who had joined the BHP board in 1892 and become chairman in 1907, had been a strong supporter of Delprat's steel plans. The two men worked closely together when, in March 1914, Darling died. (There has been a member of his family on the BHP board continuously ever since.)

The first shipment of iron ore from Iron Monarch arrived at Newcastle on 8 January 1915 in the vessel *Emerald Wings*. The blast furnace was blown in on 8 March with the first tapping giving the new cast-house hands the scare of their lives. On 2 June the Governor General Sir Ronald Munro Ferguson declared the works open before a great assemblage. There was an official luncheon with a band and bunting hung on all sides.

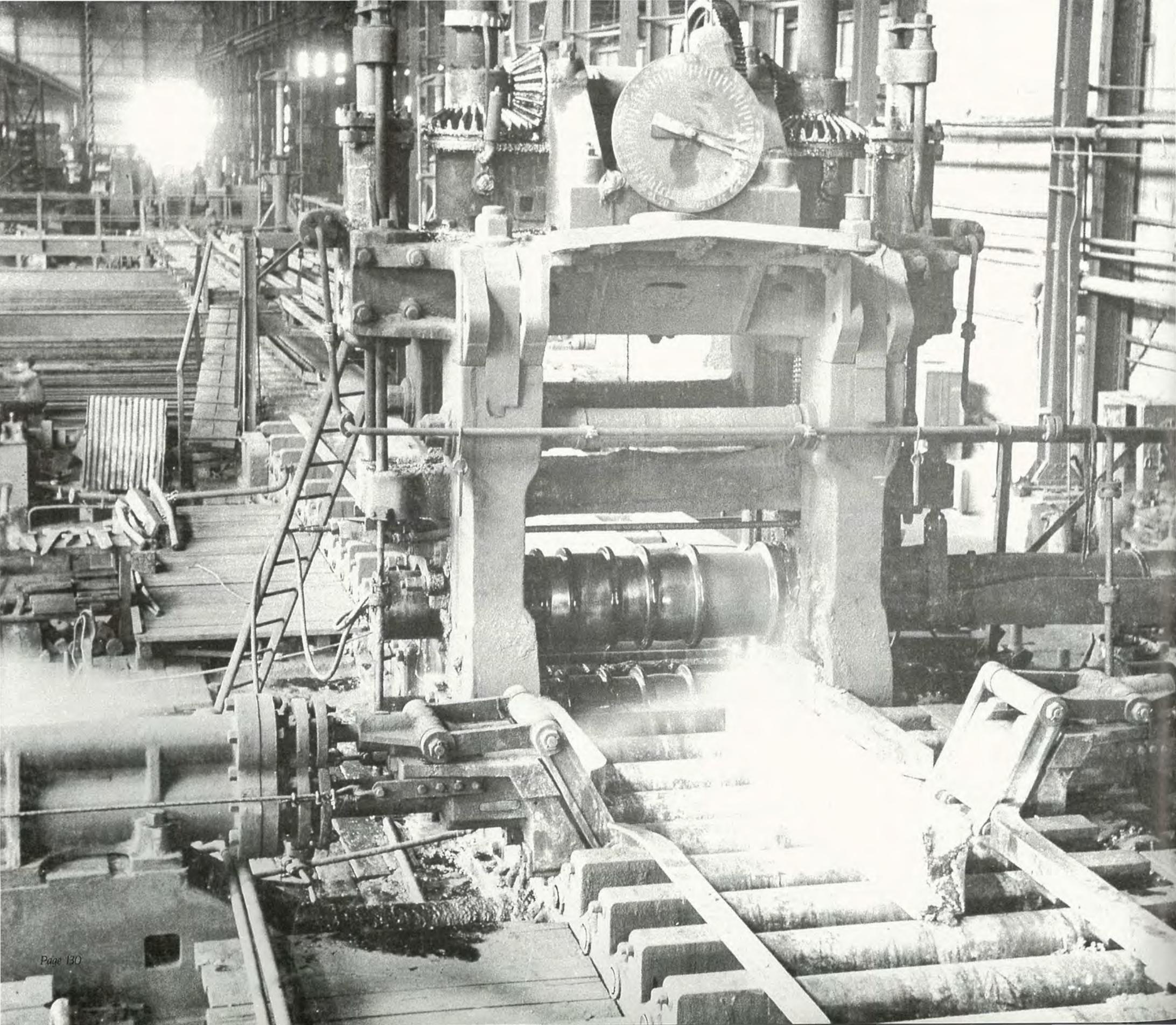
Said His Excellency: BHP had added to British experience "the resources of Australia and the demon of energy of America". Said Chairman McBryde: the site where the works stand was acquired "thanks to the national and generous spirit in which the government of New South Wales met the company". Said General Manager Delprat, in a letter to his wife: "Everything went like clockwork."

BHP had committed some £1,500,000 in the venture. Its entire first year's output of steel had already been ordered. Meantime, the Anzacs were already on Gallipoli, and all told, some 70,000 Australians were overseas on service. Industry too was being mobilised.





War
and its
aftermath
and a
changing
of the guard



The first ten years at Newcastle saw solid progress. By 1924 there were three blast furnaces strung along the river berth (preceding pages), plant capacity had been increased and efficiency improved, all of this in spite of the 1922-23 closure for lack of orders.

The original 35-inch bloom mill (left — a 1920 picture) was modified during the war to roll plates needed for shipbuilding and for construction work.

The

1914-18 war cut across the development plans Baker had in mind for the Newcastle plant. Inevitably, with Australia cut off from traditional suppliers there was a call for more steel in a great variety of shapes and grades. Then after the war the victorious Allies — Australia included — faced serious adjustment problems in a world plagued with too much industrial capacity, too little effective demand, and labour relations upset by inflation and social change. For BHP, this was also the time of final withdrawal from the line of lode the company had been formed to work.

Following the 1909 strike at Broken Hill the only work done at the Big Mine for a time was on the dumps and concentrators. BHP took no part in negotiations for a new award in 1911, but paid the higher wages ensuing while higher lead prices brought an uneasy calm. The award ran to 1915; its last year saw renewed agitation and violence, with health and safety issues emerging along with calls for shorter hours and for higher wages to offset inflation. The Arbitration Court duly granted a 44-hour week and higher rates.

In 1917, largely arising from what was tantamount to a general strike in New South Wales, there was another stoppage at the Barrier involving more incidents and the reinforcement of police in the town. Then in May 1919 there was further trouble — this time a climactic strike that lasted until November 1920. Once again, health and safety issues formed a major part of the miners' claims, together with demands for the abolition of contract work and night shifts, for higher wage rates and for a 30-hour week.

A state government commission eventually found that stricter health controls were indeed needed to protect the men. One in seven of the underground workers was found to have "miner's disease" in some form. Meanwhile, strike funds were coming in from many parts of Australia, and particularly from the New South Wales coal miners. This

time the unions were reluctant to take their claims to the Federal Arbitration Court, and finally a special tribunal headed by a New South Wales justice was appointed jointly by the federal and state governments to hear the claims.

The resulting award gave the men a 35-hour week, higher rates, and among other improved conditions, compensation for those suffering from work-induced diseases. It was a remarkable package of concessions in the context of the time, awarded after strikers had lost an estimated £2,500,000 in wages.

The judge issued his award believing that the mining companies could afford the costs. That year, 1920, had seen the world price of lead averaging a record £38 a ton; by the following year lead was down to £23 and did not return to its 1920 peak for a quarter of a century. BHP and most of the other companies cut back their operations from 1920, but while the expensive settlement brought distress to Broken Hill for some years through layoffs and short-time working, it also marked a turning point. The Barrier Industrial Council emerged as the dominant union organisation and following mergers and closures among the mining companies, turbulence gave way to a different pattern of life on the field.

In BHP's case, full-scale working on the mine was never resumed. The company finally closed the mine itself in March 1939 and its last treatment plant in August 1940. The Big Mine had produced almost 12,000,000 tons of ore, from which had been recovered:

189,450,000 ounces of silver

1,450,000 tons of lead

620,000 tons of zinc

13,000 tons of antimony

together with small quantities of gold and copper.

Before the outbreak of war in 1914 the Broken Hill South and North Broken Hill companies had discussed with BHP proposals for their purchase of interests in the



Among other things, the bloom mill operators (above) were able to roll plates needed for the shell of no. 2 blast furnace, completed in 1918.

Meantime, Bowes Kelly (above right) the only remaining founding director had become chairman for a third term. He was in the chair until 1923 and remained on the board until his death at 78 in 1930. Kelly had also played a big part in the development of the Mt Lyell copper mine.



Port Pirie smelters. Those talks came to nothing, but with the outbreak of war, Prime Minister William Hughes made it clear that he expected all Broken Hill concentrates to be processed in Australia. In these circumstances, arrangements were made to form The Broken Hill Associated Smelters Pty Ltd to take over the smelting plant, with the three companies holding equal shares. Other Barrier companies subsequently took up shares also, and finally in 1925 BHP sold all its BHAS interest to the other shareholders. With that sale went the coke ovens at Bellambi NSW, originally built by BHP in 1900.

Based largely on what he had seen in his US travels Delprat first assumed that the new steel venture would be fully integrated, and would produce a range of products. Baker convinced him of the merit of a more cautious approach: BHP would concentrate on the rolling of rails (for which there was a certain market) and heavy structurals. Additional sales would be as blooms or billets sold to others who would be attracted into downstream manufacture by the prospect of a cheap and reliable source of feedstock. At the same time BHP's management would not be dissipated by too great a span of activities.

Delprat explained this policy at length to the Interstate Commission in 1914, saying that while BHP was for itself satisfied with the existing rate of duty on imports, it recognised that higher duties would benefit those other manufacturers who would become the company's customers. (There was a move at the time for greater protection for local iron and steel products.) The general manager set out quite succinctly the "path to becoming a big steel master" as he saw it: "Once you are a big man you can always get sufficient money to extend the industry enormously. . ."

Newcastle's first tonnages of rails went to complete the east-west transcontinental line which was open for traffic by October 1917. Sales were also made to the state

rail systems and there were some shipments to the Western Front. Meanwhile, the war interrupted the steelworks' supply sources. Arrangements had to be made with A.R. Newbold, who made refractories at Lithgow, to produce silica bricks for the open hearths. Magnesite was found first in the Tamworth district and later at Fifield in western NSW. First dolomite was obtained in the Mudgee district and fluorspar from near Tumbarumba, both in NSW. It was originally intended to take limestone from Wardang Island in Spencer Gulf, but a quarry at Melrose near Devonport Tas was found to contain better quality material and a full-scale quarrying operation was started there.

Within a year of commissioning his first blast furnace Baker was planning his second, to have a capacity of 1000 tons a day (it was completed in 1918) and four more open hearth furnaces. Foundries were added so that the plant could make its own moulds and castings and in 1916 an 18-inch merchant mill was commissioned. Two other mills, one 17-inch and one 8-inch were added in the following year.

In 1917, the BHP board decided to enter into shipbuilding. The New South Wales government had established a shipyard on Walsh Island near the steelworks and now accepted the company's offer to buy it. But Prime Minister Hughes had other ideas. He had already arranged (without consulting his cabinet) to buy 15 ships to form a national shipping line, and also wanted a federal government-owned shipyard. Delprat explained to the New South Wales premier that the BHP directors thought it "wise and patriotic" to abandon their shipbuilding plan and to supply the federal venture instead. Such a step involved modifying the Newcastle bloom mill to roll plates, which was successfully done. It was also possible then to roll the plates needed for the new blast furnace already under construction.

Little of the progress in these early wartime years



Kelly was succeeded as BHP chairman by John Darling's son Harold (left) who had replaced his father as a director in 1914. Harold Darling's 27-year term as chairman was the longest for the company's century.

For all of those years, he worked closely with Essington Lewis (right), the young South Australian mining engineer who had followed Delprat as general manager.

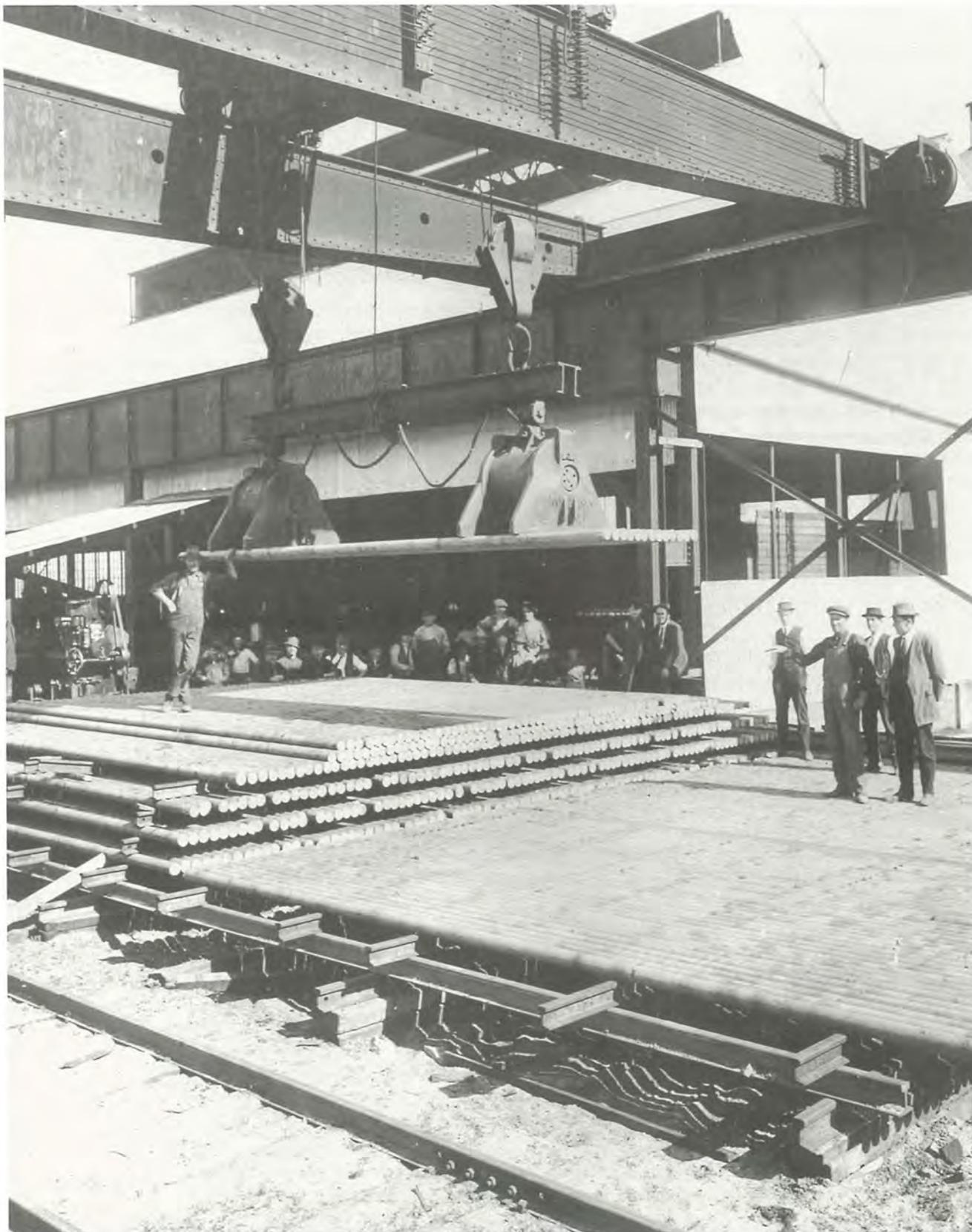
would have been possible without an active programme to recruit experienced steel industry superintendents and foremen, mostly from the United States. Men who had worked on the building of the plant formed a large part of the locally recruited workforce when operations began. By Australian standards of the time, the Newcastle plant was highly mechanised, but even so, the work was heavy and the demands of continuous operation were onerous. Nor did Newcastle escape the industrial unrest that was general at times. The plant was caught up in the general 1917 dispute, which stopped steel production for three months, and had further consequences. The NSW Industrial Court deregistered the unions involved in that widespread series of strikes, and subsequently, three "company unions" were formed. One of them was the Iron and Steel Industry Employees' Protective Association which under BHP sponsorship sought to sign up the Newcastle workers. But the entire union movement opposed such American-style organisations, and by 1921, the steelworks' union was absorbed into the Australian Workers' Union.

The rising cost of living which was the underlying cause of the wartime and post-war labour unrest was also reflected in the steelworks' operating costs. Rising coal prices and higher shipping freights were the major causes for concern. Even so, with output increasing, the company's profits were rising by the war's ending to the highest level since the turn of the century. In June 1918, a new issue of shares at £2 was well received by investors, and raised some £638,000 to finance steelworks' development. Two months later, the company issued 600,000 bonus shares to shareholders, and at the same time made all shares on issue paid up to £1 instead of 8/-. The confidence these moves reflected was soon to be shaken.

The year immediately following the 1918 peace saw changes in the company's top ranks. Bowes Kelly had taken

over for a third term as chairman from Duncan McBryde in 1917 and stayed in the chair until 1923. (Kelly died in 1930, aged 78, the last of the founding directors having served on the board for 45 years.) In 1919 Delprat went overseas to assess peacetime possibilities and returned confident that BHP would be able to compete, but told the Board meeting at Newcastle that he wanted to retire. "I considered I was getting too old for the position", his diary records. "Board agreed but no time was fixed so as to enable them to make proper arrangements. Was asked if I considered Lewis would do for the position — said yes — that he was rather young but would soon get over that. No further mention was made of the matter."

The man Delprat's entry referred to had gone to work for BHP in 1904 as a mining engineer student enrolled at the South Australian School of Mines. Essington Lewis was the son of a prosperous station owner, businessman and MP, John Lewis, who had chaired the parliamentary committee that had earlier approved BHP's Iron Knob tramway. The young man was something of a sportsman. He played football for Norwood and for the South Australian state side (as ruck-rover and half-forward), was a champion polo-player, accomplished at the billiard table, and determined in whatever he took up. The sports writers of the time called him "Snowy", and Geoffrey Blainey, his biographer, says that had he died at the age of thirty, the obituaries would have been on the sports pages. Lewis started work underground at Broken Hill, and was then transferred to the acid plant as a shift boss. In 1905 he was sent to Port Pirie where he had an eight-year progression before becoming assistant manager. His duties there eventually included supervision of the Iron Knob quarries, and, with the development at Newcastle, he was sent to boost output of the ironstone. By the time production began at Newcastle, Lewis was in charge of materials from the iron ore and limestone quarries, and by 1917 he was in charge of all construction work at the plant itself. When Delprat went away on his 1919 tour, Lewis was named as



acting general manager; he was 38, easily the youngest of the steelworkers' management team.

In 1920 it was Lewis' turn to go overseas. He went with Harold Darling, who had taken his father's place on the board in 1914. The two men visited steelworks in the US and Britain, and became convinced that proposals which had been brought forward by Delprat for further Newcastle development should not go ahead.

A third blast furnace was already under construction, and also the board had accepted Delprat's and Baker's recommendation that a Duplex steel plant should be installed. There was at the time a world-wide shortage of scrap, felt particularly in Australia, and the Duplex system had been introduced in the United States as a technique which used pig iron as the only metallic feed. But the new system was expensive, and Darling and Lewis successfully argued that at a time of doubtful market conditions, it should be dropped. Soon afterwards, in February 1921, Lewis replaced Delprat as general manager. Delprat remained for a short time as a consultant, and for many years kept in touch with company people. For a time, he was active in a short-lived organisation named The Single Purpose League, formed by a group of businessmen to oppose compulsory arbitration. His opinions were sought by many, he was an accomplished sculptor, and tinkered with radio circuits. He died in 1937, aged 79.

Baker retired as manager of the steelworks in 1925, and was replaced by Leslie Bradford. A metallurgist who had done much of the pioneering work on the flotation processes used by BHP at Broken Hill, Bradford transferred to Newcastle where he became open hearth superintendent. He resigned in 1921 to take his flotation patents to the US, but went back to BHP in the following year.

Lewis took over to face a flood of import competition. In 1920, the general level of tariffs in Australia was

Wartime needs resulted in rapid development of metallurgical skills at Newcastle. Leslie Bradford (above left) who had worked on the flotation processes at Broken Hill, transferred to the steelworks to become open hearth superintendent.

Rails rolled at the new plant were shipped to the warfronts, and special grades for munitions use (picture left shows the first such shipment being assembled in 1917) were successfully produced.

A moulding shop (above right) made possible the casting of mill housings and other parts to help with plant modifications.

increased, with protectionist sentiment running strongly throughout the country. Duties were imposed on imported pig iron and raw steel for the first time, and those on steel sections and products were increased. But in Britain, particularly, steelworks' wages and costs were far lower than in Australia, and overseas shipping rates had been slashed in the wild scramble to survive. At the suggestion of the Tariff Board (established by the Federal Government in 1921) BHP adopted the practice of quoting uniform prices at all Australian capital city ports. This somewhat reduced Sydney's advantage from a steel-user's point of view, but helped the company's sales elsewhere.

But by the end of 1921, British steel was on sale in Australia for about half the price of the local product. BHP had been able to persuade the South Australian government to reduce the royalty on Iron Monarch ore, but the New South Wales colliery proprietors would not reduce the price of their coal. The company saw no prospect of reducing wages. About 300 men were laid off as a first step, and then in May 1922 the works closed completely.

In August the Arbitration Court refused an application by the company to cut all wage rates by about 10 per cent. Chairman Kelly told shareholders at their meeting that month that the basic wage at British steelworks was 35/- a week, compared with 78/- in New South Wales. Coal cost up to 21/9 a ton at Newcastle, and up to 8/6 a ton in Britain. "With a full sense of their responsibility", he said, "your directors feel impelled to say that the compulsory arbitration system of Australia is strangling the industries and crippling the economic progress of the country". The company appealed the court's refusal to cut wages, but the unions urged that ample profits had been earned in earlier years. In rejecting the appeal, the judges reasoned that since the workers got no share of the profits, they should not be made to take a share of the losses. The works remained closed. The unions said it was a lock-out.

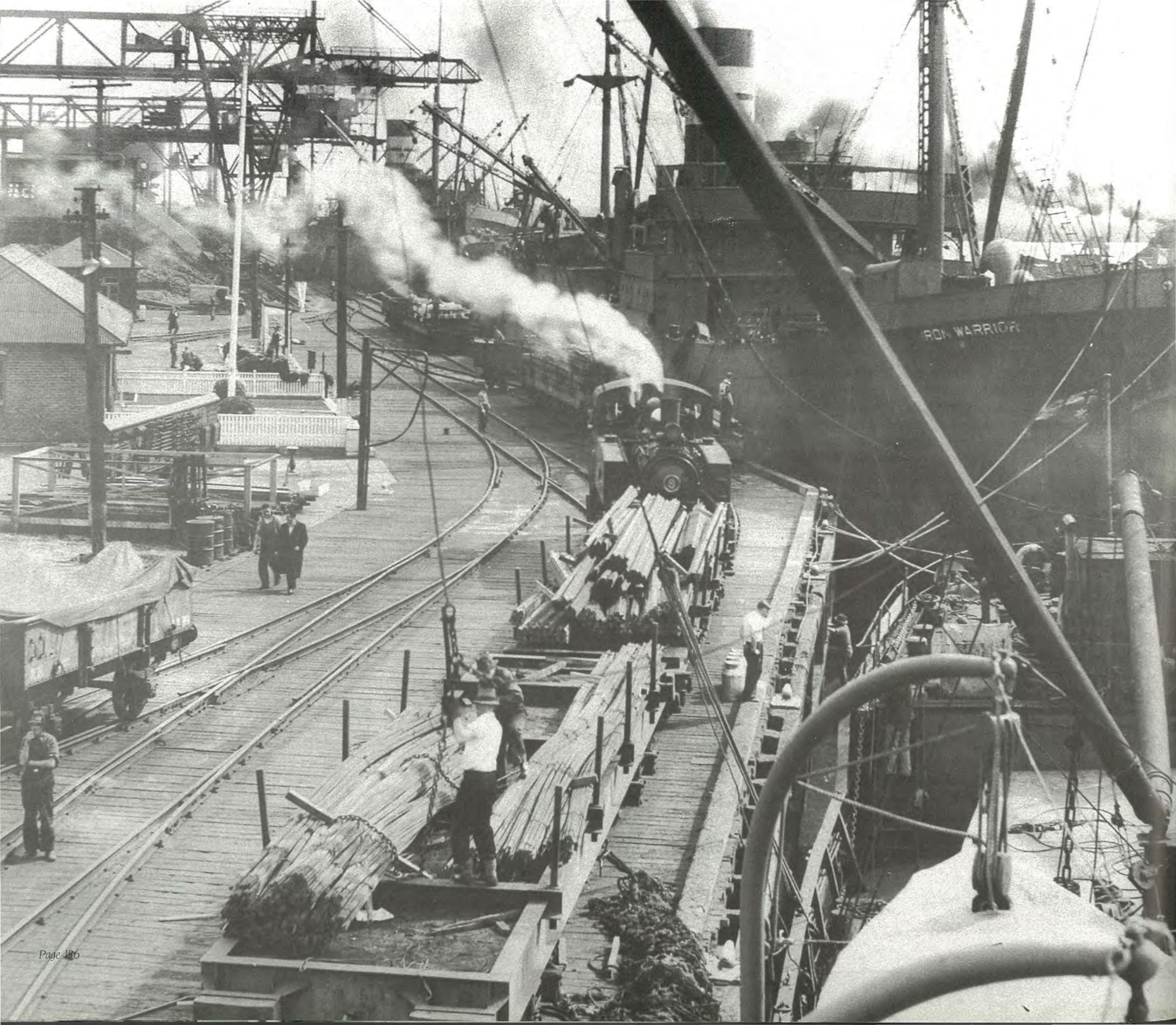
After nine months of closure, BHP made an



agreement with the Australian Workers' Union that provided for a slight overall cut in wages. The New South Wales government arranged to exempt temporarily the steel industry from the introduction of a 44-hour week, and there was a general improvement in business conditions. The company had recorded its first-ever loss in 1923, but the following year saw a return to profitable trading with record output. By 1925, output had risen again to 341,000 ingot tons.

Orders for feedstock from the industries which had been attracted to Newcastle contributed to the recovery. As a wartime development, the Austral Nail Company Ltd of Melbourne decided to build a new wire mill next to the Newcastle steelworks. On Baker's advice, BHP bought a Morgan continuous rod mill to roll feedstock for the new neighbour and to supply Titan Wire and Nail Company in Melbourne and Lysaght Brothers and Co Ltd of Sydney. BHP helped Austral Nail with its new project, the rod mill was commissioned in 1918 and the new wire plant opened the following year, to be an immediate success. The British firm of Rylands Brothers, up to then the largest supplier to the Australian market, then merged its Australian interests with Austral Nail, forming Rylands Bros (Aust) Ltd, and extending the range of wire products.

By the outbreak of war, Lysaghts Galvanised Iron Pty Ltd of Melbourne was taking about 70 per cent of the output of sheet steel made by John Lysaght Ltd of Bristol, UK. The company then bought land at Newcastle, and, with a promise of post-war tariff protection, built a plant to supply the entire Australian sheet steel market. A new company, John Lysaght (Australia) Pty Ltd was formed in 1918, headquarters of the operation was transferred to Sydney, and the new mills went into production in 1921. Up to 20 per cent of BHP's Newcastle output was taken by the new venture, which quickly found markets for its Australian range of products. There were merger talks between John



By the late '20s the Newcastle works wharves (left) presented a busy scene, with 1927 a record year for steel output (387,929 tons). The company's own fleet had grown to five, including Iron Warrior, purchased two years earlier. Plans were being made to build the by-product coke ovens envisaged in the original plant layout.

Meanwhile, the settlement at Hummock Hill (seen right in 1914) had become the town of Whyalla.

Lysaght and BHP in 1925 which came to nothing, and until 1969, Lysaghts remained as BHP's largest customer but without any direct BHP interest or ownership.

The war also resulted in a shortage of railway wheels and axles, as a result of which four NSW foundries in 1917 formed the Commonwealth Steel Products Company Ltd. It was not until 1919 that this venture started operations at Waratah near Newcastle, but from then on, growth was rapid. Such initiatives as these were in line with the policy that Delprat had expounded whenever the opportunity arose. Writing in 1920, he had said "We aspire to be the mother, or key industry of many dependent industries valuable and necessary to the growth and maturity of the Australian nation".

Matthew Flinders had given Hummock Hill its name in 1902, and it was not until 1920 that the settlement became Whyalla. By then, progress at the port and at the Iron Knob and Iron Monarch quarries reflected growth in the Australian steel industry. The tramway's original 40lb rails were soon replaced with 80lb track and the ore-handling plant at the port lifted to a capacity of up to 1000 tons an hour. By 1919, pneumatic equipment was replacing hand drills in the Monarch quarries, and a year later leases were obtained for new ironstone deposits on the northern end of the Middleback Ranges. These Iron Baron workings were later linked to the tramway to the coast.

The earliest days at Iron Knob and Hummock Hill saw some houses of corrugated iron, white painted on timber frames, but many of the men lived in tents. Then stone and concrete homes made their appearance as living standards in this 11-inch rainfall area were gradually improved. Water remained a problem, with some supplies coming from local bores, dams and evaporation plants, and some brought in by steamers as ballast.

The post-war years still saw bullocks, donkeys and even camels hauling wool from the outback stations to

Iron Knob to be railed to Hummock Hill and thence barged across the gulf to Port Pirie. But while the barges continued to ply, supplying flux to the Port Pirie smelters, direct shipping services to the east coast became more frequent.

Emerald Wings and *Bright Wings*, the two chartered ships that opened the iron ore traffic to Newcastle were bought by BHP in 1919, and renamed *Iron Baron* and *Iron Prince*. The latter ran aground near Cape Howe in 1923, but in that year, BHP was able to buy three of the "E" class ships of the disbanding Commonwealth Shipping Line. The three, named *Iron Knob*, *Iron Master* and *Iron Prince* were joined in 1925 by another "E" class vessel named *Iron Warrior*. These 6000 ton ships, built in Australia for the government line largely from Newcastle steel, became the mainstay of the company's seaborne trade up to the mid-'thirties. Success in establishing its own fleet operations was an important part of the company's drive to keep costs to a minimum. It also represented a change in management philosophy; Lewis did not entirely share Delprat's concern to concentrate management on a narrow front.





June, 1st. 192



A
meeting at
Sydney Central
on the way
to new
dimensions



Charles Hoskins became convinced that the inland location of the Lithgow plant meant that its future prospects were doubtful. He formed Australian Iron & Steel Ltd to build a new steelworks at Port Kembla and by June 1927 work had begun there on foundations for a first blast furnace (preceding pages). The weatherboard office on the right of the picture was the first building erected on the site.

In the north, BHP was developing its own coking coal sources. The first company colliery to be put into production was John Darling, near Belmont (seen left in 1929). The mine was exceptional for its day, having concrete lined shafts and, on the surface, even brick stables and extensive exercise yards for the pit ponies.

Few

Australians expected the crash of '29 on Wall Street to bring trouble to their shores. The *Sydney Morning Herald* even thought that the "ramifications may be favourable to other countries rather than unfavourable". But with only a few weeks elapsed of the difficult decade of the '30s, there were uneasy second thoughts.

Wool prices were already down and the Australian wheat harvest was poor; the trade balance was moving rapidly to a crisis. Unemployment had been rising steadily since 1927, and although migration to Australia was slowing anyway, the new Labor government in Canberra had proposed in November 1929 to suspend assisted passages from Britain.

The Federal budget for 1930 introduced Australians to a sales tax, import cuts and higher charges generally ("most destructive", according to the *Brisbane Courier*) and Sir Otto Niemeyer from the Bank of England was lecturing the state premiers on the merits of balancing their books. The new premier of New South Wales, Mr J.T. Lang led his state on an opposing path.

By 1931 unemployment was at least 20 per cent and peaked at about 30 per cent in the following year. The scale of hardship and distress throughout the country was unimaginable. It was not until 1934 that there was some recovery and there were still scars of the great depression when the world went to war five years later.

Policies followed after the 1922 shutdown give an impression of having been guided by prescience: certainly they represented the driving convictions of Essington Lewis. The priorities he pursued were those of efficiency, cost reduction and husbanding of resources rather than expansion for its own sake. Capital costs were met largely from earnings in a most conservative financing plan. But there were substantial investments during the period, for Lewis was prepared to scrap outmoded plant to promote competitive ability. Thus, the Semet-Solvay coke ovens at

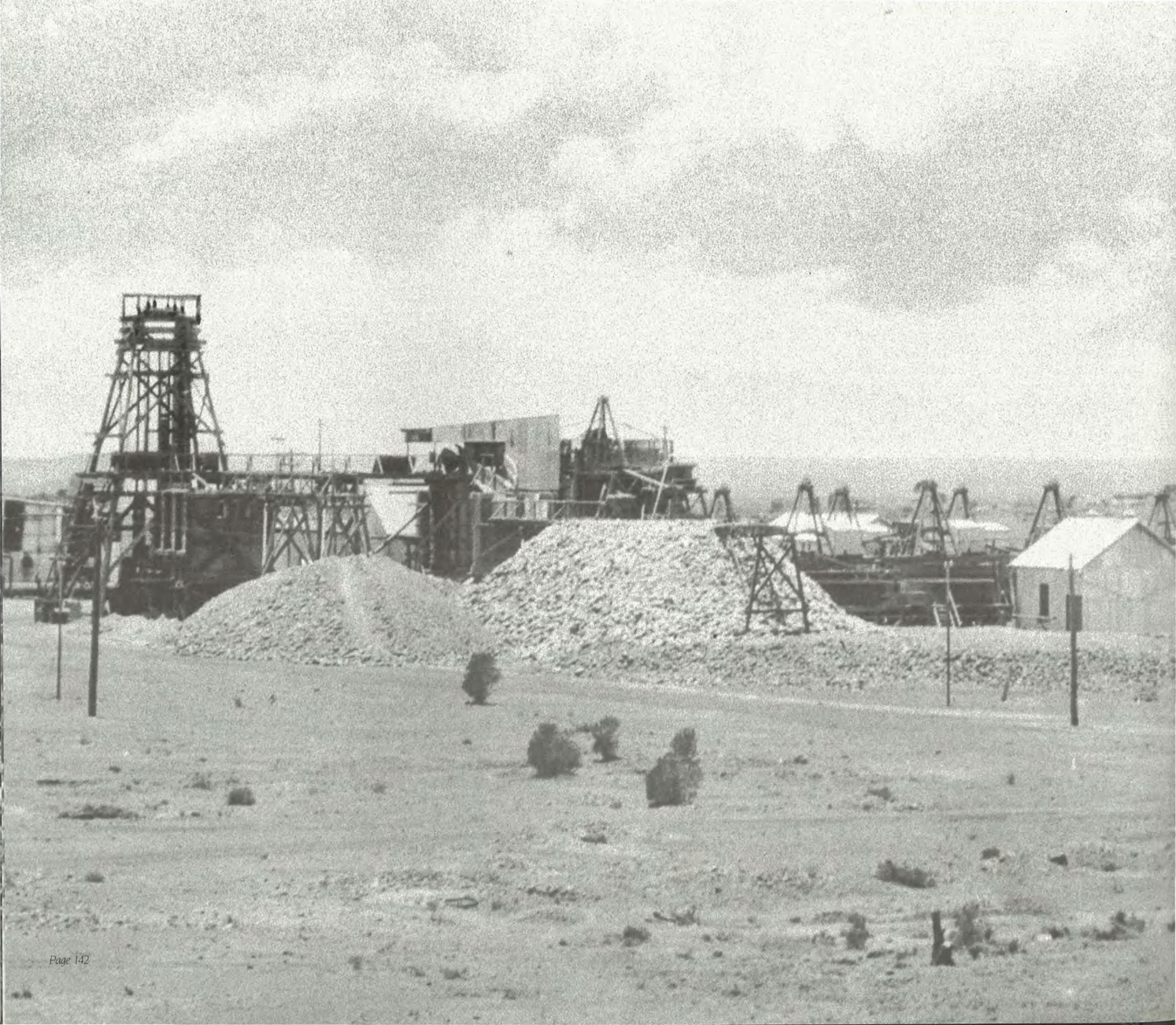
Newcastle, never entirely satisfactory but the only type available at the time of installation, were replaced. The new units, comprising two batteries of Wilputte ovens and a new by-products plant, cost some £1,000,000.

The rising cost of coal having proved as damaging as higher sea freights, that problem too was tackled. Coal measures were taken up at Elrington near Cessnock NSW and the John Darling colliery was established at Belmont, 12 miles south of Newcastle. Work on both began in 1925 and John Darling was in production from two seams two years later. Elrington, a far deeper pit, produced coal in 1930 after protracted labour difficulties. Within the next few years, BHP bought the Burwood, Lambton and Redhead collieries. The development of Lambton, particularly, involved mechanisation to a degree then new to the New South Wales coalfields. By 1935 there were over 1200 men working in the collieries compared with 4600 at the steelworks itself.

Lewis was also ready to integrate downstream to protect outlets for the steelworks' semi-finished products. When Rylands Bros (Australia) Ltd found itself in difficulties following the 1922 downturn BHP bought a controlling interest from Rylands of UK by an exchange of shares. When Titan Manufacturing Co Ltd of Melbourne formed a new subsidiary in 1927 to take over its nail and wire operations, BHP took a half share. Later it bought out the whole Titan holding. Earlier BHP had joined with Bullivants of London and three other British firms to form Australian Wire Rope Works Ltd. This company's new plant at Newcastle went into production in 1925.

There were additional similar moves later. The Lysaght Bros wire plant on the Parramatta River at Chiswick was purchased with another share exchange, and BHP took up a minority interest in what was to become Commonwealth Steel Co Ltd. Partly as a result of Lewis' urging, Stewarts and Lloyds of the UK built a tube mill at Newcastle in partnership with BHP.

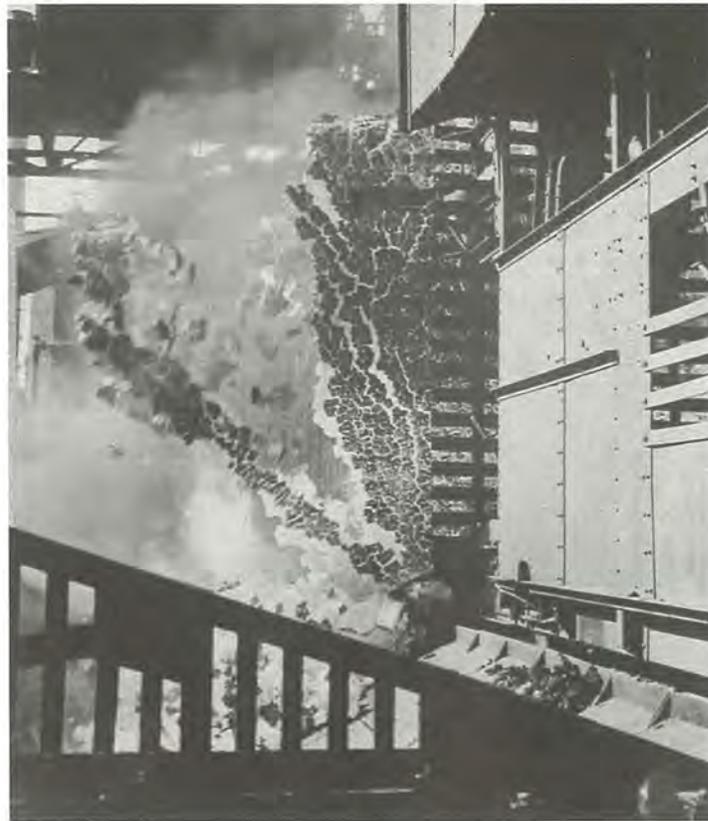
And there was that other development of the early



Two new Wilputte coke oven batteries installed at Newcastle from 1929 (above right) reduced fuel consumption for cokemaking by 27 per cent, and contributed greatly to the efficiency drive that enabled steel prices to be progressively lowered.

But world depression had caught up with Australia and by 1932 output was down to about one quarter of the plant's capacity. They were the days of many anxious men at the employment office outside the gate (below right).

Partly to help the national economy, BHP made efforts to revive gold mining in Australia; in the course of this, Hannan's North mine, just outside Kalgoorlie WA (left) was bought in 1932 and worked for some years.



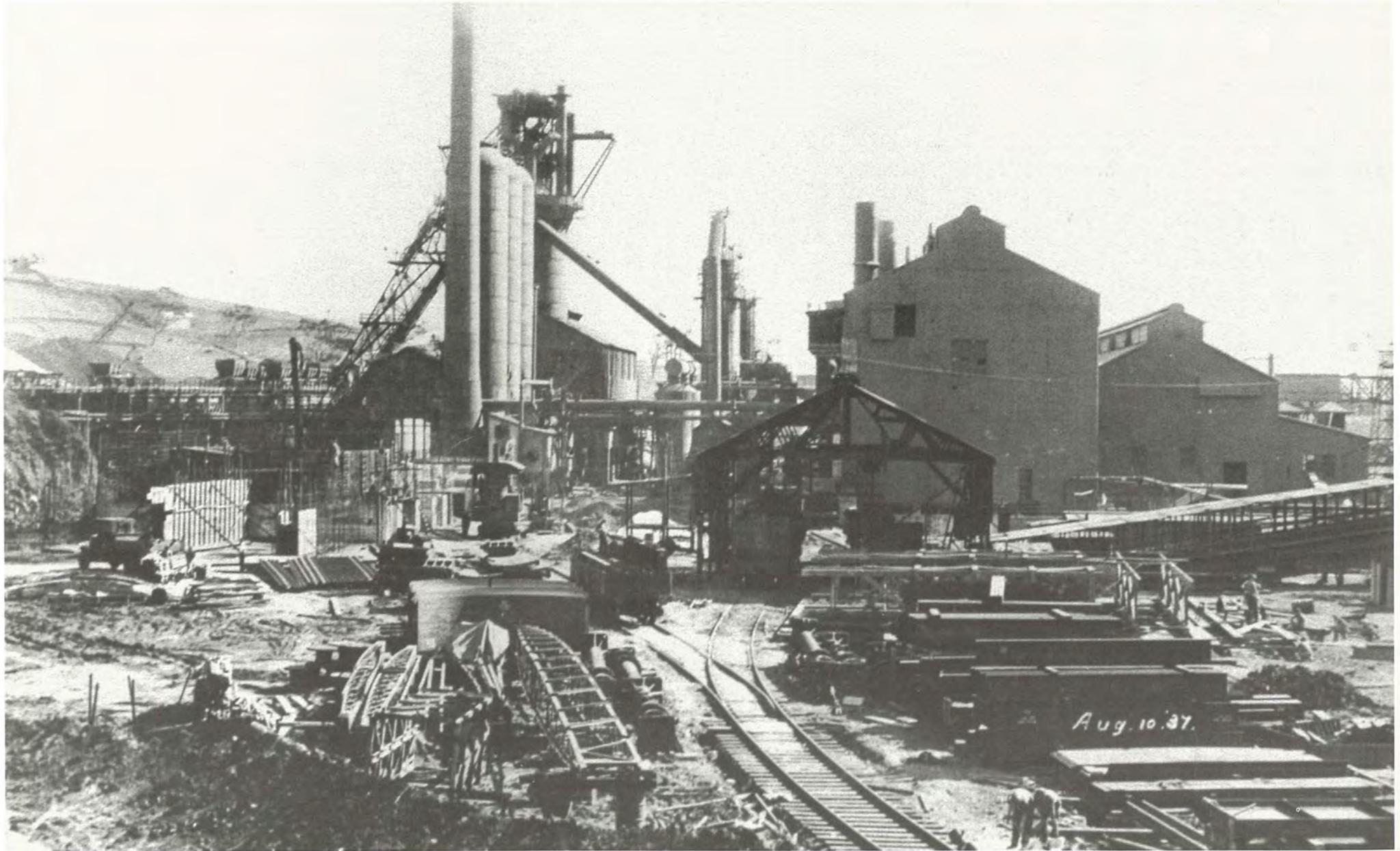
depression years: both politicians and businessmen came to look on gold with new respect. Said Chairman Harold Darling to his shareholders in 1931: "Gold at the present moment is the only article in the world for which demand cannot be satisfied."

The mine at Broken Hill had worked for a few months up to June 1930, but by then the zinc concentrates produced after meeting Australian costs could not be sold on world markets. At his 1930 meeting, Darling had despaired of a future for the country's mining industry. Of ores there were ample reserves, but production costs particularly wages denied access to markets. In the Australian metals mining industry, he pointed out, employment had dropped from 64,419 in 1913 to 16,667 in 1928.

It was soon after that Prime Minister Jim Scullin suggested to Lewis that the company might investigate the possibilities of reviving the old Western Australian goldfields. The following year, announcing a programme of gold exploration and development, Chairman Darling said that a return to gold mining would help national recovery and would increase the demand for steel products, and the company had the trained people and technical organisation to undertake such a move.

Attention was first paid to the Kalgoorlie fields in Western Australia where the the Hannan's North mine was purchased in 1932. It was just outside Kalgoorlie town, and had earlier been worked intermittently for some years. After dewatering, sufficient new ore reserves were found to justify building a small treatment plant a year later, and the mine was worked successfully until 1942, when wartime manpower problems forced a closure. After the war mining resumed until 1951. Other exploration work in the area was unfruitful.

In New South Wales also the search for gold produced mixed results. Hargraves' original gold discoveries in 1851 had been in the Macquarie River valley



It fell to Cecil Hoskins (above left — later Sir Cecil), Charles' son, to carry through his father's development plans for Port Kembla.

By 1937 (left) two blast furnaces and four open hearths were in operation, with a bloom mill and finishing mills. But by then, AIES was already within the BHP group.

near the town of Wellington. There had been a great deal of dredging for alluvial gold in the area, but with small-scale units; BHP became persuaded that there were possibilities in larger-scale operations. By 1936 a new company, Wellington Alluvials Ltd had been floated off to BHP shareholders, with substantially the BHP board as directors. Actual dredging began in 1938 but there were considerable technical difficulties until 1942 when in the year of the first dividend, manpower problems became acute there also. Mining was suspended until after the war, but the returns even then were not satisfactory, and the company was wound up in 1958. This was in spite of the fact that in its later years, the dredge was producing significant quantities of industrial diamonds.

Another small gold mine at Cowra Creek, near Cooma, opened in 1936, also had to close in 1942 for lack of men, and was finally abandoned in 1953. BHP's interest in gold was to be renewed a decade later with more positive results.

At its worst, the great depression reduced Newcastle's steel output to about one quarter of capacity while many steelworks overseas were closed altogether. By 1935, with demand picking up rapidly, the works produced a record 552,710 tons. Chairman Darling went to his jubilee shareholders' meeting to report a profit of £670,000, the best result for forty years, and to speak of impressive growth.

Thus BHP fifty years on: the company's investment in steel totalled about £10,000,000, there were over 10,000 employees and around 10,000 shareholders. Australian registered shareholders held about four-fifths of the shares on issue, a turnabout from 1900 when two-thirds were registered in London.

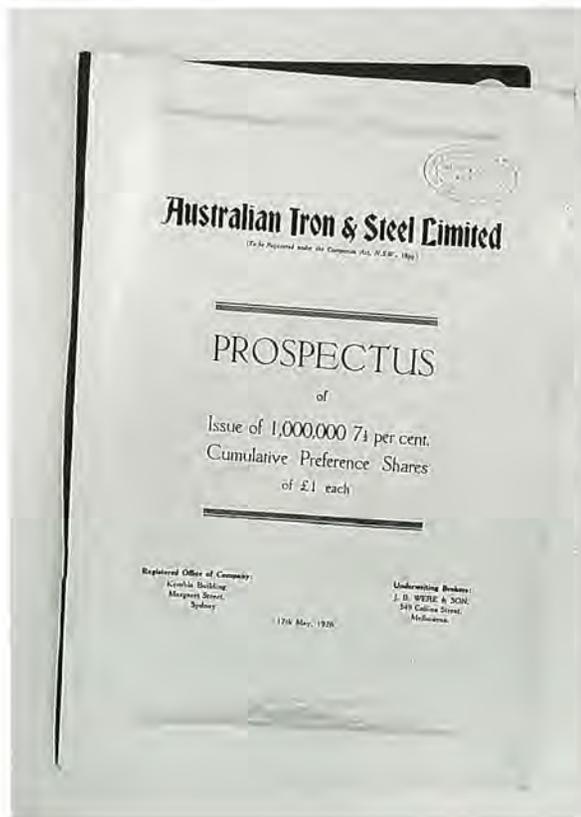
Depression notwithstanding, the company's reserves were at an all-time high. Dividends had been passed for the years 1930-32 to conserve funds, but were resumed as soon

as business picked up. At the same time, Lewis' drive to lift efficiency had made it possible to reduce steel prices to an aggressively competitive level. Lewis was quite confident when he told British steelmasters during a 1934 visit to London that BHP's technical standards could be compared with any in the world.

By 1935 the Newcastle plant comprised the two new Wilputte coke oven batteries, three blast furnaces (record output for the largest was 5915 tons a week) and ten open hearth furnaces, four of them of 130-ton capacity with the newest only just commissioned. The bloom mill had a capacity of 12,000 tons weekly and there were seven finishing mills, including a 28-inch rail and structural mill, an 18-inch continuous mill, a plate mill and a 16-stand Morgan rod mill rolling a single strand. A tinplate plant, long considered, was at the planning stage. Finishing shops, roll turning shops, foundries, fabricating shops and a brick plant maintained production standards well above those of the day.

Good housekeeping at plants was a Lewis fetish, and he imposed it throughout the organisation. (The use of shadow boards to store tools and spares was a case in point.) The managing director (Lewis had joined the board in 1926) kept up a punishing programme of tours and inspections which became a central feature of the management style. Safety programmes with shop committees and bonus schemes had been introduced in the early '20s, as was a suggestion scheme.

Breaking new ground for Australian industry, a formal staff training scheme was introduced in 1927, encouraging junior members of staff to study in their spare time. The plan comprehended a policy of promotion from within, with regular transfers to ensure appropriate levels of experience and supervision and the recording of each individual's career path. Young men passing through this scheme were to provide much of the company's senior management in later years. A provident fund was established in 1926, and a staff-controlled sickness and accident fund in the same year.



Apprentice training was accorded a high priority; by 1935 there were about 150 lads indentured to the various trades at Newcastle works, with courses including attendance at the Newcastle Technical College.

Care was taken to maintain links with steel industries overseas. Lewis himself made exhaustive tours about every five years, and between 1919 and 1935, there had been about 70 overseas visits by others to keep abreast of techniques.

Progress at Newcastle was matched by development at Whyalla and the ironstone quarries, from which about 10,500,000 tons of ore had already been shipped. At Iron Monarch, shovel operations and ore haulage within the pit had been electrified, while each ore train carried a standard load of 2000 tons from the primary crusher at the mine to the secondary crushers at the port. The shiploading plant had a capacity of about 1000 tons an hour; besides loading the company's ships for Newcastle and barges for Port Pirie, there were regular overseas shipments to make useful contributions to profits. The Iron Prince deposit in the Middleback Ranges was being opened up to meet the rising demand.

At the growing townships of Whyalla and Iron Knob water supply continued as a problem but otherwise living conditions had been greatly improved. A company dairy at Whyalla ensured fresh supplies and a company nursery was acclimatising trees which would flourish in the semi-arid conditions. Amateur botanist Albert Morris from Broken Hill visited the town to help in the tree-planting programme. Eucalypts and acacias predominated. Schools, scout and other groups, libraries and sporting fields made possible the full enjoyment of family life.

With all this as a background, it was hardly surprising that Darling said at the opening of his jubilee address that the board was proud of the company's organisation. It was quite late in that speech that the chairman referred to certain developments which were to make the newspaper headlines of the day.

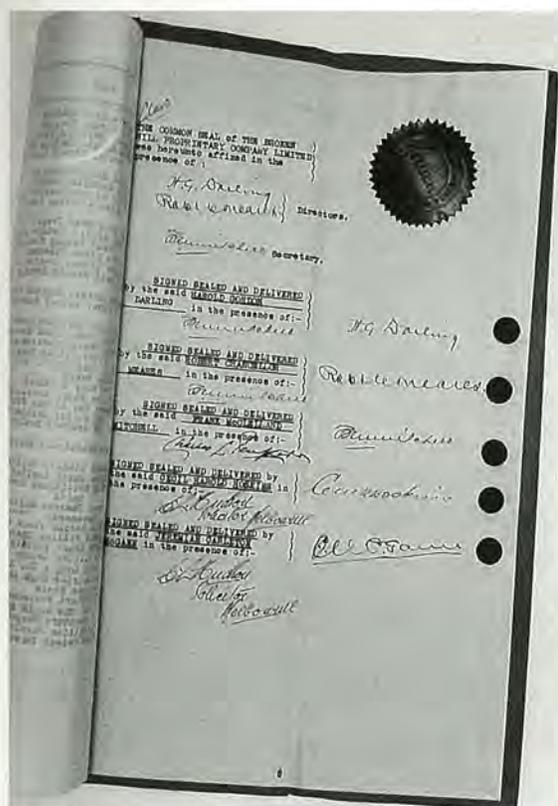
While Baker was driving his men to get the Newcastle works into production in the north, Charles Hoskins was facing serious difficulties at Lithgow to the west. The year immediately before the outbreak of war in 1914 saw British, American and German firms undercutting Lithgow prices, to the point that in that year output was down to 50 tons of steel a week. The war changed that. The Commonwealth Small Arms Factory was established at Lithgow, and by the armistice, the Hoskins plant had a regular weekly output of 2500 tons of iron, together with a range of steel products including some special steels, and was working to capacity. In 1919, the company was restructured to become Hoskins Iron and Steel Co Ltd; Charles had bought out his brother George.

The peace kept the order book full with housing products in demand but also brought difficulties, old and new. Lithgow's local raw material supply was far from satisfactory, while the level of rail freights both incoming and outgoing was strangling the company. Charles Hoskins became convinced that he would have to move his works to the coast. In 1923, he unveiled to a New South Wales government committee a plan to build a new plant on a 380-acre site at Port Kembla bought from the Wentworth family. An investment of £2,000,000 was involved. Lithgow was to remain in operation. In 1925 Charles handed over to his son Cecil, after the state parliament had passed the necessary bills to allow the planned development to go ahead. In the following year, Charles Hoskins died.

Port Kembla was the logical site. The company already had a coal mine with coke ovens at Wongawilli on the Illawarra escarpment and had recently taken up leases to extensive limestone deposits at Marulan in the Moss Vale district. Port Kembla itself was the nearest deep water port to Sydney, and indeed had already been chosen as the site for the projected (but never established) state government-owned steel enterprise.

Cecil Hoskins made a start at the new site, but soon found that a stronger financial structure was necessary. In

AI&S became a BHP subsidiary by an exchange of shares. Signatures (below) are those of the directors of the two companies on the documents arranging details of the exchange.



1927, Australian Iron & Steel Ltd was formed, incorporating the former Hoskins company, and with the ordinary shares also held by Dorman Long & Co Ltd, Baldwins Ltd of UK and Howard Smith Ltd. In addition, £1,000,000 was raised with a public issue of preference shares.

By 1930 operations had begun at Port Kembla with one blast furnace with a daily capacity of 800 tons. Just before AI&S was formed, Hoskins' had addressed the problem of iron ore supply, for their original local sources proved inadequate for production on any scale. In 1927 they bought for about £27,000 a lease to the iron ore deposits on Cockatoo Island in the Buccaneer Archipelago off the far north west coast of Western Australia. The lease had been held by the Queensland government, all that remained of a still-born 1918 plan for a state-owned steel enterprise to be built at Bowen Old. The new owners soon found, as had their predecessors, that shipping the Cockatoo ore would involve difficult engineering. To feed the new blast furnace in the meantime therefore, a 10-year contract was arranged for BHP to supply ore from the South Australian quarries.

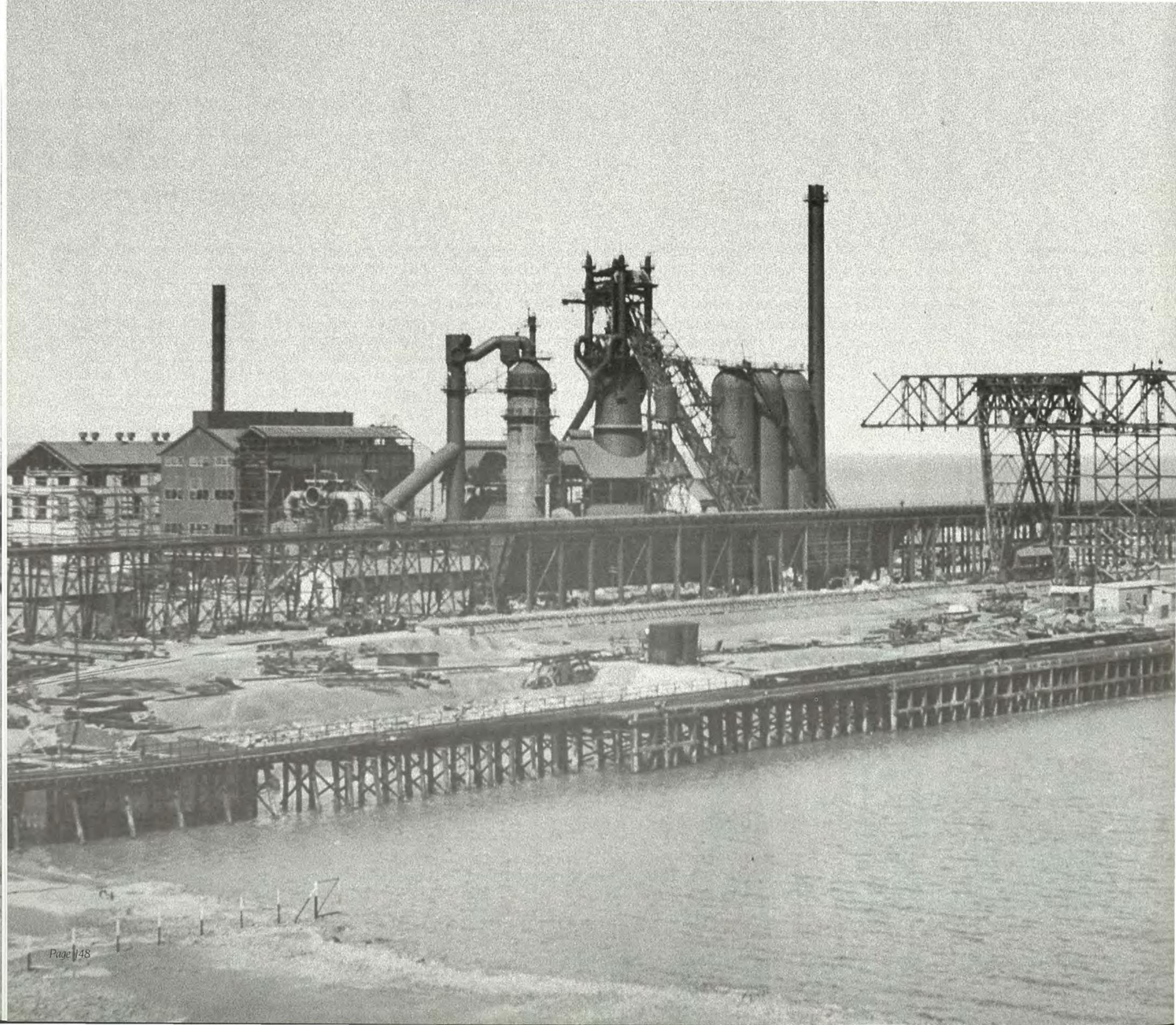
The new AI&S plant ran into difficulties from the outset. A new state government rail link to Moss Vale for limestone haulage was delayed, while lower-than-expected levels of output prevented the company from meeting its contracted tonnages over the rail system. The relatively high award rates for the Lithgow plant were carried over to Port Kembla and in spite of applications to state tribunals, the resulting competitive edge in labour costs held by Newcastle continued. There were usual commissioning difficulties and with the depression at its peak, the additional capital needed to complete the new works could not be raised. Such orders as could be obtained for iron and steel production were insufficient to justify economic levels of production.

The two Australian steel companies were in contact

during this critical period over the iron ore supply contract and with some exchange visits by technical people. In 1933, Sir Richard Firth, a visitor to Australia from the UK firm of Richard Thomas & Co, talked informally with the Hoskins brothers (Cecil and Sid were joint managing directors, with Cecil as chairman) about the desirability of a merger of the two steelmakers. There was, he thought "only one sane solution" in the Australian industry. But he ventured the opinion that BHP would not initiate discussions.

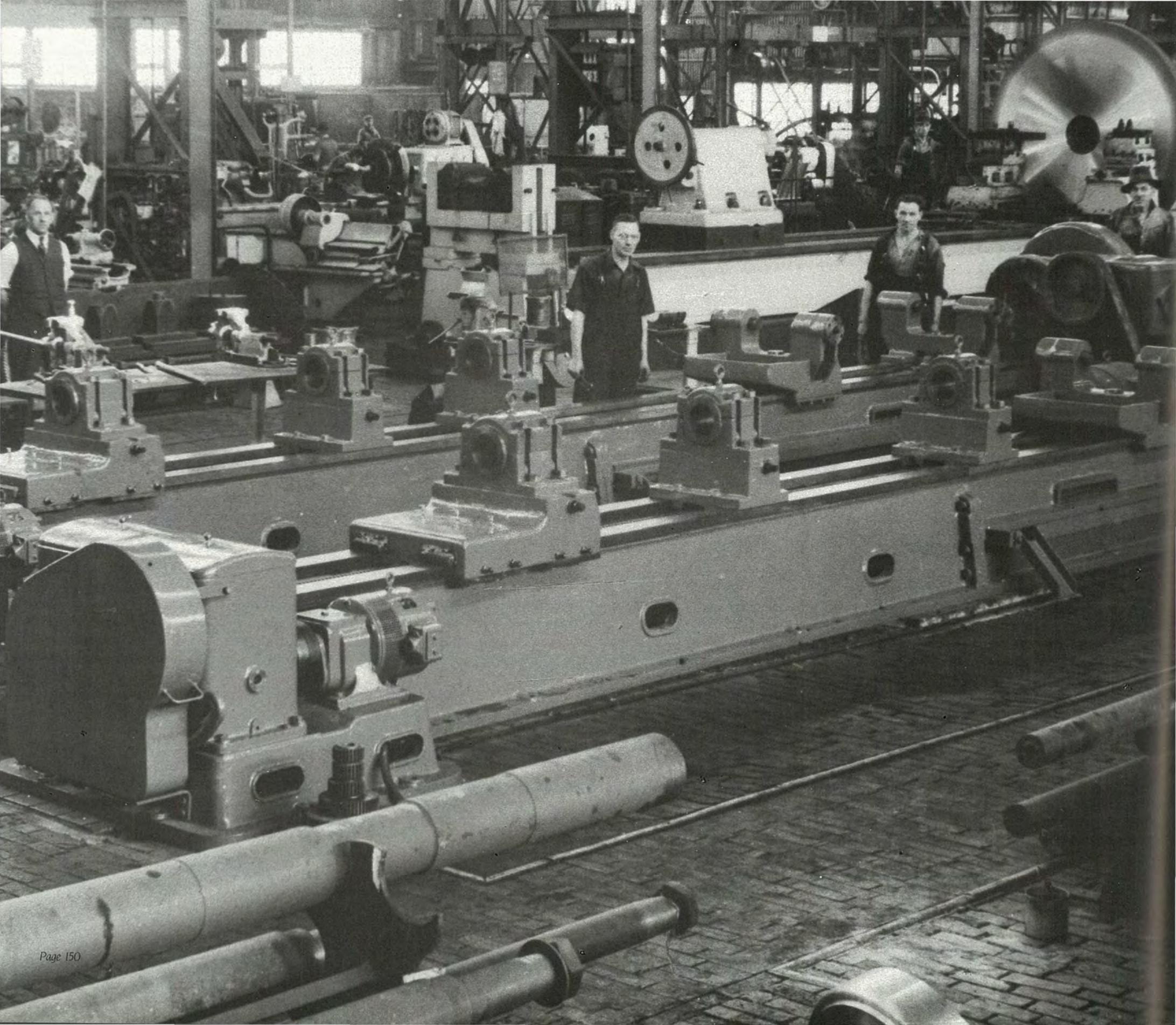
As it happened, AI&S profit for 1934 recovered substantially, only to fall again in the following year. In July 1935, Cecil Hoskins asked Lewis if they could have a talk, and from then on events moved swiftly. On the 27th, Cecil and his brother met Lewis at Sydney Central railway station; the BHP man was on his way home to Melbourne from Newcastle. Negotiations for merger were begun, and by early August rumours from the share market were appearing in the newspapers. Darling confirmed to BHP shareholders at their annual meeting at the month's end that "conversations" were indeed taking place. On 18 October stock exchanges were told that by an exchange of shares AI&S had become a BHP subsidiary; 750,000 BHP shares were exchanged for 2,467,507 AI&S ordinary shares of which 950,000 were partly paid.

The Port Kembla installations comprised the American-designed blast furnace, three 150-ton open hearth furnaces also US designed, a large-scale bloom mill, a 36-inch structural mill and a merchant mill. There was a spun pipe plant and appropriate plant services, including a wharf at Port Kembla harbour with 300 ton-per-hour ore handling equipment. The works was linked to the state rail system, and on the raw material side, owned the Wongawilli colliery with coal washery and coke ovens, the Marulan limestone quarries and the Cockatoo iron deposits. Before the financial details were settled, Lewis had his production engineers working on integration of the two plants.





A wartime
charter
as wide
as the
seas
and high
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skies



The war of '39 could be seen by some while still some way ahead. Such perceptions were at least a part of the planning that led to the building of a new blast furnace at Whyalla, virtually complete by October 1940 (preceding pages). Later a shipyard was built at the head of the same inlet, and Whyalla became a key part of Australia's war effort. An American journalist, writing about the town and its defence commitments in 1941, dubbed it "Secret City".

The east coast steelworks were also mobilised for war: by 1941, this workshop at Port Kembla (left) was building the precision lathes needed for boring gun barrels. Improvisation was the order of the day — at a high level of technical achievement.

BHP's

years up to the threshold of the second world war saw strong growth, diverse development and new magnitudes. In 1937, company profits passed the £1,000,000 mark for the first time since the silver-boom years of 1891-2. Steel output passed the 1,000,000 ton mark for the first time. Baker's forecast that the company would be able to make iron at a lower price than anywhere in the world was realised: BHP's product prices had in fact been dropping steadily since 1930 while those in most other countries were rising. Output stood at 1,170,000 ingot tons in 1939, which was also a year of record exports as BHP iron and steel found markets in Britain, Europe and elsewhere. And all through those years there were the portents of war, seen by some and ignored by many.

Essington Lewis sailed from Australia in April 1934 on one of his trips to Europe and America; during the trip and for the first time, he visited Japan. In a fortnight he saw two steelplants only (and little of them) but talked to as many Japanese businessmen as he was able. He was impressed and even alarmed. Writing to the Chairman Harold Darling after he left Tokyo, he said that "Japan may be described as a big gun-powder magazine and the people as fanatics and any day the two might connect. . ." By the year's end, having visited Nazi Germany also, Lewis was back in Australia urging preparation for war. Steps he thought necessary included large-scale shipbuilding, development of an aircraft industry, munitions manufacture and raw material stockpiling.

In January 1935 Lewis and Darling lunched with W.S. Robinson, the influential Australian who was then managing director of the Broken Hill Associated Smelters and several big mining companies. They resolved to form a syndicate to make aircraft in Australia. Within a year the Commonwealth government had formally invited the partners to undertake the project and four other

companies — General Motors-Holden's Ltd, The Electrolytic Zinc Company of Australasia, ICIANZ Ltd and the Orient Steam Navigation Co Ltd had joined BHP and BHAS in the venture. BHP and BHAS each provided one third of the capital. Commonwealth Aircraft Corporation Ltd was formed in October 1936 after Wing Commander Laurence Wackett, who had been appointed manager, had gone overseas to select possible designs. Wackett's choice fell on an American-designed two-seater fighter-bomber, hardly an advanced aircraft, but still a test for a workforce with virtually no actual experience in such manufacture. In January 1939, Lewis (who was managing director of CAC) was at the Fishermen's Bend plant in Melbourne to see the first Wirraway make a 15-minute test flight. There were about 50,000 separate parts in that airframe and its Wasp engine; almost all had been made by the CAC people themselves.

By the end of the war, over 1000 planes had been built at Fishermen's Bend, including Wackett trainers, Boomerang fighters and Mustangs. CAC also produced engines for other manufacturers. Australia (a country which had produced some notable aviation pioneers) at last had an established aircraft industry.

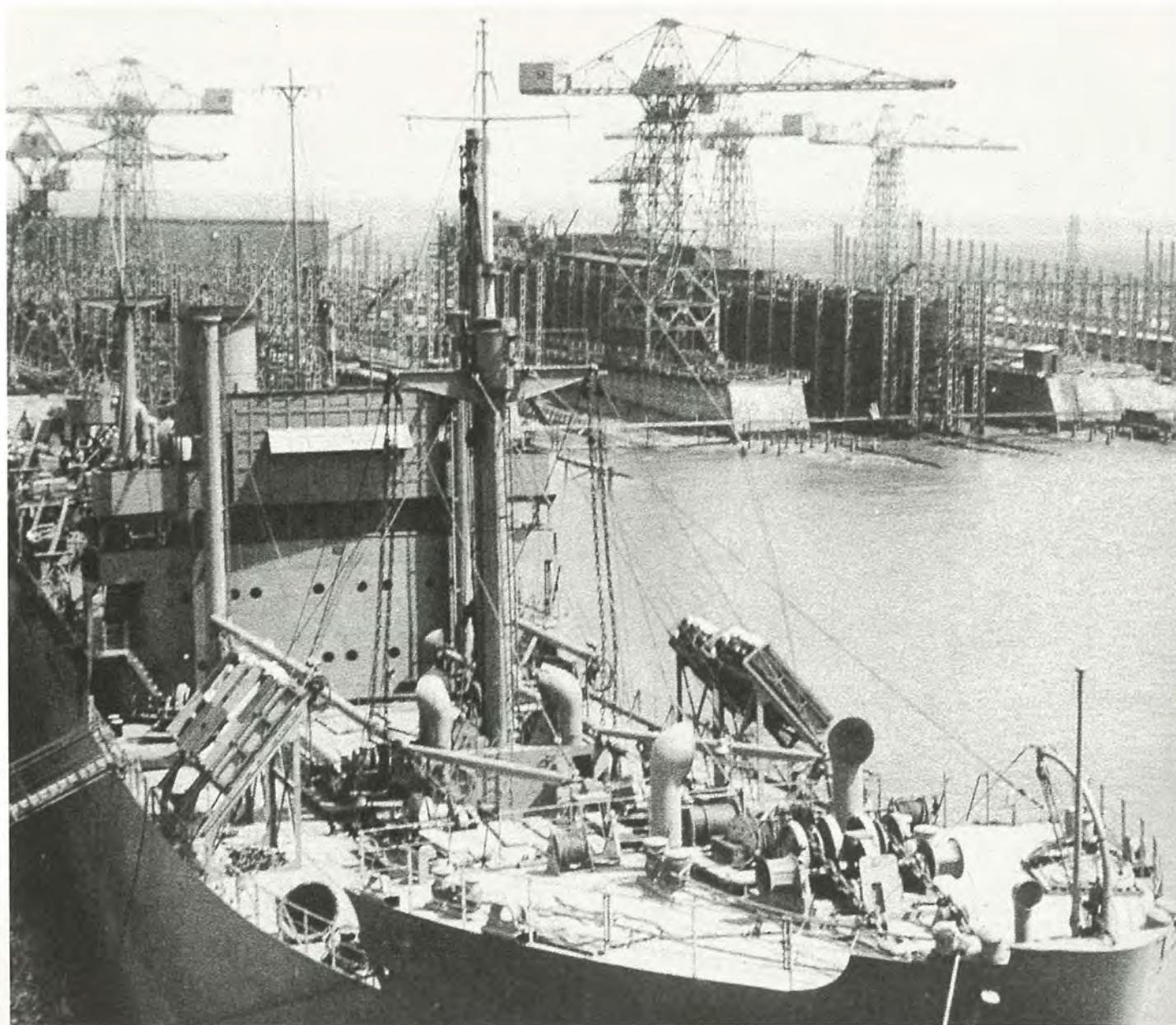
Meanwhile Lewis' interest in Australian aviation prompted other moves. One of his early thoughts was that the company should buy a small fleet of light aircraft for executive use. Apart from direct advantages, he thought that this would provide training for pilots and ground staff. There was interest in the twin-engined Gannet machine, which the small Tugan Aircraft Ltd was building at Mascot, NSW; CAC took Tugan over in 1936. About this time also, BHP was helping the aero club movement which was becoming active. (BHP Review, the company's staff magazine first published in 1922, carried encouraging reports of progress by the Spencer Gulf club.) Then in 1937, BHP joined with Zinc Corporation in the purchase of a

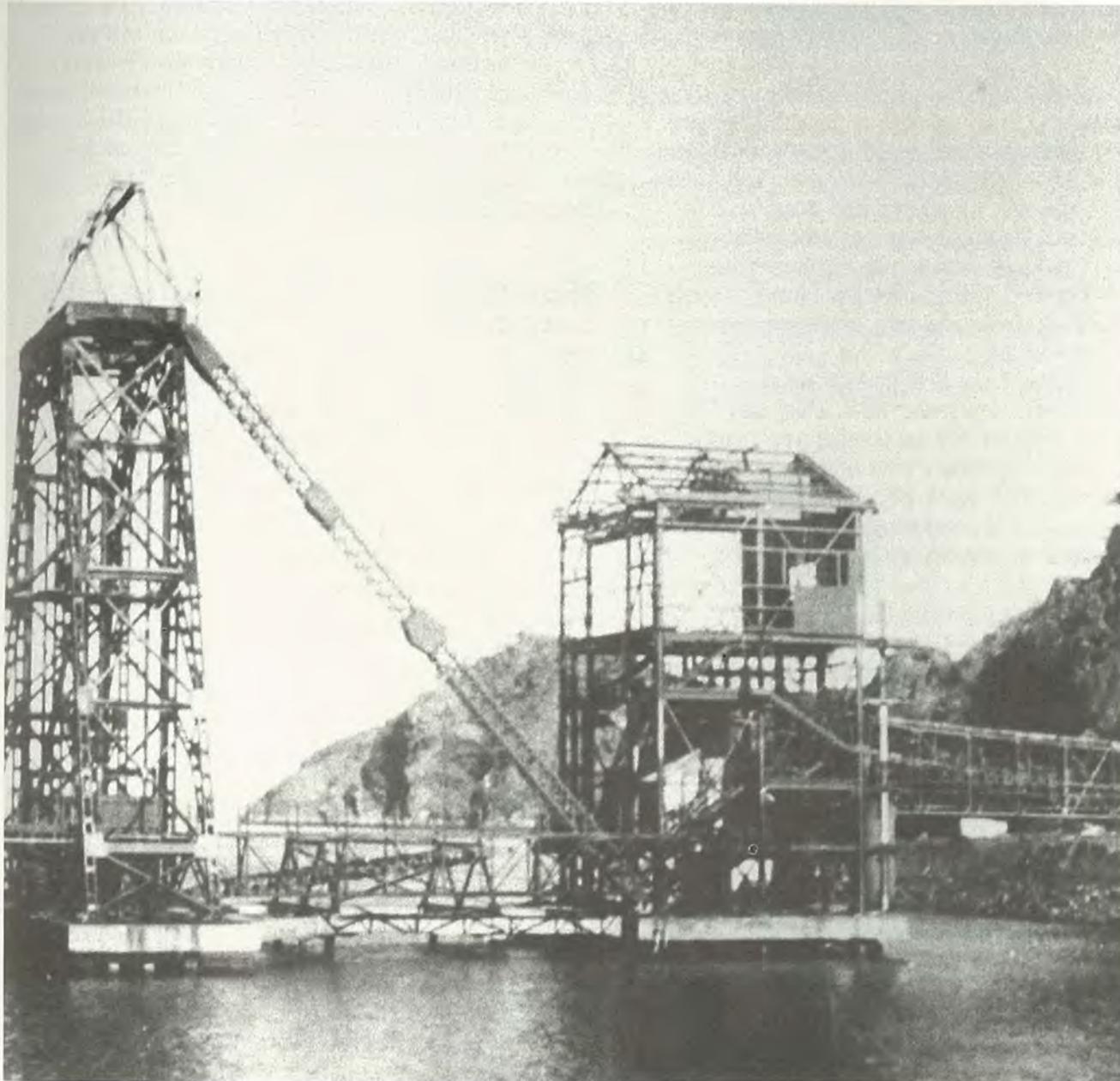


By 1939, Newcastle and Port Kembla steelworks had a combined capacity of 1,500,000 tons of raw steel a year. Newcastle, the larger plant, had 13 open hearth steel furnaces (one being charged is seen above).

It was 1940 before the first keel could be laid at Whyalla shipyards but facilities for full scale operations were quickly installed (right).

Leases for the Cockatoo Island iron ore deposits had been included in the takeover of A&S, but work on developing the mine there was interrupted by the war. With the peace, construction of the jetty was resumed (far right). It was the first such all-steel structure in the country, involving special design problems because of the extreme tidal range. (Photograph is from the R.M. Bennett collection).





Lockheed 12A, named "Silver City" and at the time the fastest machine in the country. From that beginning Associated Airlines Pty Ltd was later formed to provide service facilities for company planes.

It was however within the steel industry itself that there was the most dramatic progress involving investment on a scale hardly seen heretofore by an Australian company. Such was BHP's financial strength that funding was not a problem. Besides the shares issued for the AIES exchange, a cash issue was made at a 10s premium in September 1935 to raise £2,250,000. Two years later another issue on the same basis raised over £2,600,000, and in December 1939 over 11,000,000 new shares were issued from the share premium account. In less than four years the number of shares on issue had risen 2 1/2 times to 11,396,936 (par value was still £1) and reserve funds had almost doubled.

At the time of the merger, Port Kembla steelworks output was about a quarter of the tonnage produced at Newcastle and being a new plant still, there was scope for improved balance. Much of the new investment was accordingly concentrated on the southern works. Work began in 1936 on a fourth open hearth furnace (to be of 150 tons) followed by a fifth the following year. A second blast furnace with a daily capacity of over 1000 tons (then one of the largest in the world) was in operation by 1937 and arrangements were made to uprate the original furnace. In 1940 a sixth open hearth of 250 tons was commissioned bringing the ingot capacity of the plant to 617,000 tons. A battery of Wilputte coke ovens had been completed at the works by 1938 replacing the older ovens at Wongawilli. New continuous mills were added, handling capacities at the wharf were improved and plant services kept in line with these developments.

Product lines were rationalised so that, in general,

heavier sections were rolled at Port Kembla and others at Newcastle, an arrangement which suited the respective mill capacities.

Newcastle itself, with post-depression demand rising rapidly, was working to full capacity at this time. Between 1936 and 1938 three new open hearth furnaces of 130 tons were added and a third by-product coke oven battery was ready by 1939. The plant's foundries and machine shops were extended making possible among other things the manufacture of mill rolls. Rolling mills themselves were uprated and electrified. A ferro-alloy plant was completed in 1939 as a self-sufficiency measure, and a new larger ore bridge built at the wharf.

During the 1914-18 war BHP had gained some experience in munitions manufacture in which Lewis had been personally involved. For the coming crisis he now had Newcastle install the necessary plant and machine tools to resume such production. From 1936, the company was making shell cases for 18-pounder and anti-aircraft guns. By the time war came, the munitions shop was already working 16 hours a day.

After a quarter of a century of steelmaking at Newcastle the view from the newly-extended administrative building was of a plant already pressing upon its site boundaries. The workforce totalled some 7000 men with another 8500 in the subsidiary and associated industries nearby.

Even on the less complicated skyline at Whyalla new developments were soon to make themselves evident. BHP's leases for the Iron Monarch and Middleback Range ironstone deposits ran until 1944, but in 1937 Premier Richard Butler of South Australia raised with the company the possibility of smelting within his state. It was a proposal to which, in the climate of expansion, the company found itself readily able to accede, particularly with the support of the Commonwealth Government for strategic reasons. The

board demurred at proposals for a timetable for large-scale development, but agreed as a first step to build a blast furnace rated at 750 tons daily to supply foundry iron to the Australian market. Initially coke would be back-loaded from the eastern states' works on the ships on the iron ore trade. Dredging for the new harbour and work on the wharf and plant itself began in 1938 and the furnace was blown in three years later.

Meanwhile as Australia climbed out of the 'thirties depression, the country's increasing appetite for steel was putting greater pressure on iron ore supplies. The Iron Prince and Iron Baron deposits in the Middleback Ranges were linked to the Whyalla tramway by 1931 and two years later the first load of Middleback ore supplemented deliveries from Iron Monarch. Pioneering work at the new Iron Prince quarry was by contract. Fred Collins and his four mates, the first contract party, had a weekly target of 500 tons of ironstone, shovelled by hand.

Exports of iron ore also were rising; in 1936 a peak of some 400,000 tons (all manganiferous not suitable for local smelting) were shipped from Whyalla, a quarter to USA but the remainder to Japan. There were new moves from 1935 to work the Yampi Sound deposits. Following the takeover of AIES, development work on Cockatoo Island was resumed although it was to be 1951 before any ore was shipped to Port Kembla. But on neighbouring Koolan Island, Brasserts Ltd of UK had taken over the leases and had agreed to ship 1,000,000 tons of iron ore a year to Japan. By July 1937 preparation on the island warranted the drafting of a first industrial award for Yampi Sound. When war broke out between Japan and China, public unease in Australia over these current and prospective Japanese ore sales became open disquiet.

It was not until the following year that Prime Minister Joe Lyons reacted, and by then he had different grounds. Dr W.G. Woolnough, the government's geological adviser,

reported in April 1938 that the Yampi Sound and South Australian deposits, which he put at about 300,000,000 tons overall, were the nation's only economic iron resources. Something was already known about iron in the Pilbara, but the belief at the time was that distance to the sea, a barren coast at that, made the deposits there economically unworkable. "Steps should be taken" Dr Woolnough recommended, "to conserve . . . reserves." In July, the government banned iron ore exports. It was to be twenty years before the stultifying effect of that ban was lifted.

In 1939 shipments of pig iron to Japan were also banned after a serious strike at Port Kembla over the issue, but it was not until the end of 1940 that the government stopped shipments of scrap.

Progress at the steelworks during the late 'thirties was mirrored in BHP's subsidiary and associated industries. The wire product companies — Rylands, Titan and Lysaght Bros — all expanded, with Rylands particularly breaking new ground technically. That company was successfully designing and making its own wire drawing equipment, and developing considerable metallurgical skill in its specialised field. BHP also increased its interest in Australian Wire Rope Works by buying the shares held by the British firm Bullivants. By the end of the 'thirties the Australian producers were meeting virtually all of the country's demand for wire products. This meant that about 380,000 tons or 40 per cent of Newcastle steelwork's product tonnage was going to the wire mills, replacing the declining demand for railway material.

The special steel producer Vickers-Commonwealth Steel Company (as it had become) changed its name again to Commonwealth Steel Company Ltd in 1935 when BHP bought out two English shareholders to increase its interest; in 1939 the BHP share was increased again. Meantime, Comsteel was increasing its range of special and alloy

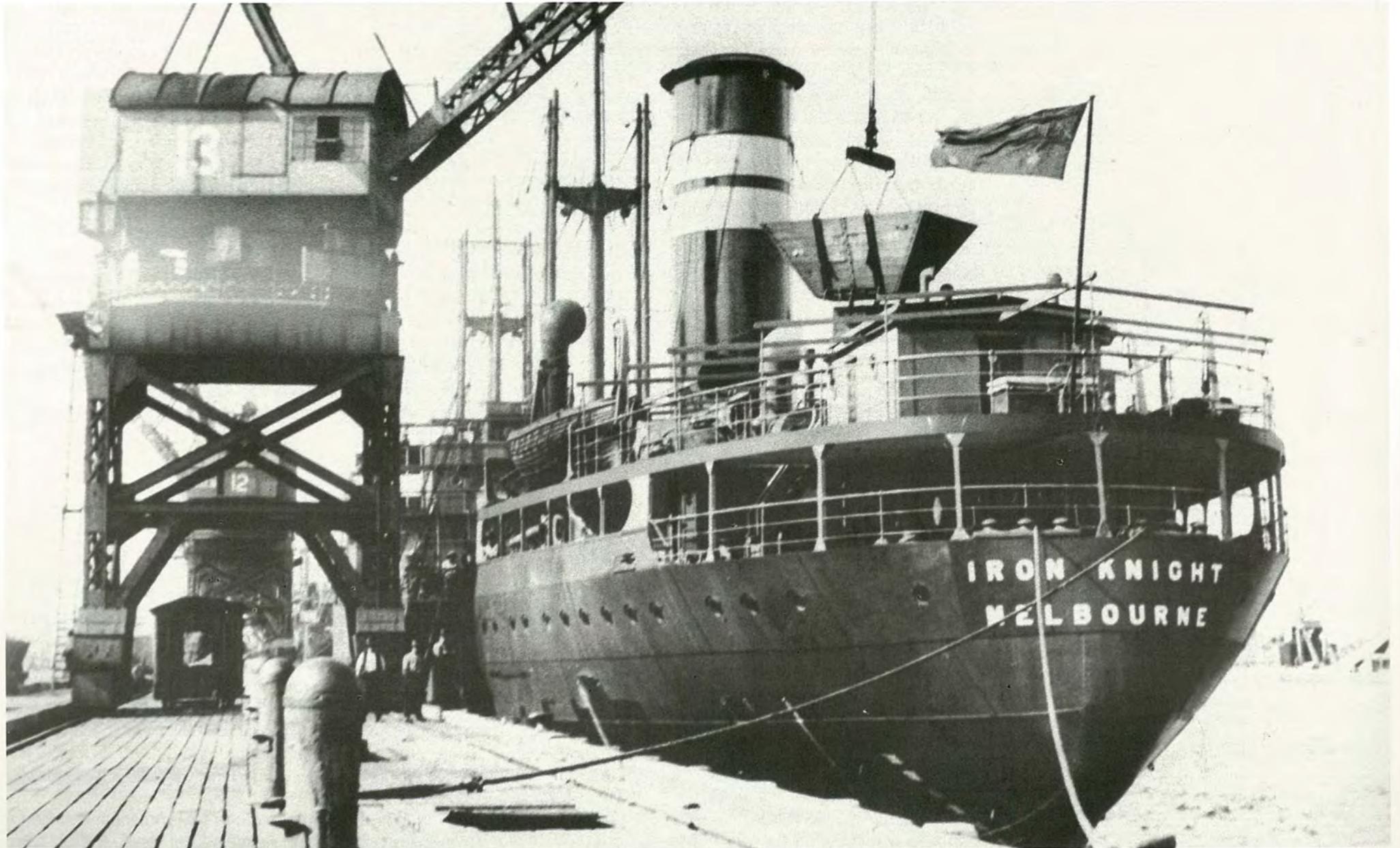
steels, adding to the capacity of its forging shops and installing specialised mills.

John Lysaght's growth was largely centred on building (in partnership with the US company Armco) a new plant, Commonwealth Rolling Mills Pty Ltd, at Port Kembla. These works were in operation by 1939 producing sheet steel largely for the expanding Australian car body industry. Around the same period, Stewarts and Lloyds joined with an English company to build a new pipe and tube mill near Adelaide, drawing feedstock from Newcastle.

In 1937, the US-based Rheem Manufacturing Company made its first offshore investment with the building of a plant at Waterloo NSW to make 44-gallon drums for the oil industry. Two years later, BHP joined with the Americans to form Rheem Australia Pty Ltd to operate this plant. Within the next few years, Rheem was to extend its operations Australia-wide. In 1939 also BHP took a share in the Wiltshire File Company Pty Ltd, founded the previous year to make files in Australia using American techniques.

Shipbuilding had been one of Lewis' priorities for war preparedness but it was 1939 before a plan of action could be found. The four E-class merchant ships bought by the company after world war one were becoming inadequate by the early thirties, and in 1935 orders had been placed on a Glasgow yard for two 8000-ton vessels. This produced critical comment among some NSW Labor politicians already attacking the takeover of AIGS. At the time however, such was the depressed state of the world industry that overseas yards were building far more cheaply than was possible in Australia. In the following year two more similar ships were ordered and by 1938 all four — *Iron Baron*, *Iron King*, *Iron Knight* and *Iron Chieftain* — had joined the fleet.

In 1939 the Commonwealth government announced a plan to encourage shipbuilding in local yards. A short time



Not least among reasons for the shipping shortages experienced by BHP during the war years was the loss of two vessels through enemy action. *Iron Knight* (left) was torpedoed off Eden with the loss of Captain D. Ross (above left) and 35 others. Earlier, *Iron Chieftain* had been sunk off Sydney with the loss of Captain L. Haddelsey (above right) and 11 other men.

later BHP was asked whether it would be prepared to build naval vessels, and the board at once agreed to do so. Whyalla was the logical location for the new venture: it was strategically suitable, steel needed for ship construction could be delivered as back loading on the ore carriers, and the harbour already dredged for the new blast furnace provided a slipway site. Five building berths were planned with fabricating and machine shops at their head. By July 1940 the keels of two patrol vessels were laid, and on 12 May 1941, the first of these, *HMAS Whyalla*, was launched. Three more naval corvettes were completed at the yard by the end of the war.

War's impact was directly felt by BHP when *Iron Chieftain* was torpedoed and sunk 25 miles off Sydney on 3 June 1942 with the loss of 12 men including the master, Captain L. Haddelsey. Then on 8 February 1943 her sister ship *Iron Knight* was also torpedoed and sunk, this time off Eden with the loss of 36 men including the master, Captain D. Ross. By the end of 1943 these two had been replaced by *Iron Monarch* and *Iron Duke*, built to a similar design at the new Whyalla yard. In the next two years four *River* class merchant vessels were built for the Commonwealth government's shipping line.

Shipbuilding at Whyalla gave a sharp fillip to the town's growth. The population grew from 1400 in 1939 to 8000 by the war's end, involving extensive housing and other development programmes. Water supply was probably the greatest problem the people of the town faced, since up to 1943 much of the supply was brought in as ballast in the *Chieftain*-class ships, which had been fitted with special tanks for the purpose. But in 1940 the Commonwealth and South Australian governments joined to build a 223-mile pipeline from Morgan on the River Murray to Whyalla, BHP having agreed to provide the reticulation system necessary at the receiving end. When South Australian Premier Tom Playford on 31 March 1943

opened the valve to let Murray River water run through the town, new standards of life became possible in a place soon to become the state's second-largest city.

Through these years, Essington Lewis was playing an ever-larger part in his country's affairs. In March 1938 he had been asked to chair a panel to advise the Commonwealth government on the mobilisation of private industry in time of war. Then in the following year, he and Norman Myer (chairman of the big retailing firm) were appointed business consultants to the Department of Defence. With the war situation worsening in May 1940 when the Nazis invaded France, Prime Minister Robert Menzies saw a need for what he termed "new and unofficial and drastic" methods of increasing munitions production. A supremo was to be appointed, the government decided, with unprecedented powers to marshal industry. As he later recalled it, Menzies asked Lewis whether he would take on the task "with a charter as wide as the seas and as high as the sky". Within a week Lewis was visiting munitions plants all around the country and within a month he had brought together a new organisation which included several of the nation's leading industrialists and some of the top public servants. He worked largely from a plan brought forward by J.K. Jenson, the senior public servant who went on to serve as secretary of the Munitions Department in the crucial years. J.B. Chifley, former engine driver and a former ALP Minister for Defence, was the first director of labour in the new team.

Lewis himself took a seat on the Defence Committee, and attended the War Cabinet with the Chiefs of Staff. He remained as BHP's chief general manager (he stood down as a director from 1938 until Harold Darling's death in 1950) and took with him a small personal staff of BHP men, including Jan McShane, Fred Merrett and Lindsay Jenkins, all of whom also remained on the company's payroll.

Within six months of Tuesday 25 June 1940, the starting date for the new organisation, munitions output increased almost four-fold. The range of weapons,



ammunition and vehicles produced astonished those who were able to assess what was achieved. Some ALP men had questioned Lewis' appointment, but when in October 1941 the Curtin Labor government finally took office following Menzies' resignation, his job was confirmed with even wider powers. In January 1942 he was made Director General of Aircraft Production as well as Munitions, that function having earlier been made a separate department. Overall, Australia built 3500 aircraft during the war, including 700 Beaufort bombers and 329 Beaufighters. By mid-1943, the munitions workforce involved peaked at 150,000 men and women, and the range of products extended to optics, tanks and torpedoes; the guns included a sub-machine gun designed by the Port Kembla mechanic E.E. Owen. Initiatives taken during this period contributed in no small measure to the expansion of Australian secondary industry after the war.

Later in 1943 after some demurral on his part Lewis was accorded a rare distinction: he was made a Companion of Honour. Acknowledging the award, Lewis himself said he saw it as a gesture "to the many thousands . . . who are working so well for the munitions and aircraft efforts". But Lewis' own efforts were regarded by those around him as little short of superhuman. For four hectic years his life was an incessant round of meetings, travel and inspections, with his time spent in planning, encouraging and where necessary criticising and driving. His optimism, and his strong sense of possible achievement inspired the many with whom he came in contact.

By mid-1944, with the tide of war turning, the pressure on Australian war production slackened. Lewis was able to go on an extended overseas trip. Back in Australia in March 1945, he submitted to Prime Minister Curtin his resignation as Director General, and concentrated his energies once more on BHP's affairs.

With Lewis so committed to the national scene, Leslie



Aircraft production became a special interest for Essington Lewis, particularly after 1942 when it became a part of his wartime directorate. The group at left, photographed in September 1941, stand before a prototype Woomera bomber, built by CAC but never put into production.

Left to right: Sir Alexander Stewart (later a CAC director), Harold Darling, Laurence Wackett, Senator J.W. Leckie (then Minister for Aircraft production) and Essington Lewis.

The picture above of Lewis and Prime Minister J.B. Chifley was taken in January 1945, when the BHP man took his wartime colleague to visit Whyalla.

Bradford had been appointed acting chief executive in BHP's Melbourne office. Harold Darling, who had become chairman in 1923, remained in that office through all these crucial years to 1950. Len Grant was manager at Newcastle, and Cecil Hoskins was general manager at AI&S Port Kembla. The course of the wartime years at the two steelplants was far from even. At first, left-wing leaders among the trade unions were sceptical of the conflict's significance and there were stoppages at both plants on a range of issues. Commencing in March 1940 there was a ten-week strike on the NSW coalfields that was particularly disruptive.

About the end of 1941 the labour relations climate changed; a Labor government had come to power in Canberra, Japan had entered the war and Germany had attacked the USSR. From a pre-war output figure of just over one million tons of steel ingots, production quickly increased to a 1942 peak of 1,676,000 tons. It was to be over a decade before this figure would be equalled.

At Newcastle works particularly there were notable technical achievements in those years. In two instances, there was the need to replace materials the supply of which had been cut off by the war. BHP had attempted unsuccessfully before 1939 to obtain process technology for the manufacture of tungsten carbide, a hard metal developed particularly by Krupps of Germany from about 1926. Faced with the urgent need to maintain supplies of this metal for essential machine tools and other equipment, a crash programme was started at Newcastle in December 1940. After one year's research, Jack Richards and his colleagues then produced dies and tool tips on a laboratory scale and designed a pilot plant. Full scale production of the sintered metal tools and tips began in 1942.

Magnesium metal was another material of which pre-war Germany had been the world's leading producer, and for which Australia was dependent on imported supplies. In July 1940, E.T. Henderson and J.D. Norgard from BHP Newcastle arrived at the Essex works of Murex Ltd, a

leading UK metals firm, to learn the specialised techniques of producing the vital product. By July 1941 magnesium made at Newcastle was being delivered for Australian aircraft and ammunition manufacture.

Conventional bullet-proof steel at the time required as alloys nickel, chromium and molybdenum, all in short supply, and the rolled plates needed treatment before they could be welded or tested. George Bishop, then steel superintendent at Newcastle, developed a substitute steel using manganese, silicon and chromium with one of the beach sand elements. Importantly, this steel could be welded and shaped in the as-rolled condition, a great advance in armament production.

The later war years brought difficulties at both plants. Men were drawn off to the services and to munitions work, inadequate maintenance during the periods of pressure resulted in increased downtime through machine failure, and shipping shortages complicated raw material supply. Relatively low grade iron ore from New South Wales deposits (mainly Crookwell and Cadia) had to be used to supplement shipments from South Australia. The Melrose limestone quarry which had supplied Newcastle (Port Kembla drew its flux from Marulan on the southern escarpment) was exhausted and a new source had to be opened up at Rapid Bay on St Vincent Gulf SA. Coal supplies also were barely adequate.

There were fresh rounds of labour disputes, with one in December 1943 resulting in Prime Minister Curtin using emergency powers to order the company to resume operations which had been closed down.

All these problems were swept to one side on 15 August 1945 with the final Japanese surrender. Lewis' old colleague Ben Chifley, by now prime minister in place of the greatly mourned John Curtin, said in his national broadcast: "Now our men and women will come home . . . to a peace which has to be won."





How that
frustrating
peace
was
eventually
won



Building of Australia's first hot strip mill at Port Kembla in the mid-'50s was possibly the country's major industrial development for the decade. Picture at left shows Prime Minister R. Menzies pulling the switch in a formal opening ceremony in August 1955. State premier J.J. Cahill turns to watch, with works manager A.A. Parish behind him and 1300 distinguished guests applauding.

The whole party toured the mill building (preceding pages) wondering at the huge scale of the 1,000,000 tpa venture.

The

winning of the peace of which Prime Minister Ben Chifley had so clear a vision looked far from certain in those first few post-war years. Half a million Australians were coming out of uniform but manufacturers were finding that wartime manpower shortages were persisting. With the pressure of war abating there was a renewed spirit of militancy in labour relations. And a nation which was richly endowed with coal resources, and heavily reliant on that coal, found itself hampered on every side by coal shortages. But secondary industry had made great progress throughout the country, largely as a result of the drive by Lewis' munitions organisation, and there was a new spirit of national consciousness abroad. Solutions were to be found to most of the problems arising, but only at the expense of time, that ultimate resource.

Output of steel for the first few post-war years continued well below wartime peaks; the 1946 figure indeed was the lowest for a decade. Capital spending at the plants was held back, largely by external factors. Newcastle's first sinter plant, a new open hearth furnace and a coal washery had all been completed in 1944, while in the same year work resumed on the Cockatoo installations, that island having had to be evacuated two years earlier. Shipping operations continued to be hampered by crew shortages and minor strikes, while labour shortages on the wharves meant that the turnaround of vessels between Newcastle and Whyalla was taking about 30 per cent longer than before the war. In 1946 the company foreshadowed major expansion plans for Port Kembla but two years passed before actual construction could commence.

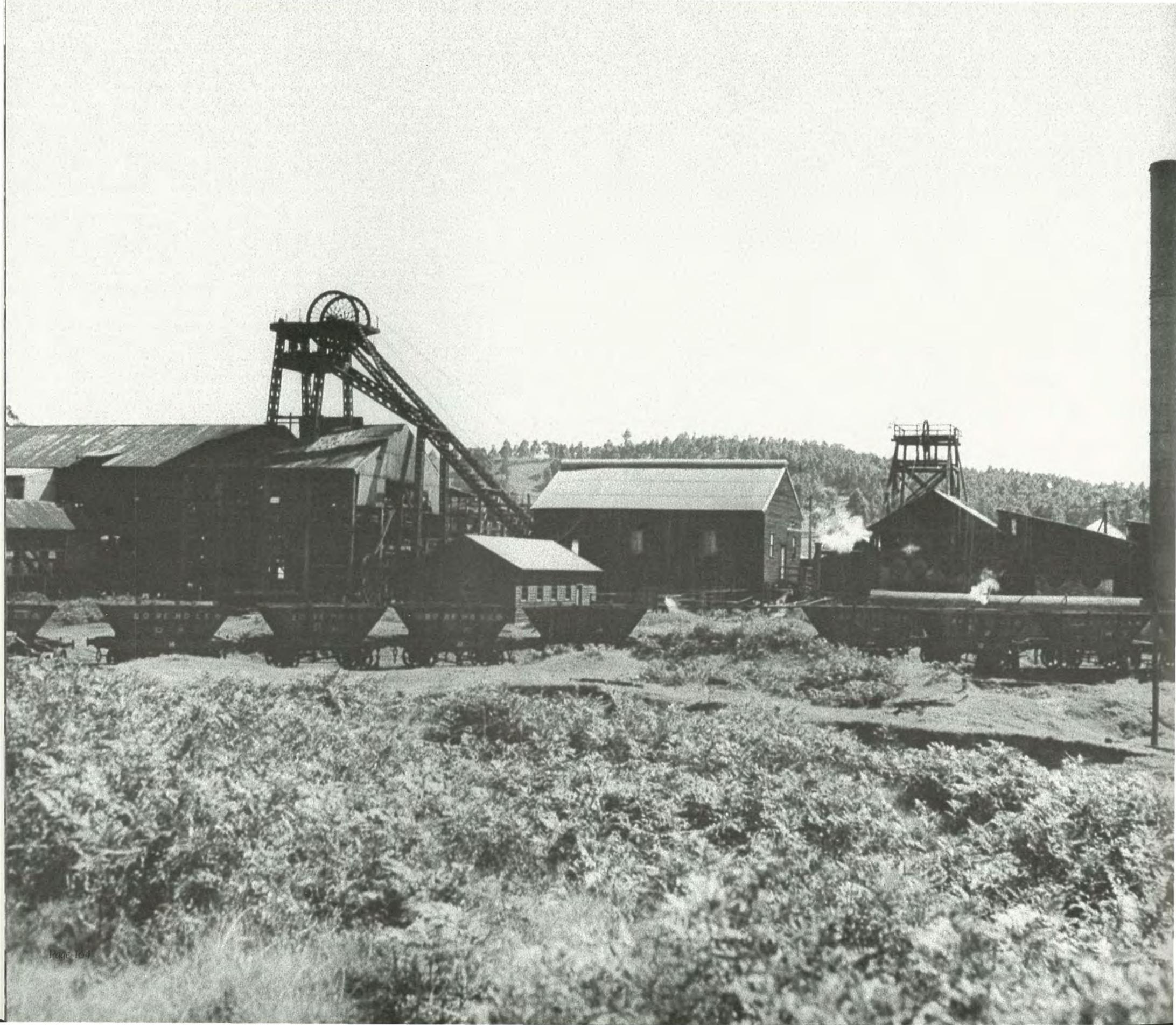
By 1947 that determined Immigration Minister Arthur Calwell had his imaginative migration schemes in place. The country's population was to be doubled by the planned inflow from Britain itself, from Commonwealth and allied countries and from among the displaced persons of

Europe. By 1947, in Britain alone some 200,000 people had registered for assisted passage; there were far too few ships to carry them to the new land. But from 1947 on there was a rapid build-up, with over 55,000 total arrivals in 1948 and 150,000 in 1949. The peak year of 1950 saw 152,505 net arrivals and then the rate dropped back.

BHP and other employer groups joined in the government's planning bodies for this drive, providing jobs and assistance for the new settlers. Hostel accommodation was provided at the major centres to help receive the newcomers to the steelworks and the quarries. By 1955 migrants accounted for 27 per cent of the Port Kembla workforce and 20 per cent of the Newcastle payroll. More significantly migrants accounted for nearly three quarters of the increase in the company's payroll during the 1945-1954 decade. The large-scale development at Port Kembla particularly would not have been possible without this influx of New Australians.

Labour shortages in those early post-war years were made more difficult by a serious strike, which, beginning on a relatively minor manning issue at Port Kembla in September 1945, soon involved Newcastle. This was not settled until January 1946. It was a complex dispute, because the union involved, the Federated Ironworkers' Association, had been deregistered by the state industrial tribunal over an issue arising in another industry. Later, in 1949, the communist leadership of the FIA of the time was replaced in a court-controlled ballot of the union's members, with a less militant group taking over.

The coal shortages of the early years were persistent and damaging. The Joint Coal Board, established by the Commonwealth and New South Wales governments in 1946, instituted a rationing scheme which meant that the BHP collieries, already unable to meet the full requirements of the steelworks, had about one-fifth of their output allocated to other users. Although the BHP mines on the northern coalfields particularly were the industry leaders in mechanisation (and in working conditions and pithead





Shortage of coal was a post-war problem for the Australian steel industry. To relieve it, collieries were purchased on both northern and southern NSW coalfields, including Stockton Borehole in the north, seen left, and by 1950 all pits had been mechanised.

It was in that year that Harold Darling died, and was succeeded as chairman by Essington Lewis. Norman Jones, the quietly spoken chemist from Newcastle (above) then became chief general manager, and managing director two years later.

amenities) local strikes were common. Then, commencing in June 1949 there was a 10-week national coal strike, with the miners' militant leadership calling for a 35-hour week and other improved conditions. Work was resumed only after the Labor government in Canberra legislated to freeze the union's funds and used troops to work some pits.

But withal it was in the company's collieries that progress was earliest evident. On the southern fields, Bulli and Mt Keira (later called Kemira) had been bought pre-war, and the Mt Kembla colliery was purchased in 1945. Then a new mine, Nebo, was opened south of Mt Kembla in 1946, while a great deal of work was done over the whole field to improve coal handling. In the north, Stockton Borehole was purchased in 1949 and by the following year all mines were mechanised, with comprehensive training programmes established on both fields. By 1951, the group's total coal output passed 2,000,000 tons for the first time.

Meanwhile the restricted level of output from the BHP steelplants in the late '40s was being felt nationally, as the pent-up civilian demand for all classes of manufactured products rose rapidly. BHP steel was still among the cheapest in the world, but the proportion of the Australian market supplied from local output fell from 91 per cent in 1946 to 57 per cent five years later. Imports of steel rose sharply to exceed 500,000 tons in 1950 and 750,000 tons in 1952, the year in which the Commonwealth government announced import controls. From then on, BHP output gradually rose to meet the burgeoning market, with 2,000,000 tons of ingots produced for the first time in 1954. But demand continued to move ahead of supply. Australian steel consumption jumped from 285 lbs per head of population in 1946 to 725 lbs ten years later (and then peaked at over 1200 lbs in 1970-71).

Around the year 1950 there were many harbingers of change. In Canberra Prime Minister Menzies had taken office at the head of a Liberal-Country party coalition

following Labor's defeat in the December 1949 elections. Many of the difficulties of peacetime adjustment had been overcome and secondary industry was going ahead.

Chairman Harold Darling was among those who were optimistic about the prospects of peace. "We are poised today," he wrote as the war neared its end, "on the threshold of a greater Australia than any of us ever dared to dream." But Darling died in January 1950 before BHP was able to pass over that threshold. In his long term as chairman he had done much to smooth the way for Lewis' — and the company's — achievements in difficult times. In the reshuffle that followed Essington Lewis became chairman and Norman Jones was appointed chief general manager, with Ian McLennan as general manager. Cecil Hoskins resigned as general manager of AI&S (but remained on the AI&S board). It was in the following year that A.A. Parish became manager at Port Kembla. Keith Butler, wartime manager at Newcastle, carried on there until 1952.

Then in June 1952, Lewis stepped down to become deputy chairman. He was 71, and for more than 30 years his had been the decisive voice in the management. The new chairman was lawyer Colin Syme, 49, who had already been on the company's board for 15 years. Norman Jones joined the board as managing director, and Ian McLennan became senior general manager, with a seat on the board in the following year. These three were to play key roles in a startling new pattern of growth.

Just as the pre-war decision to concentrate development at Port Kembla was logical given the circumstances of the day, so the further decision to base that development largely on flat product manufacture was the idea for the post-war times. Consumer durables of all types were obviously the products which were going to enjoy market growth, and steel sheet and plate were essential to supply the manufacturers producing them. Already by 1950 plate and sheet accounted for over one third of steel imports. General Motors-Holden's had





Development at Port Kembla involved the dredging of a new inner harbour and the filling of swamp land as a site for what was in effect a new steelworks. On 28 November 1960, tugs nudged Whyalla-built Iron Yampi into the new berths (left) for an official inauguration.

Ian McLennan (above) who as a young engineer had left Melbourne University to go to work for BHP at Whyalla, had played a major role in these developments. He became general manager in 1950 and a director three years later.

produced their first batch of Australian cars in 1948 (Lewis, who had done much to encourage that, was allowed to buy the first Holden; he would not accept gifts) and the automotive industry was expected to grow rapidly. BHP had been considering tinsplate manufacture for years, and thought that the time had now come to add this also to the product range.

By 1949, a new second merchant mill had been completed at Port Kembla, a new coke ovens battery had been commissioned and another was under construction. A third blast furnace with 1500 ton daily capacity was being built, and two 240-ton open hearth furnaces were being installed. But the most dramatic development was the building of a flat products division, with a hot strip mill of 1,000,000 ton annual capacity as a centre piece. To this was to be added a plate mill and a tinsplate plant, the whole complex to be built on a new site, at the time a swamp under water. The state government undertook to dredge a new harbour (at the company's expense). The building of a second steelmaking shop with slabbing mills to serve the new division was foreshadowed. The overall plan involved an investment of about £40,000,000.

By 1955, with the completion of the hot strip mill, Port Kembla's steelmaking capacity was 1,300,000 tons, overtaking Newcastle in size for the first time. Wollongong's population had jumped from just over 62,000 in 1947 to over 90,000 eight years later, making it the third largest city in New South Wales. There was a triumphant official ceremony at Port Kembla on 30 August 1955 at which, before an assemblage of 1300 guests including two state premiers, federal ministers, industry men and journalists from afar, Prime Minister Menzies formally put the plant into motion. "I am pulling the switch," the prime minister declared, "and hoping confidently for the best." Then it was very much Cinesound newsreel stuff as the noise of the six-stand mill filled the half-mile long building and the long glowing strand hissed and banged out to the downcoilers. Behind the applause and bunting it was in the opinion of

many the day on which Australian secondary industry came of age.

At Newcastle, a new coke ovens battery was completed by 1954, replacing older units, and the plant was producing over 1,000,000 tons of ingots a year. Work had started on a new skelp mill. But a move of greater significance for the plant's future was the agreement with the New South Wales government in 1950, under which BHP was able to reclaim more land along the Hunter River to provide much-needed space for expansion.

Greater quantities of raw materials were needed to pace these developments. A new bench was opened at Iron Monarch, which by 1955 was supplying the steelworks with about 2,900,000 tons of ironstone a year. The new quarries at Iron Prince and Iron Baron were being mechanised while Cockatoo Island quarry had been brought to the stage of supplying about 1,000,000 tons of ore a year. The new limestone quarry at Rapid Bay was meeting Newcastle's and Whyalla's growing needs, while the quarry at Ardrossan on the opposite side of St Vincent Gulf, opened in 1948, was proving a satisfactory source of dolomite, replacing the earlier New South Wales workings.

With an eye to the future, BHP reached an agreement with the Western Australian government in 1952 under which in return for an undertaking to build a rolling mill at Kwinana, near Fremantle WA, the company obtained leases to the iron ore deposits on Koolan and Irvine Islands in Yampi Sound. Work began at once on the Kwinana plant, which was rolling merchant sections by 1954 from feedstock shipped from Newcastle.

The subsidiaries meantime were sharing in the general growth. Rylands opened a new wire mill at Geelong Vic in 1953, Lysaght Bros installed more equipment at the Chiswick NSW works, while Titan diversified into the



Iron Monarch (left) remained the group's chief iron ore source for these important years. By March 1956 when the picture was taken, "A" bench (centre) was almost removed and "F" and "G" benches had been taken. The storage bin and train loading point can be seen at right.



Immediately following commissioning of Port Kembla's hot strip mill a start was made on a fourth blast furnace, built on the newly reclaimed land. The new unit (below) was a record-breaking success.

The company's new research establishment (below, right) was already under construction at Shortland, near Newcastle.

production of mining equipment and hand tools. Comsteel, which had played a key role in the wartime production of alloy, tool and special steels, had greatly expanded its facilities in the process. A noteworthy post-war addition at Waratah was a 5100-ton German forging press, shipped to Australia under the war reparations scheme. By 1954, the Comsteel plant was able to produce some 65,000 tons of special steels a year from electric, open hearth and induction furnaces.

Among the associated companies, a significant move was the commissioning in 1955 by John Lysaght Australia of a new plant at Port Kembla, immediately adjacent to the new AI&S flat products plant. From then on, JLA's manufacturing development was largely concentrated at this new site.

By now BHP's accounts were giving a foretaste of the group's emerging strength. Net profit by 1954 reached the new peak of £3,887,000, and reserves the new high of £11,669,000. Capital spending for the post-war decade totalled nearly £50,000,000, most of it incurred after 1948. New share issues, all after 1948, produced about half that amount. There were three issues between 1949 and 1954, all at a modest premium, raising £24,116,979 between them, and bringing the number of shares on issue to just under 30,000,000. By 1954 the group had 29,000 employees and a payroll totalling £27,000,000. It was the beginning of a new scale of corporate values in Australia.

Among other developments of the early '50s was an increasing interest by the company in research and minerals exploration. Both Port Kembla and Newcastle had established research laboratories at an early stage, concerned in the main with process technology. In 1948, the board invited an English scientist, Dr. Frank Adcock, to advise on research organisation generally, and following

this, a plan for a central research development was evolved. The building of a new laboratory began in 1955 at Shortland in the Newcastle district, and in the following year, Professor Howard Worner, who had held the chair of metallurgy at Melbourne University, became the company's first director of research.

Minerals exploration up to then had been undertaken by members of Frank Hockey's department; Hockey had been general superintendent of mines and quarries since 1931. The appointment in May 1951 of Frank Canavan of that department as chief geologist indicated a growing concern for the function.

Then early in 1954 BHP's directors were told that another company had applied for an authority to prospect for petroleum in an area of NSW which included all of the group's southern and part of the northern coalfields. An oil strike in Western Australia, which itself came to nothing, prompted such initiatives in several parts of the country. Partly to protect the coal measures, BHP itself took up the prospecting title, which later after a change in the legal machinery involved, became Petroleum Exploration Licence 25. A young man from the AI&S coal geology section, one Brian Hopkins, was set to work on the petroleum geology of the area. It was beginning of a different nature.







Tea time
topic:
are you really
interested
in finding
oil?



The early '60s saw what was possibly the most costly and concentrated industrial development in Australia up to then. Basic oxygen steelmaking converters were installed at Newcastle (preceding pages and below) to replace the open hearths, while at Port Kembla new steelmaking shops were completed and a first electrolytic tinplate line (left) commissioned.

At both plants, new rolling mills were added. Newcastle got an additional blast furnace, and colliery development continued apace.



In the ten years to 1965, BHP's equity base expanded by 3½ times. Profits trebled, and steel output more than doubled. Some £345 000 000 was spent on capital works. The range of resources in the company's planning was greatly extended. There were major technical advances in production. And the new dimensions were but a foretaste of what was to come.

It was a period in which Australian manufacturing generally went ahead. The economy boomed under the influence of rising consumer demand, with escalating wool prices as a springboard. There was one car to every four Australians by 1955; car and white goods buying had doubled the national hire purchase commitment in the previous three years. Import restrictions were renewed in 1955 (for the third time in six years) and then stayed in force until 1960. It was a boon to the manufacturer, although the government's concern was with the balance of payments. Poker machines were legalised in New South Wales in 1956 just ahead of the nation's first experimental nuclear reactor. The cities were getting bigger and bigger, the millionth post-war migrant had been welcomed and inflation was beginning to bite (although the overdraft rate was still only 5½ per cent prime). Full employment was the order of the day, and it was reflected in every aspect of the labour front.

At the outset Port Kembla was very much the centre of excitement in BHP's expansion. The flat products development called for additional ingot capacity, so that the hot strip mill commissioning was followed immediately by a start on a fourth blast furnace. It was built on the newly drained site, near the inner harbour project which was also under way. A new steelmaking shop was added, with three large open hearth furnaces operating by 1959. More were to follow. A new slabbing mill, then one of the largest in the world, was installed in line with the hot strip mill and completed by 1958. Tin plate production had begun a year

earlier with hot dip lines. Initially, the cold rolling necessary for tinsplate output was done at the adjacent John Lysaght plant, but by 1962, A&S had its own cold rolling mill together with an electrolytic tinsplate line, the latter able to produce plate with differential coating weights.

The extra coal needed came from increased development of the existing collieries in the Illawarra escarpment, and from the opening of a new pit further to the north at Appin. The overall growth plan for Port Kembla then envisaged an ingot capacity of 2 600 000 tons a year, calling for 3 000 000 tons of coal annually.

It was a time of technical change in many areas, the fruits of overseas liaison and local experimentation, bringing marked increases in productivity. When in May 1959 Port Kembla's new No 4 blast furnace was blown in it had a rated daily capacity of 1750 tons of iron. By October 1962 the unit was producing 2760 tons daily with greatly reduced coke ratios, made possible by the use of self-fluxing sinter and other improvements in operating practices. One of the major post-war innovations in the steel industry was the introduction of pure gaseous oxygen in smelting, a development made possible by German war-time progress in oxygen extraction from the atmosphere. An Austrian state-owned organisation pioneered oxygen blowing as a steelmaking technique, and BHP people had followed the work with interest. By 1960, oxygen was being lanced into Port Kembla's open hearth furnaces, greatly reducing the time required for each heat, while a technical mission was overseas completing arrangements for the use of the Austrian patents at Newcastle.

At the time, Newcastle had fourteen relatively small open hearth furnaces, some of which were the original units which had been progressively rebuilt. The new plan called for the replacement of eight of these by two 200-ton basic oxygen furnaces, units which at the time of their design were larger than any then in use in the world. By 1962 they were operating in a rebuilt section of the steelmaking shop drawing supply from a gaseous oxygen plant built on land





At Whyalla, a new steelmaking shop and rolling mill was built, and a second blast furnace planned. Picture at left shows the new plant in January 1965 with the BOS shop centre and the mills in the upper right.

Newcastle, which had been running out of space, was able to use land reclaimed by the filling of Platt's Channel. Picture above shows Keith Butler, works manager (centre) at a modest ceremony in May 1954 when the old channel was cut off from the River Hunter in preparation for the reclamation. (H. Teal on the left, C.W. Gates on the right).

newly reclaimed from the old river channel. There were other major investments at Newcastle. A modern skelp mill had been installed in 1958 to improve the feedstock available to the pipe and tube industry. In 1962 the bloom mill was rebuilt and there was added a new 4-strand rod mill to supply the wiredrawing plants. A fourth blast furnace with a rated capacity of 1650 tons a day was commissioned in 1963, a new sinter plant having been built two years earlier. David Baker's works had been changed out of recognition in the space of a few years, with the new installations stretching down the newly reclaimed areas.

At Newcastle, as at Port Kembla, there had been additional colliery development and a great extension of plant services. Then in 1965 the Newcastle steelmakers celebrated fifty years of operation at the plant with civic ceremonies and open days for families. Some 11 500 people worked there using 50,000 tons of coal a week and making around 1,500,000 tons of steel a year. Additional steelmaking capacity and the introduction of the new technique of continuous casting were already planned.

It was in March 1958 that Chairman Colin Syme and SA Premier Sir Thomas Playford announced an agreement in principle under which a tonnage steelplant would be built at Whyalla. Special steels were already made there in a small electric furnace, but it required the new larger development to fulfil a long-held objective of the state government. By the following year a detailed agreement had been reached. Site work started in 1961 and first steel was made in the new works in February 1965. Two 100-ton basic oxygen furnaces were installed, giving an initial plant capacity of 500,000 tons of ingots annually. This was to be doubled with the completion of a second blast furnace, which was already in hand. The rolling train comprised a bloom mill and 4-stand structural mill. Addition of stands to roll wide flange beams and columns was foreshadowed. Initially, the blast furnaces took coke from the eastern plants, but it was

envisaged that Whyalla would later have its own coke ovens.

In 1960 a new agreement was reached between BHP and the Western Australian government. It involved the opening of a new ironstone deposit at Koolyanobbing, near Southern Cross, a town on the east-west rail line. For its part, BHP agreed to undertake steelmaking at the Kwinana plant by stages, commencing with a blast furnace and sinter plant. The Koolyanobbing ironstone to be carried by rail to Kwinana for smelting or shipment was a sufficient addition to the rail freights available to justify the extension of the standard-gauge transcontinental line to Perth. A national standard-gauge rail network was being planned by the Commonwealth government, and the Western Australians were keen to be linked to it. Construction of the Kwinana furnace began in 1965; it was blown in three years later.

The agreements with the two state premiers involved BHP in a combined commitment to spend at least £70,000,000 on the works. On the government side, there were commitments to provide housing and infrastructure development. In both cases, the key was access to raw materials, but in the next few years there were to be significant changes in the outlook for Australian iron ore supply.

Iron Monarch and the two nearby quarries of Iron Prince and Iron Baron, with capacity to produce over 4,000,000 tons of ironstone a year, and with substantial reserves ahead of them, were BHP's chief ore sources in the early '60s. The two Middleback Range quarries had been mechanised, and the extension of the water supply pipeline to Iron Monarch (and to Iron Knob township) made possible the installation of a plant there to concentrate the low grade ore handled in the course of pit development. Construction work at Koolan continued until 1964, and the following January *Iron Dampier* left the island with the first ore shipment for the east coast plants. Shipments from Cockatoo continued.

For some time, however, there had been a growing



realisation in Australia that the country's iron ore reserves were substantially greater than had earlier been estimated. By the late '50s, there was also a more widespread understanding that Japan's burgeoning steel industry, reliant on imported ore as it was, represented a huge potential market for ore. In December 1960 the Commonwealth government yielded to pressure from would-be developers, and announced a partial lifting of the embargo; the ban on shipments from established iron ore mines remained. There was a further liberalisation in June 1963 but in the meantime several knowledgeable prospectors, including Lang Hancock and Stan Hilditch, were actively promoting ore deposits they had pegged.

For its part, BHP began investigating ore occurrences in the Constance Range area in Queensland and to explore more widely in Western Australia. Earlier, company geologists had surveyed the Robe River WA district as part of a search for manganese. So Joe Harms, Barry Morgan and their colleagues used some of the data gained then in a detailed exercise in photo-interpretation which located significant iron ore deposits in the area — all without leaving their Melbourne office. Helicopter-borne field teams confirmed the discoveries in 1961, and in the following year, temporary reserves over these major deposits at Deepdale were taken up by the company.

In 1962 a new ferro-alloy plant was opened at Bell Bay on the Tamar estuary in Tasmania, intended eventually to take over from the small ferro-alloy furnace at Newcastle. The new plant used an electric smelting process, and was located to take advantage of the island state's hydropower supply system. Manganese ore was obtained up to then from various small deposits mainly in Western Australia with some supplies imported. But about the time that the new Tasmanian plant was being completed, BHP geologist Bill Smith in Darwin was looking into a new possibility.

Groote Eylandt, just off the eastern shore of Arnhem Land NT, was named on 17th century Dutch maps after Abel Tasman's voyages along Australia's northern waters. The Macassans regularly called at the island to trade and collect trepang, and in 1803 Matthew Flinders sailed right round it and named some features. In 1907 a South Australian government geologist recorded outcrops of manganese ore on the island but his report was never followed up. Then in 1921 the Church Missionary Society founded a mission there, but it was only in the aboriginal bark paintings that the manganese found a use.

By 1962, the Commonwealth Bureau of Mineral Resources had established that the island's ore deposits were promising, and BMR Darwin officers were discussing with the CMS the possibility of the mission undertaking a small-scale mining operation. Enter Bill Smith, who had become aware of the existence of the deposits.

With the permission of government and CMS people, and the encouragement of Keith Rowell, his general manager, Smith visited Groote and found that there were indications of a substantial sedimentary deposit. A further agreement permitted a six-week exploration programme with a field team, which showed that the deposits were very extensive indeed. The CMS meanwhile had taken out authority to prospect over virtually the whole mineralised area, and by October 1963 had agreed with Keith Rowell and his men a detailed plan to allow mining to proceed.

BHP would pay the standard territory mining royalty, which included a share for the benefit of the aboriginal people as a whole, plus a special royalty to a trust for the benefit of the Groote Eylandt people. Sacred sites within the leased areas would be protected, jobs would be available for any islanders wishing to take them, and otherwise the aboriginal way of life on the island would be fully respected. It was the beginning of a relationship between mining company and native people which would prove comprehensive and enduring, and one in which Rowell and his colleagues took great pride. The Groote



In June 1965 Newcastle plant celebrated fifty years of steelmaking with receptions and open days, with Premier Robin Askin as one of the guests of honour. Picture at left shows the NSW premier being welcomed by (r to l) Colin Syme, Norman Jones and Ian McLennan.

Colin Y. Syme (above), a Melbourne lawyer, had joined the board in 1937 and had succeeded Lewis as chairman in 1952. Both he and Ian McLennan were knighted in 1963.

Eylandt Mining Company Pty Ltd was formed in 1964, and two years later Col Brunker and his BHP team shipped out the first load of Gemco manganese to the Tasmanian smelters. Australia's import bill for manganese had risen to £2,000,000 in 1965, but then dropped away to nothing. Within a short time, Gemco was a significant producer of metallurgical grades for world markets.

Not least of the support services needed for the growing steel industry was the BHP fleet. With more ore to be shipped from the Yampi Sound quarries, with the establishment of the Whyalla and Kwinana works, and with the increased scale of operations generally, the role of sea transport was vital. Ten ships were built at Whyalla between 1943 and 1965 for the company's own use, including *Iron Monarch* and *Iron Duke* which replaced the two lost by enemy action. Given the fully-committed state of the world's shipyards at the time, those new ships represented about 130,000 tons of capacity that probably could not have been otherwise obtained.

The largest of the BHP ships, *Iron Flinders* (commissioned 1959) and *Iron Dampier* (1961) were of 19 100 tons, oil fired and turbine driven. Two earlier ships, *Iron Whyalla* (1954) and *Iron Spencer* (1957) originally of 10 600 tons DW were the last coal-burners built. Two smaller ships were bought in for general cargoes, and another, *Iron Clipper* of 40 325 tons was taken on charter in 1965. At the time she was the largest vessel on the coastal trade.

The Whyalla shipyard launched ship 41 in 1965 — the 21 400 ton *Gerringong* built for Bulkships Ltd. An even larger ship, the 47,000 ton *Darling River* for Australian National Line, was on the ways at the time. Besides the growth in size (bulk carriers like tankers were being built to ever-increasing dimensions as part of the struggle to contain operating costs) the Whyalla yard had undergone a fundamental change in building techniques. The rivetting of hulls used in the first days of the yard 25 years earlier had

given way to welding, often highly specialised. Increasingly sophisticated methods of flame cutting and forming steel were being introduced and larger and larger sections of hulls and superstructures were being pre-assembled. More and more use was being made of Japanese techniques in ship design and yard practice.

Among the steel-using industries, John Lysaght Australia's new plant at Port Kembla soon confirmed that company's place as BHP's largest customer. By 1960, JLA output totalled 667,000 tons of sheet steel products, up by 3½ times in just over five years. A second pickle line had been commissioned in 1957 following the opening of the Springhill Road plant two years earlier. In 1961, JLA successfully offered 3,000,000 shares to the Australian investing public while remaining a subsidiary of Guest Keen and Nettlefold Ltd of UK. More equipment was added progressively at Port Kembla, and in 1964, JLA started its first overseas subsidiary in Malaysia.

BHP's wire operations were grouped into a holding company, Australian Wire Industries Pty Ltd, in 1958 after further growth by Rylands, Lysaght Bros, Australian Wire Rope Works and their associated companies. Titan also expanded, particularly in the marketing of mining products. Comsteel added new electric furnaces, and in 1959 installed at Unanderra near Port Kembla Australia's first Sendzimir mill for the cold rolling of stainless steel sheet and strip.

Tubemakers of Australia and Rheem Australia both expanded their organisations and their markets, with the latter successfully diversifying into home appliance manufacture.

Impressive as BHP's growth was at the time, the company was not without its contemporary critics. Customers complained of long delivery times as the works struggled to lift output to meet the ever-increasing demand.





Development of Groote Eylandt as one of the world's major producers of manganese ore is one of the success stories of Australian mining. Following confirmation of the extent of the orebody, early progress was rapid. It was in October 1963 that BHP reached an agreement with the mission and people of the island. By 1964, Col Bruncker and his team were drilling to establish the mine plan (picture left) and production started only two years later.

Above: Lewis Weeks, the American petroleum geologist who was consulted by BHP at an early stage of the company's search for oil. In the picture Weeks is talking to Bruce Bennett of the Victorian Gas and Fuel Corporation at the opening of the first gas processing plant at Longford Vic in April 1969.

The company's view was that Australia was still getting steel at prices among the world's lowest. The cost of local capacity geared to the higher levels of occasional peaks (or, for that matter, the cost of extended trade credit) could only mean dearer steel for all customers irrespective of cyclic demand.

Even with the higher profits, the group's earning rate on funds employed and (perhaps more significantly) the dividend yield at current share prices were both comparatively low. Shareholders voiced complaints at several meetings, which prompted the chairman in his 1965 address to deal head-on with the issue. "During the past few years", Sir Colin Syme said, "there has been debate on such matters as to whether we have expanded fast enough; whether we have given sufficient attention to export; and whether customers are being asked to pay high prices. . . to help pay for our capital expansion. . . More recently a good deal of publicity has been initiated to the effect that shareholders should receive greater benefits. . . Recent criticisms charge directors with being pro-national in their outlook and it has been suggested that. . . this has become a religion or obsession. . . There is no conflict between a pro-national outlook and the interests of the company. It is essential in the interests of the company that the directors should have a pro-national outlook".

By 1960 the company's paid-up capital was £64,300,000, shareholders' funds totalled £113,000,000, overall employment was 37,800 and there were 64,244 shareholders. The wider scope of operations had prompted a management reorganisation the year before, with Ian McLennan becoming chief general manager and R.G. Newton general manager finance and treasurer. They joined chairman Syme and managing director Jones to form the company's first finance committee. At the same time, ten general managers were appointed, seven in head office functions and three at the steel plants. Among the

ten was J.C. McNeill, then made general manager commercial.

A year earlier, the company had moved its Melbourne head office to 500 Bourke Street, the first time it had erected (or even owned) its own such building. It was named Essington Lewis House. The deputy chairman had turned 80 in 1961; he still visited company centres, but spent longer periods at "Landscape", his property near Tallarook Vic. It was while riding there with his daughter on 2 October 1961 that he died. . . horse and man falling together. The warm tributes to the life of a great Australian came from throughout the country and from many places overseas.

While all these things had been happening, Brian Hopkins' lonely task on Petroleum Exploration Licence 25 had taken a new turn. By mid-58 Hopkins and his colleagues had completed geophysical mapping and by June 1959 first drilling had begun. Then an American exploration company offered to farm-in, and Ian McLennan and his managers felt the need for expert advice. John Norgard, then general manager operations was going to the USA early in 1960; he was given the task of investigating and recommending the best consulting petroleum geologist available. Norgard returned with the name of Lewis G. Weeks.

Recently retired as chief geologist for Standard Oil (New Jersey), Weeks was regarded in the USA as being at the top of his profession. He had never been to Australia but had studied the country's geology and was prepared to help. Weeks came to Sydney in March 1960. He then spent several days in the Port Kembla area with a BHP party comprising Frank Canavan, chief geologist; Murray Lonie, then assistant general manager raw materials and exploration; Brian Hopkins and Ron Wilson, coal geologist. His verdict was that PEL 25 was insufficiently attractive to warrant investment.

It was back in Sydney a few days later, over afternoon



The surge of growth included new iron ore developments, among them the opening of the Koolan Island deposit (left) in 1964. This had earlier involved negotiations with the WA government with the company undertaking to establish a rolling mill at Kwinana, near Fremantle.

New ships were added to the company's fleet, including Iron Flinders in 1959 (seen above left building in the Whyalla yard) and a sister ship Iron Dampier in 1961. Both were of 19,000 DWT and were the largest then in service.

tea at the Hotel Australia, that Weeks put the question to Lonie and Canavan: "Is your company really interested in finding oil?" Pressed to elaborate Weeks said he would explain if BHP were genuinely interested. Lonie felt that the American should go to Melbourne for further talks and so it was arranged. The talks were between McLennan and Weeks, who said that he knew where oil would be found: on the continental shelf in Bass Strait. McLennan had already agreed to standard royalty terms for Weeks' advice, but he was astounded at the prospect unfolding. Had Lewis Weeks ever seen Bass Strait? Some of the roughest water in the world? That, replied Weeks, was purely an engineering problem. Technology was advancing at such a rapid rate that by the time oil was found there would be ways and means of producing it.

On 18 March 1960 the BHP board decided to take up titles to areas in Bass Strait and to go on with initial magnetometer surveys there. How the rapid series of discoveries came to be made from then on forms part of another following story. It was, however, clear within a very short time that completely new horizons were opening up for BHP.

The 1959 reorganisation proved to be but one step towards a more comprehensive management structure. By 1965, facing the new development possibilities in both oil and minerals besides the growth in steel, Sir Colin Syme was planning further changes. (Both he and Ian McLennan were knighted in August 1963). With the board again feeling the need for advice, Cresap McCormick and Paget, a leading New York firm of management consultants, was brought in. With their aid, working from 1966, a structure evolved which led ultimately to the creation of operating divisions as profit centres with appropriate staff functions to serve them. The accent was on flexibility, to deal with development as it occurred. Top management was reorganised for a start. Norman Jones retired as he had

earlier wished to do; he had been chief executive for all of the wearing years since 1950. Colin Syme became an executive chairman, retiring from the law firm of which he had been senior partner. Ian McLennan became managing director. The finance committee was enlarged and an executive committee was created.

For the 1965 year, BHP's net profit was £19,625,000, an all-time high, and reserves had grown to £155,993,000. Shareholder's funds stood at £269,050,000. Success in steel had given the group the financial strength and management capability to grasp the new opportunities now offering.





Sudden
paths lead
upwards
and
outwards
to new
horizons



The Bass Strait oil and natural gas discoveries from 1965 led to a rapid sequence of construction projects. Within the next six years platforms were built on four fields, a first network of pipelines was completed, and gas and oil treatment plants and storage facilities built.

Jackets for the platforms were assembled at Barry Beach, in Gippsland Vic, where a large-scale construction base was established. (Picture on preceding pages shows the Mackerel jacket under construction there in June 1975).

Completed jackets were skidded on to a barge, towed out to location and then launched. Picture at left shows launch of the Cobia jacket, the first such picture obtained from Bass Strait; earlier launches were at night.

By 1984, 12 production platforms were in place and initial reserves of crude oil and condensate totalled over 3,000,000,000 barrels, of which about half had been produced. Initial reserves of natural gas stood at about 350,000,000,000 cu m, of which less than one-seventh had been produced.

The

idea in the minds of many BHP people as they looked ahead to their company's centenary year was put into words by Chairman Syme at his last shareholders' meeting. Sir Colin — a director for 34 years and chairman for 19 of them — said on that 1970 occasion: "It seems to me, and I believe to most Australians, highly desirable that this country should have at least one company which is capable of playing in the international league".

It was an idea for which the time had come. It was increasingly clear that BHP's growth pattern could no longer be contained within the boundaries known so far. Both geographically and in scope of operations more room was needed, and this became the underlying management objective as Syme's successors led the company into disciplined diversification through times of change.

Change indeed was in the air of the '70s: in Australian politics, in the way world influences affected Australian business life, in the social aspirations within the country and in the new possibilities that technology might bring. There was perhaps a certain symbolism in the progressive adoption of those sophisticated metric measuring units in place of such things as the rods, poles or perches which had served grandfather. (Former BHP executive John Norgard headed the commission which introduced Australians to SI mysteries).

Back in 1965 it may have been difficult to interpret the portents. Admittedly, newspaper headlines of the time dealt with such matters as Victoria's ending of fifty years of 6 pm closing of hotel bars (John Locantro, Young & Jackson's publican, described his first late night as "sheer bedlam") and Tom Playford losing a South Australian election after a record 27 years as premier. There was Joan Sutherland returning home after 14 years away and explaining "It was Melba who inspired me to have the guts to go overseas", while Roma Mitchell QC became Australia's first woman judge. A Miss Jean Shrimpton, visiting English model, shocked some Australian mothers

by appearing on the Flemington lawns on Melbourne Cup Day wearing a mini skirt and without gloves. Australia sent a battalion to Vietnam on the fiftieth anniversary year of Gallipoli. Oddly enough the establishment of a formal OPEC secretariat in Vienna (the Swiss having refused appropriate recognition) rated only some obscure mentions. But the biggest of black headline letters came out in February when the very first Bass Strait well blew out; production tests later confirmed flows of natural gas and condensate. Australia, and BHP, were really in the oil business.

Oil's excitements and aftermaths

The sequence of events in Bass Strait was this: by 1961 BHP held exploration permits for offshore areas in waters off Victoria, Tasmania and South Australia, and Weeks had been retained as geological consultant. Aero Service Ltd, a Canadian company, was engaged to carry out an aero-magnetic survey of the permit areas. The results outlined the Bass Basin for the first time (the Gippsland Basin having been outlined in an earlier BMR survey) and Weeks then urged the BHP board to carry on with the next step — a marine seismic survey. This contract went to Western Geophysical Company of America, and by November 1962 two specially equipped vessels brought from Italy had commenced their runs, using Shoran navigation while small explosions were traced along the sea bed. It was a first for Australian waters, and many the clearances that had to be obtained from Commonwealth and state authorities to allow the job to go ahead.

By May of the following year seismic work was completed, while at Weeks' suggestion also consulting geologist Lyman Reed had come to Melbourne from USA to undertake basin studies. The Gippsland Basin looked the most promising, and Weeks and the BHP board felt it was time to consider taking partners. There was no lack of interest on the part of oil exploration groups, and the BHP

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people had discussed their progress with many of them. While Reed, a gentle Southerner with a lifetime in the business, worked on basin delineation another experienced American, James Clark, was engaged to advise on partnership arrangements.

Clark urged (and Weeks agreed) that in the first instance BHP should negotiate only for a Gippsland Basin programme. In February 1964 letters were sent to ten interested companies (arguably the ten largest in the oil world at that time) setting out BHP's terms in general and inviting specific proposals. The BHP men thought that Clark's terms were stiff, and even doubted they would be accepted; some observers thought them impertinent. But Clark insisted they were justified by the prospect, and Esso must have thought so also, for their bid was the most attractive of all received. In April BHP's directors approved the offer from Esso Exploration Australia Inc. Said Sir Ian McLennan in a cable to M.A. Wright, executive vice president of Standard Oil New Jersey: "We look forward to a happy association. . ." Similar tendering procedures were later followed for the Bass and Otway Basins, with both being awarded to Esso.

At the time of the Gippsland Basin agreement, BHP had four people working full-time on the Bass Strait project, and two of them were consultants. That was very soon to change as the company's oil and gas division became established.

The basis of the original agreement between BHP and Esso was that Esso would first undertake seismic to determine actual well locations and then drill at least five wells in the Gippsland Basin. Such work was to be at Esso's expense. In the event of a discovery, BHP could either take a royalty or become a 50 per cent partner (Esso made it plain from the outset that they preferred the latter) in which case BHP would contribute one half of the development costs arising and pay half the costs of the particular find.

For the dry wells BHP would pay nothing. Lewis Weeks' fee was to be a 2.5 per cent royalty.

With the partnership established events move rapidly. The new seismic work had been completed and the drillship Glomar III had spudded Australia's first offshore well, Barracouta, before the year's end. On 18 February 1965 Keith Rowell in Sydney for a meeting was called to the telephone: that first well had struck natural gas. There had been a blowout at 4321 feet. It was a complete surprise: expectations had been centred on oil.

In the event the Bass Strait partners had to wait until June 1967 before they were able to announce discovery of oil in Kingfish, followed rapidly by more in Halibut. That June saw BHP shares double to nearly \$17. By November 1968 there were some sales at \$25 after further drilling had confirmed Kingfish and Halibut as major fields. Australia's dependence on imported oil had been slashed back.

The marketing problems had to be dealt with at once. By March 1967 long term contracts were signed with the Victorian Gas and Fuel Corporation for the sale of Bass Strait natural gas, and that State authority was planning the changeover to the new fuel throughout a widespread system. BHP and Esso had obtained production licences, and BHP for its part had raised the capital of its subsidiary Hematite Petroleum Pty Ltd to \$30,000,000.

Sale of Australian crude oil was already subject to government regulation resulting from earlier small onshore discoveries, and in 1968 talks began with the Commonwealth government on a pricing formula for Bass Strait. The OPEC price for marker crude through the '60s was about \$US 1.80 a barrel, and in October 1968 Prime Minister John Gorton announced an arrangement decided on after receiving much advice from many quarters. After a short introductory period, the formula adopted would make the price of Bass Strait crude \$A 2.06 a barrel for five years from September 1970. An allocation system was to



BHP's first revenue from Bass Strait came from a sale of natural gas in May 1969 (above left). The first gas processing plant at Longford near Sale, with a capacity of 11,000,000 cu m a day, had been completed that year. Picture above shows Sir Ian McLennan, then BHP managing director (left) with M.A. Wright, then executive vice president of Standard Oil New Jersey (right) at the plant opening.

Production from the Marlin platform, the second to come into production, had been delayed by a gas blowout (below) which took nearly a month before it could be controlled.

be introduced to ensure that all local production was absorbed by Australian refineries. At first the price structure with its deliberate incentive component appeared favourable indeed to the producers, and there were not wanting some to make much of that aspect.

The scheme had run barely a year before OPEC posted a new price of \$US 2.18 and the critics fell silent. Almost from then on for the rest of the five-year period Bass Strait oil was sold below world market prices. It was not until the 1977 budget that the Commonwealth government announced a plan "in principle" to lift the local price towards current world market levels, a complex scheme which, so far as the producers were concerned, was never fully implemented.

For Australian governments the Bass Strait discoveries raised problems of sovereignty over the offshore areas. A first "Submerged Lands Act" passed federal and state parliaments in 1967, but over ten years elapsed before the more vexing legal problems arising were resolved.

Out on Bass Strait itself there had been engineering achievement on a scale and at a pace rarely known in Australia — with some raw drama following.

BHP had opted to take its half-interest in the discovery fields, and by the last days of 1967 the jacket for the Barracouta platform, the first to be built at the construction and service complex at Barry Beach in Gippsland, was loaded out. Platforms for Marlin, Halibut and Kingfish fields followed in succession. Gas processing and crude oil stabilisation plants were built at Longford near Sale, with the first units ready by 1969, and a fractionation plant (to treat LPG extracted from gas liquids) and shipping terminal were built at Long Island Point on Westernport.

Pipelines linking the system were ready to enable first gas deliveries to be made on schedule in March 1969, with first offshore oil following seven months later. In three years to 1970, BHP had committed \$135,824,000 in Bass Strait,

the first of substantial investments there to follow. By June 1970 the company had made its first shipment of LPG to Japan under a \$100,000,000 long term contract and had undertaken its first overseas oil exploration venture, in New Zealand.

On the afternoon of 2 December 1968, with the sea dead calm, the drilling crew on the Marlin platform had an awesome experience. Meters on the drill column showed all at once that gas had burst into the column. Ninety minutes later the men had to be taken off as the sea boiled white around the platform legs: the escaping gas was roaring out through the sea bed. It was to be nearly a month before the well was brought under control, and only after colourful troubleshooter Red Adair from Texas was brought in with his special skills. He was eventually able to make a hose connection and pump in mud. The recovery operation cost the Bass Strait partners about \$5,000,000, and they considered themselves fortunate that no fire had occurred.

Nearly three years later there was another blowout on Marlin in which the gas did ignite. Giant flares enveloped the structure rising high enough to be visible on shore 60 km away. In this case two Esso engineers were able to re-board the platform and close valves controlling the gas. The emergency was ended after only four hours, but once again the dimensions of risk in the offshore oil business had been graphically demonstrated.

Seven additional Bass Strait fields had been discovered by 1978 and brought into production by 1983. Oil production was expected to peak at just over 400 000 barrels a day up to 1985 and then decline, with lower levels of output extending beyond 2000. Gas sales from extensive reserves were already contracted well into the next century.

The charges imposed on oil production by the





various governments, representing around 85 per cent of the prices paid by the refiners, quickly became major items in the national budgeting processes with Canberra the big winner. Achievement of near self-sufficiency in oil also had a profound effect on the national balance of payments and on national strategic thinking. All told, an initiative by BHP in the '50s produced not only higher returns to shareholders and a new direction for the company. It also gave new flexibility to the national economy — and to the nation's governments — for a time.

Bass Strait operations are managed by an Esso subsidiary reporting to a joint venture committee representing Esso and BHP. Within BHP, an oil and gas division was quickly established (eventually to become the subsidiary BHP Petroleum Pty Ltd) and a wide-ranging exploration programme mounted. The company's board adopted the policy of establishing BHP as a serious contender in the oil industry and Bass Strait success provided the credentials needed to be recognised in a business to which many aspired. Exploration permits were obtained within Australia and a number of overseas places including USA, North Sea, China and various islands of the Pacific. Some interests were farm-ins, and as more and more experience was gained, BHP operated on its own account in others. The '70s saw some limited successes, not least of them an expensive search in waters of the Exmouth Plateau, far out from the Australian north west coast, where (with Esso as partner) a very large gas accumulation was found, probably an energy source for some future time.

Tentative plans to move into down-stream activities such as refining and marketing were set aside in favour of a deliberate policy of concentrating on exploration and production. The only down-stream activity is a joint venture established by BHP in 1977 with Monsanto Australia Ltd in Melbourne, producing styrene monomer with ethane piped

from Long Island Point and benzene from the group's steelworks as feedstock. But a year earlier than this venture (to the satisfaction of BHP general manager Des Wittwer and the people in his oil and gas division) the company took a considerable hand in Australia's largest resource development.

Down on Victoria's South Gippsland Highway lies the township of Woodside — a petrol station, a good pub and a post-office-store that sells bait; Bass Strait's Ninety Mile Beach is seven minutes away down the side road. The 200-or-so households around the township are more concerned with their sheep than with the company that carries the town's name . . . although Woodside Petroleum Ltd today is a household name in the Australian investing community.

Woodside (Lakes Entrance) Oil Co NL was formed by a group led by Melbourne accountant Rees Withers. The company floated late in 1954 heavily oversubscribed in one of the oil fevers that gripped Australian stock exchanges from time to time. The new venture held exploration leases along a section of the Ninety Mile Beach, for there had long been interest in the oil seeps found in that part of Gippsland. (Lewis Weeks' wisdom was not so much shown in pointing to the south-east regions, as in understanding the possibilities of offshore exploration). While the stock market waxed and waned Woodside struggled on for some years, even taking up some offshore titles adjoining the acreage in which BHP/Esso were to make big discoveries. Then in the early '60s, supported by insights coming from the emerging earth sciences, the company turned its attention to the far north west. By 1963 Woodside had leased virtually the whole north west continental shelf.

Exploration of such extensive areas was beyond the small company. Partners were necessary, and by the year's end a joint venture was arranged with interests held by Burmah Oil, British Petroleum, Shell and California Asiatic,

Gas discoveries off the north west coast of Australia from 1971 led eventually to the formation of the North West Shelf joint venture, supplying Western Australia and (in the future) Japanese customers. Picture left shows the semi-submersible drilling rig Ocean Digger, built at the Whyalla shipyard, flaring gas from a successful well on North Rankin field in 1972. The Ocean Digger's drilling programme discovered three major gas fields, North Rankin, Goodwyn and Angel.

with Woodside and an associated company retaining one third. For a time Woodside continued with its searches elsewhere but then with its larger partner Burmah decided to concentrate all efforts on the north west. After some discouraging first wells, very large gas fields were discovered, the first at Scott Reef in the Browse Basin, then in 1971 at North Rankin, 160 km off Karratha, which latter field became commercial. Discovery of two other fields, Angel and Goodwyn, followed.

The joint venturers however soon realised that (like other resource projects in the north west) development of these offshore fields would have to be a huge undertaking. The reserves of gas and condensate were there; the problem was to find markets large enough to absorb the output volumes necessary to justify the scale of investment which had to be involved. It was in 1976 while these problems were still being juggled that Burmah Oil, faced with a serious financial crisis in its global operations, decided it would have to sell its promising Australian interest.

BHP seized the opportunity, bought Burmah out and then agreed with Shell a re-arrangement of shares. It was clear that the new project would have to enter world LNG markets, and Shell, besides holding an existing interest, was already an experienced shipper of liquefied natural gas from other ventures. After a complex interchange, BHP and Shell between them directly and indirectly emerged with a 38 per cent overall interest, with BP and Calasiatic still with 16.67 per cent each and the remainder held by the public through Woodside. It amounted to an Australian equity of some 48 per cent. BHP and Shell managerial and technical people were seconded to Woodside, replacing those from Burmah who had been working on the project. Geoff Donaldson, long-time chairman of Woodside, remained in that position, but Withers retired.

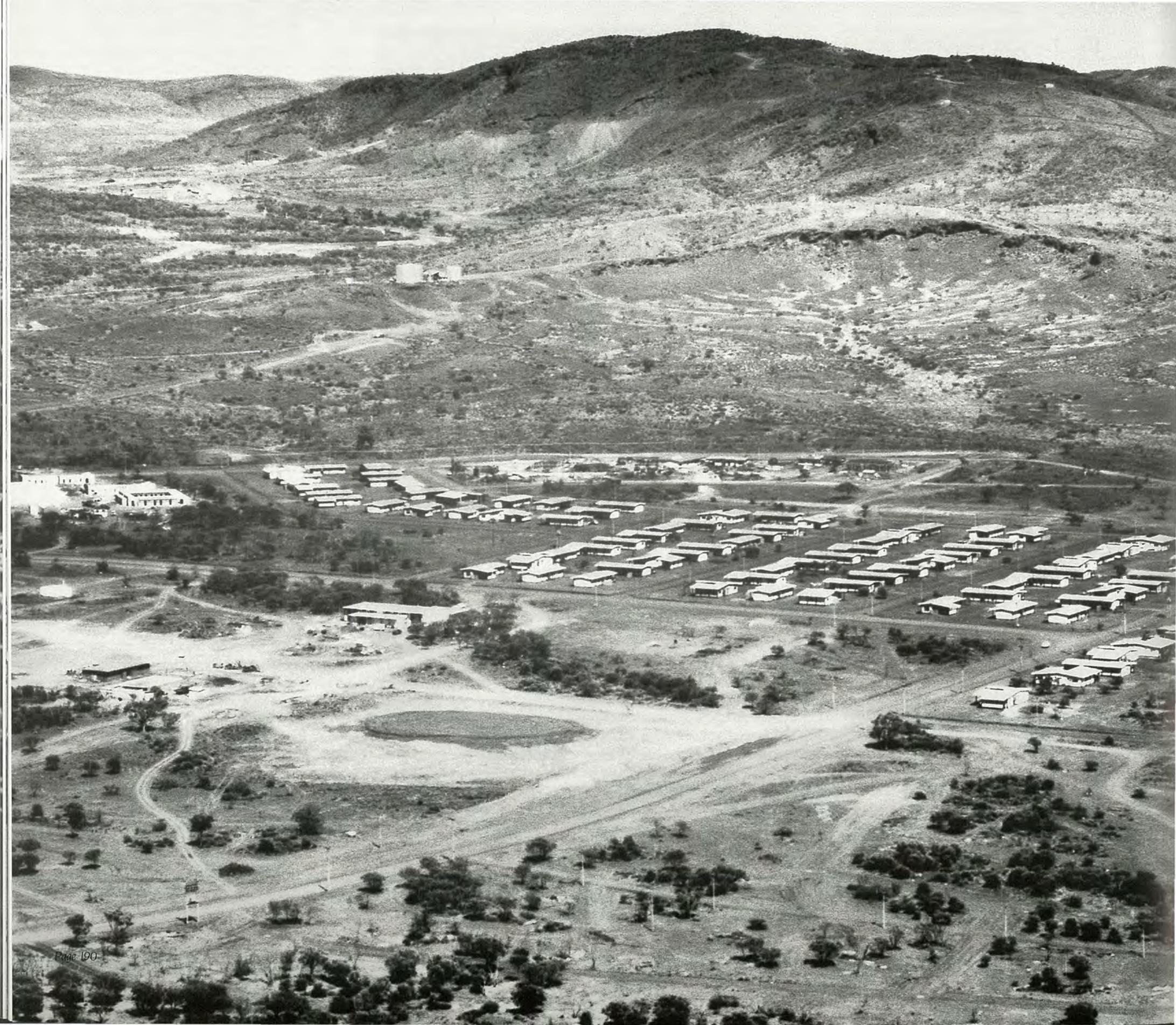
Government approval for these moves was obtained and by 1980 an overall development plan had taken shape.

From a first platform on North Rankin, gas would be piped to Perth and surrounding areas (replacing earlier sources which were already becoming depleted) for domestic and industrial use, while some 6,000,000 tonnes of LNG a year would be available for export. In mid 1981 a memorandum of intent for the sale of the LNG was signed with eight Japanese power utilities, but before this could be formalised in contracts, a further re-structuring of the joint venture was necessary.

By the time the North Rankin jacket was built and the first domestic gas sales made to Perth in August 1984, the total cost of the venture was estimated to be \$11,000,000,000. Woodside, still the smallest participant in terms of financial resource, had been able to meet its share of the cost of the first domgas phase by a history-making loan raising, but the still-larger scale of the second phase involving LNG export (about \$8,000,000,000 of the total) presented greater difficulties.

After protracted talks a separate financing plan for the LNG phase was arranged with six equal partners. Shell and BHP have agreed to buy an additional interest from Woodside, which would bring their respective direct shares to one-sixth each, while Woodside will also sell another one-sixth interest to the Japanese trading houses Mitsubishi and Mitsui, both of which had been assisting in the project's affairs. BP and Calasiatic will remain as one-sixth holders. The planned entry of the newcomers probably represents the most significant direct resource investment in Australia yet made from Japan. Later, BHP and Shell made a joint takeover bid for the Woodside shares not already held.

Woodside Petroleum Ltd (as the company had become) remains as operator of the project; indeed, that company's management of the engineering aspects of this, Australia's largest such development, has given it world standing.





The township of Newman, seen left in 1968, sprang up rapidly after the Mt Newman iron ore mining venture was finally established in the previous year. At that time, Mt Whaleback in the background still had the shape for which it was named. Stan Hilditch (seen above with the truck in which he explored the area) had discovered the deposit 10 year earlier.

Pilbara mining on the grand scale

Some 400 km inland from Australia's north west coast stand the lonely Ophthalmia Ranges, named in 1876 for the sandy blight being endured at the time by the explorer Ernest Giles. Twenty years later another party named a 1000 m peak in the ranges Mt Newman, in honour of their leader who had recently died. There the overtones of misfortune for that part of the Pilbara region seem to have ended. In 1957, A.S. "Stan" Hilditch, a prospector from Meekatharra searching in the hills for manganese, found outcrops of ironstone in a great humpback feature some 20 km south of Mt Newman. Samples sent by Hilditch to his partner, Sydney mining engineer Charles Warman, assayed around 68.8 per cent iron, remarkably high for a natural ore. So it was that when in 1960 the Commonwealth government lifted the iron ore export embargo, Hilditch and Warman took up temporary reserves in the Mt Newman and Mt Whaleback areas.

In 1963 the partners eventually made a preliminary agreement with AMAX, the US mining company whose executives had been checking the investment possibilities in Australia. AMAX in turn invited CSR Ltd to join the project; experienced in international mining operations, the American company had a policy of forming partnerships with local companies where possible. Government approval was obtained and by 1965 reserves of 242,000,000 tonnes of high grade ore had been proved and contracts signed with eight Japanese steel companies to ship 100,000,000 tonnes over 22 years.

The project was planned on the basis of an initial shipping rate of 5,000,000 tonnes a year, but rising capital costs made necessary a larger scale of operations before the venture could be financed. Talks with other iron ore companies (including BHP) followed, and by 1967 the Mt Newman Joint Venture took shape: BHP would hold a 30 per cent interest, would manage the project and would be a major purchaser of ore. CSR would have a 30 per cent

interest, AMAX 25 per cent, Selection Trust of UK 5 per cent and two Japanese firms, Mitsui and C Itoh, 10 per cent.

By September 1967, the American engineering firm of Bechtel as principal contractor was mobilising workforces at Port Hedland to build port and ore handling facilities, along the line of the 426 km railroad to the mine, and at Mt Whaleback itself. The rail-laying teams set world records for their rates of track construction. In less than two years the township of Newman had been established near the minesite, all plant was in place and shipments had begun.

A formal opening ceremony with Governor General Sir Paul Hasluck speaking from the fabulous mountain of iron was televised by satellite to functions in New York, Tokyo, Perth and Melbourne, demonstrating that technology was indeed making the world a global village. Bert Rogers, the BHP engineer from Newcastle who was Mt Newman's first general manager, beamed with pride. In its first six months of operation Mt Newman shipped out 2,075,000 tonnes of ore.

Expansion began at once. By 1972 the shipping rate was 25,000,000 tonnes a year. Two years later an ore shipment to France brought the production aggregate up to 100,000,000 tonnes delivered, with plans in hand to lift capacity still further to 40,000,000 annually. That target involved duplicating major plant units, and by the time it was reached, investment by the joint venturers amounted to some \$700,000,000. With their money, the partners had built one of the world's largest mining operations. Production and shipping records were progressively raised through the '70s until it became clear that market constraints would make necessary a period of consolidation. Exactly ten years after the project's opening a beneficiation plant (installed to bring marginal iron ore within customers' specifications) brought the overall investment to \$850,000,000.

The Mt Newman Joint Venture is one of the large-scale developments that brought new standards of life to the north west. Water supply soon made the town of



The object was placed
in the hands of
the Right Honorable Sir Peter Blyden, C.B.E., M.P.,
Chairman of the Council,
at a luncheon at the Admiralty
held on the occasion of the
arrival of the first lunar rocks
of the Apollo 11 mission
on Thursday, 24th July, 1969.



The Mt Newman opening ceremonies in June 1969, in which Sir Paul Hasluck then Governor General of Australia (left) touched off huge charges in the mine of Mt Whaleback (above) were seen by satellite-carried television in London, Tokyo and New York.

Those special functions, together with others in Melbourne, Perth and Sydney, were used by the joint venturer's marketing people to demonstrate that technology was making the world of global village, even in the iron ore trade.

Mt Newman has gone on to become a world leader in the iron export business.

Newman a green oasis in a landscape reddish-brown for most of the year. Regular airline services and regional radio and television transmissions reduced the sense of isolation. Newman was the first company town in the region to be handed over to conventional local government; two years earlier in 1979 arrangements had been made for the townfolk to buy their houses on attractive terms, itself an important step in the transition from pioneering venture to a settled way of life. At Port Hedland, an old-established pastoral centre with two pubs and an Elder-Smith store with corrugated iron walls when it all started, whole new suburbs were built to house the project's people.

The railway line linking mine and port is itself an undertaking of world standing, for the Pilbara iron ore operations call for heavy haul practices on a scale and an intensity rarely experienced elsewhere. New concepts in track specification and in design of running gear, made necessary as the traffic expanded and involving major contributions by BHP research establishments, attracted widespread interest within the international railroad fraternity.

BHP's commitment to the Mt Newman project in 1966 had the effect of deferring the company's development of temporary reserves held over iron ore deposits at Deepdale, in the Robe River area. At about that time, the consortium led by Cliffs International (an affiliate of Cleveland Cliffs Iron of USA) was seeking additional ore reserves to justify further expansion of its own project. Since two of BHP's Deepdale deposits virtually adjoined the Cliffs operation, an agreement of mutual advantage was possible. (In fact, a short time earlier, the two companies had discussed a sharing of production and transport facilities).

With the encouragement of the state government, BHP in 1969 sub-leased to Cliffs areas containing about 150,000,000 tonnes of ore and in turn took up an option to buy up to a half share in the railroad already operating between Robe River and Port Lambert, and up to a 100

per cent interest in the established port facilities. The Port Lambert wharf extends 2.8 km from the shore with twin berths able to take vessels up to 250,000 tdw.

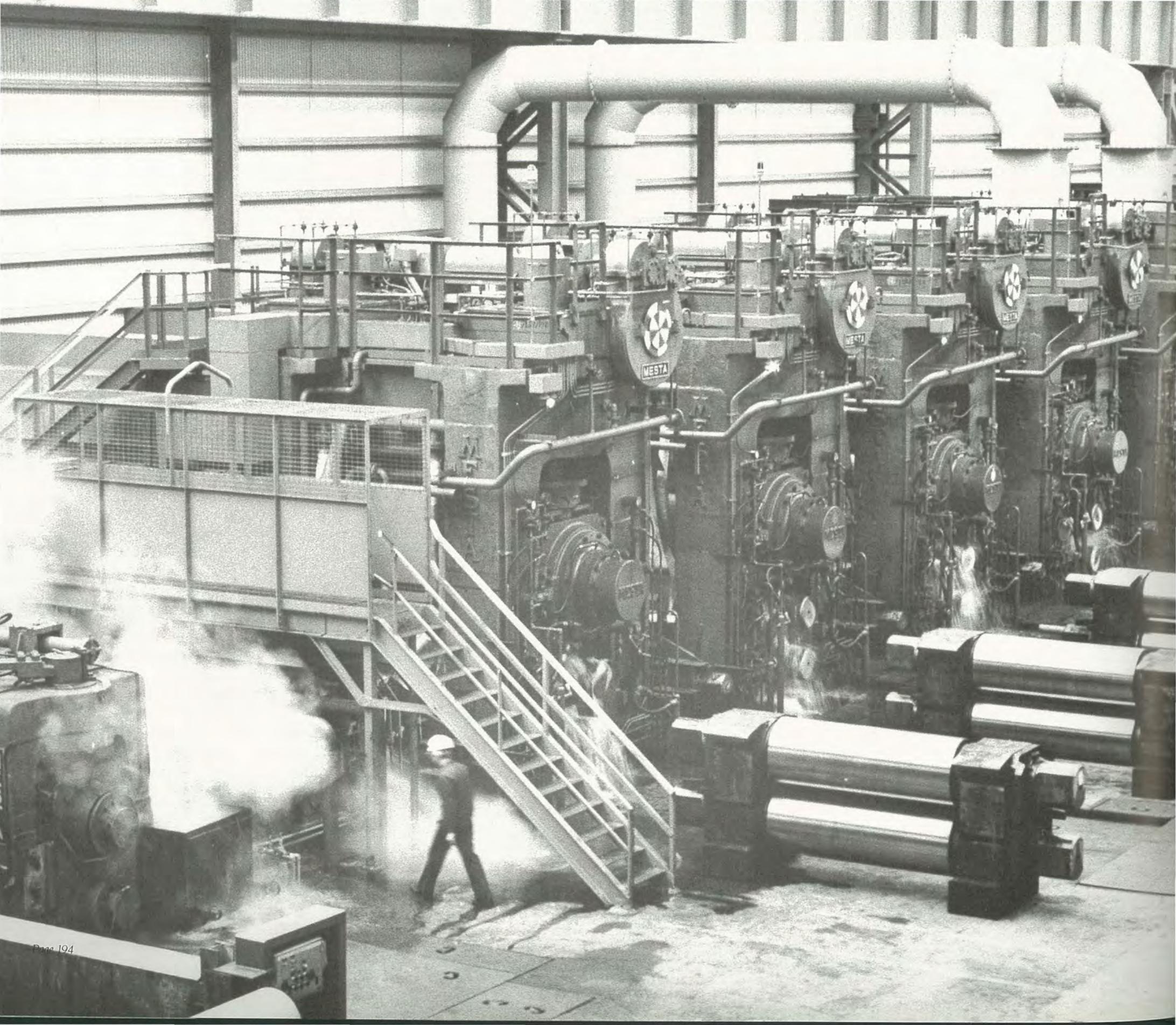
In 1977 BHP took up a half interest in both railway and port, and since then has earned returns on its \$40,000,000 plus investment. It is envisaged that if and when Deepdale ironstone finds buyers among the world's steelmakers (it is a limonitic ore shipping at about 57 per cent iron and ideal for sintering) much of the transport and loading infrastructure will be already in place.

The testing of the steelmen

For BHP's steelmakers, experience through the '70s included new peaks as measured by growth, sales and profits; followed by shattering change, as market prospects shrank while costs blew out. The outcome was a move towards a new equilibrium for the '80s and beyond.

It was in 1965 after making 5,000,000 tonnes of raw steel for the first time that BHP began planning what was up to then its largest expansion. The proposals envisaged a new 5000 tonne-a-day blast furnace, a new BOS shop and a second hot strip mill at Port Kembla. The last Newcastle open hearth furnaces had already been closed, and work had begun there on a billet caster with an associated small BOS unit. In the event, the market retreated from its 1966 levels as drought gripped Australian farms once more and world prices also fell.

With recovery on the way by April 1969 the board committed itself to the \$150,000,000 package which would lift Port Kembla's capacity from 3,700,000 tonnes to 5,400,000 tonnes of raw steel. No. 5 blast furnace, with its twin casting floors, conveyor feed and bell-less top, and the new BOS shop, were the centrepieces. In the following year an additional \$70,000,000 was committed to increase Port Kembla by a further 600,000 tonnes a year, while Newcastle capacity was to be lifted from 2,140,000 to 2,680,000 tonnes.



The hot strip mill installed at John Lysaght Australia's new plant at Westernport Vic, commissioned in 1978, attracted world-wide interest for the heat-conserving coil box fitted in its transfer bar. This made possible the installation of fewer finishing stands, giving the mill useful economies in use of power and cooling services.

The mill takes slab feed shipped from Port Kembla, and the coils produced are further treated in a continuous Zincalume line, a continuous galvanising line, a temper mill and two paint lines.

With the market continuing to encourage steelmakers in Australia and overseas, there was a development in a new direction. The directors of Guest Keen and Nettlefold Ltd of UK, parent company for John Lysaght Australia, were interested in expanding JLA operations in Australia, even to backwards integration into primary steelmaking. Discussions between BHP and GKN followed from 1967, for, with JLA's largest plant closely linked to Port Kembla works, the companies had common concerns. Finally in May 1969 an agreement was outlined. BHP would take up a half-share in JLA, partly by buying the publicly-held stock in the company and partly by purchase of additional equity from GKN. JLA would establish a new plant on a 600 ha site at Westernport Vic, commencing with a galvanising line and cold rolling mill. This would be followed by a hot strip mill fed initially from Port Kembla. It was foreshadowed that steelmaking plant would be added at some future time, 2,000,000 tonnes a year to start with. The development was welcomed by the Victorian government. Production from the galvanising line began in 1972.

For the steel industry generally, the '70s opened on a high note, with Australian demand rising so much that BHP was importing plate to help meet customers' orders. This was in spite of the successful commissioning in 1972 of Port Kembla's large new units. But persistent strikes and rising costs in these years were eroding profits, to the point that by 1975, the year in which BHP steel output reached its all-time peak at 7,900,000 tonnes, the company's accounts showed a loss on steel operations.

In fact, the problem of ensuring an adequate return on funds employed in steel had been emerging for some time, partly because of difficulty in keeping prices in line with costs. As politics invaded economics in many countries, steel pricing had achieved a notoriety best dramatised in the Kennedy years by the President's jaw-boning of US Steel into a roll-back of a price rise. BHP had

its full share of such social pressure, while at the same time, some of the company's shareholders urged no further investment in the industry.

When a Labor government was elected to Canberra in December 1972 with a policy of price restraint on what were seen as "the commanding heights of the economy" steel was very much included. The resulting curbs inevitably meant that there could be only partial recovery of the substantial cost increases encountered — and substantial in particular were the labour cost rises. During 1975, average weekly earnings in the steel industry jumped by 27 per cent. In the following year, the deflator used by BHP to adjust profits for the effects of inflation (an accounting practice introduced in 1969) stood at over 20 per cent. BHP's steel losses that year after the accounting adjustment were over \$50,000,000.

In the meantime, the Commonwealth government's Industries Assistance Commission (which had replaced the earlier Tariff Board) had been asked to report on the Australian steel industry, an inquiry which was to be somewhat protracted.

It was at about this time that the feasibility of the "Jumbo Steel Plan" became the subject of active study by a team headed by Jack Anderton, BHP's general manager steel planning. This concept had been brought forward earlier by BHP and the group's partners in the Mt Newman Iron Ore Project. In brief, it proposed the building of a large steelworks (possibly 10,000,000 tpa) in Western Australia as a joint venture by major world steelmakers, with each participant taking semi-finished steel as a return on the venture capital contributed. Pessimism in the world market hindered active promotion of the scheme at first, but the better climate of 1974 enabled BHP to form a consortium, including Japanese, British and US steelmakers, to make a detailed investigation. However, changing patterns within the world industry — reduced prospects for growth while substantial capacity remained unused — meant that by 1979 it had to be accepted that whatever its inherent

economic merits, international joint venturing in steel on such a scale was an idea for which the time had not come.

The year 1977 brought a record which gave BHP's steelmakers only a wry satisfaction: export sales for the year reached the all-time high of 2,777,000 tonnes, about 42 per cent of the division's total output. World prices at the time were down, but so was local demand, so that BHP's steelmake was the lowest since 1973.

These difficult years included a great deal of progress. BHP built a rod mill at Geelong Vic (commissioned in 1976) to supply feedstock to the nearby AWI wiremill and to produce reinforcing material for local markets. At the major works, investment was largely directed to producing better quality products, improved efficiencies and lower costs, programmes which included a slab caster and a vacuum degassing unit at Port Kembla.

The first bulk carrier of over 100,000 tdw, *Iron Sirius*, had joined the fleet in 1967, followed by *Iron Somersby* (106,200 tdw) in 1971 and *Iron Shortland* (107 140 tdw) in 1979. Two larger ships, *Iron Whyalla* and *Iron Spencer*, each of 141,000 tdw went into service in 1981.

In 1974 the BHP and GKN boards agreed to go ahead with the new hot strip mill at Westernport to be supplied with feed from the slab caster at Port Kembla. The \$100,000,000 needed for the development was largely provided by BHP contributing the uncalled amount on its JLA shares.

The close of the '70s saw domestic steel markets rising under the pressure of resource development in Australia, with world prices recovering also. Once more BHP steelmakers produced a good result by world industry standards, but still with wry overtones: the Steel Division profit for 1978/79 was a record \$127 594 000 (before inflation adjustment). But that represented a return of only about 7.3 per cent on funds, or a profit of about \$17 a tonne. With the cost of new capacity then at about \$1000 a

tonne, the auguries for investment in expansion were hardly favourable.

The question of the future for Australian steel was much debated at the time. The BHP board recognised that, as Australia's most significant form of minerals processing, it had a key place in the country's economy. But, as Brian Loton, then executive general manager of the Steel Division, told the opening stages of the Industries Assistance Commission inquiry into the industry, the business conditions under which the Australian industry operated were far less favourable than those in comparable countries, particularly in relation to the treatment of depreciation for tax purposes. And while the Australian producers had enjoyed natural advantages in raw materials, some of these had been eroded over time and by rising transport costs.

An IAC draft report in March 1979 then proposed a system of subsidies to encourage BHP to build large increments of new capacity to service export markets. BHP found this proposal unrealistic and pressed a claim for faster depreciation arrangements. The Commonwealth government's eventual decision was that faster depreciation was "inappropriate", but there should be appointed a joint committee to deal with foreign steel dumped on Australian markets. For local producers experiencing stiff competition from an over-supplied world, it was a helpful move.

The rigours of import competition were felt particularly by John Lysaght. However, the new hot strip mill at Westernport was commissioned in March 1978, while the company's product range was extended. One noteworthy such development was the introduction to the Australian market of *Zincalume*, sheet coated with 55 per cent aluminium and 45 per cent zinc. It was originally made under licence from Bethlehem Steel of the US, and offered useful advantages over the old galvanised product.

From 1976, JLA progressively improved the manufacturing process, earning licencing income for itself and ensuring that *Zincalume* found ready acceptance among

customers. Good progress was also made with the introduction of painted and other coated material. Then GKN, seeking to concentrate its operations in the EEC, offered to sell BHP its remaining half interest in JLA. In December 1979, the sheet steel producer finally became a wholly-owned BHP subsidiary, retaining its separate identity.

That record steel profit for 1979 was followed by lower returns for the '80 and '81 years and a small loss in 1982. (That last year also saw annual capital investment in steel peak at \$359,000,000). Then there was a dramatic collapse in the market in 1983, and BHP steel posted a loss for the year of \$144,247,000. Output was down to 5,323,000 tonnes, and at the year's end, only five of twelve blast furnaces were operating. Rationalisation of operations and shedding of labour became essential. JLA's sales fell by 28 per cent and there too employment had to be reduced.

A fresh IAC inquiry had opened the previous year at BHP's and JLA's request, while temporary additional protection against imported sheet was provided. Then, following the election of another new Labor government in Canberra in March 1983, BHP and the government agreed on a new five year plan for the industry. A Steel Industry Authority, including representatives of government, companies and unions, would monitor the industry's development including such aspects as import penetration of the market. Bounties would be available for various product categories, and additional protection would be available if the local producers' market share fell below 80 per cent. BHP agreed to maintain operations at its major centres (except Kwinana, where the blast furnace had been closed in 1982 for lack of export orders) and to spend up to \$800,000,000 over four years in development.

The Steel Division's nominal plant capacity was reduced from 9,000,000 tonnes a year to 6,600,000 tonnes as older plant units were taken out of service. The division's workforce was reduced from 44,250 in May 1981 to 28,984

in November 1983. Four fifths of those leaving the industry were voluntary retirees; over \$71,000,000 was paid out in severance agreements, apart from normal superannuation payments. Earlier during 1982, productivity in the division had fallen below an annual rate of 150 tonnes per employee. Twelve months later this had risen to nearly 250 tonnes, and the division was able to set 350 tonnes as a realistic target for the future.

To a large degree, BHP's experience mirrored that of the world industry. Through the '50s and '60s, steel had enjoyed a growth rate in most Western countries, Australia included, of over five per cent annually. Some decline had been expected in the '70s as economic growth slipped a little, and also as the Western world cut back its rate of steel consumption in the course of adjustment to the new high levels of energy pricing. In the event the decline in the demand was much greater than expected while a number of factors exacerbated the market fall. Some steel producing countries usually classed as developing economies continued to build new plants, while some state-owned industries did not respond quickly to the situation. By the early '80s, it was estimated that there were about 200,000,000 tonnes of annual capacity unused and hanging over the world's falling market.

BHP's steelmakers, however, had the satisfaction of seeing their industry back on profit earlier than most of their international competitors. Perhaps more importantly, the range of technical and management innovations introduced in BHP's steel division equipped them to meet the new tougher markets as well as any other producers.

Keeping pace with King Coal

The fast lane of the '70s: that was how Russell Burge described the time as it was for his Minerals Division. Fast indeed it was and much of the action centred on coal. . . first in New South Wales, then in Queensland, then in both. (The establishment of formal operating divisions within BHP



The Moura open cut (left) in the south of Queensland's Bowen Basin began operations in 1961 a first-ever long-term contract for Australian coal was arranged with Japanese mills. The Queensland firm of Thiess Bros joined with a local subsidiary of Peabody Coal Co of USA and Mitsui of Japan in opening Moura together with the nearby Kianga mine, since closed.

BHP bought Peabody's Australian assets in 1977 giving the group a 58 per cent share in the mine. The 99 cu m dragline at Moura was the largest used in Australia.

began from 1972. The Minerals Division as it was then, with W.W. Sweetland as executive general manager, was responsible for all of the group's mining activities. During the next six years a sequence of change converted the divisions into autonomous profit centres. As a result, the Minerals Division became responsible broadly for production and marketing of minerals sold outside the group, while the Steel Division managed its own captive raw material sources. By that time, Bill Sweetland had retired and had been succeeded by Burge, who had been working with him).

Back in the '60s, the first thing so far as coal was concerned was the need to improve productivity in the underground mines. On both the northern and southern NSW fields close attention was paid to coal handling out of the pits. Belt transport became the general rule replacing skips and then in June 1965 longwall mining was introduced in the Kemira colliery in the south. It was a success, and was then installed in the southern mines where working conditions permitted. Total production from the steelworks' mines passed the 6,000,000 tonne mark for the first time in 1968 with a million tonnes more only two years later.

There was also a need to develop new pits to replace depleted workings, and additional coal lands had been purchased on both fields. (Wongawilli was first worked in 1916, and John Darling in 1924). Plans for Macquarie, near the established Stockton Borehole in the north were announced in 1973 and in the following year two other collieries, Cordeaux and Tower, were added in the south. The only serious interruption to steady progress came in July 1979 when there was an explosion and fire in Appin on the southern field. Fourteen miners were killed and the workings extensively damaged. Output for the steelworks mines peaked at just over 8,000,000 tonnes in 1982, to fall back then as the works' demand slackened under market pressures. By 1984, production had recovered to 7,505,000 tonnes, with Appin output at a new yearly record of 1,614,000 tonnes mainly from longwall operation.

It was in quite a different context that from the late '60s a somewhat brushed-up King Coal was placed upon his Queensland throne. The small town of Blackwater had been linked to Rockhampton on the coast by a 190 km railway as early as 1877. Explorer Ludwig Leichhardt passing through the district thirty years earlier had noted the coal along the local river banks. There had been desultory attempts to mine in the region but even with the existing rail link it was the lack of a market for coal as much as anything else that promoted indifference. Even in the post-war years when some trade began with Japan, the established New South Wales producers scooped up such orders as were then around.

But in 1961, after first investigations around Blackwater, Brisbane contractor Les (later Sir Leslie) Thiess opened a large scale mine at Moura, inland from Gladstone in the south of the Bowen Basin. Thiess was joined by Peabody Coal Company of the US and Mitsui in a company that signed the first Australian long-term contract with Japanese steel mills for Queensland coking coal. To service the contract, TPM built a \$30,000,000 shipping terminal at Gladstone.

Then in 1965 Utah Development Company, offshoot of a large American contracting concern, found highly prospective country near Blackwater and contracted to sell large tonnages of coal to Japanese mills. From 1966 BHP also had exploration teams in the Bowen Basin, in the Blackwater area at first and then further west around Capella.

It was the new market prospects that made such developments possible. Japan's steelmakers were planning expansion on a grand scale while many of that country's own underground coal sources were being closed down as uneconomic or in some cases unsafe. Australia vied with the US and Poland to make the most of this emerging situation, and eventually captured over 40 per cent of the Japanese market. Price horizons changed as the OPEC assault on world energy markets took effect. Up to about



The Gregory mine north of Emerald Qld, named for A.C. Gregory who explored and surveyed much of inland Queensland and Western Australia, went into production in 1980. It was the first Queensland open cut mine opened by the group and its three Marion 8050 draglines (one is seen in the picture at left) were the first to be put into service by BHP itself. The units have 46 cu m buckets.

BHP began exploration work in the area in 1970, and after a five-year drilling programme took up a mining lease covering 260 sq kms. First sales agreements for Gregory coal were reached in 1977 with Japanese buyers, followed by further sales to Brazil and South Korea in the following year.

1974, prime Australian coking coal sold in Japan for little over \$10 a tonne; within two years the average price had climbed to nearly \$40, although it then flattened out. Steaming coals, demand for which was greatly strengthened by the OPEC moves, rose in price less rapidly but still sufficiently to bring a new generation of mines into production in Australia.

Governments in the coal-bearing states were hardly loath to exact tribute in various forms from the producers, but probably the greatest beneficiaries were the people of central Queensland. Irrigation schemes had brought prosperity to a few districts, but the bright new coal towns, the new roads, and the boost to such places as Mackay, Gladstone and Rockhampton added immensely to all of this. The brigelow country had come to life.

By 1970 BHP had begun trials at a new underground colliery named Leichhardt in the Blackwater district; the coal was of good quality and the seams startlingly thick but mining conditions proved very difficult and the mine was eventually closed. Another new underground mine a short distance away was commissioned in 1975 but was later sold. But an area north east of Emerald where the company had an extensive prospecting authority proved to contain at least 150,000,000 tonnes of good coking grades, most of it readily accessible by open cut. Orders were obtained from Japan, Korea and Brazil and by 1979 the \$250,000,000 Gregory mine (named for another explorer) went into production, shipping out through the port of Gladstone. While this was BHP's first export mine development, in fact the company had been able to get into the trade three years earlier.

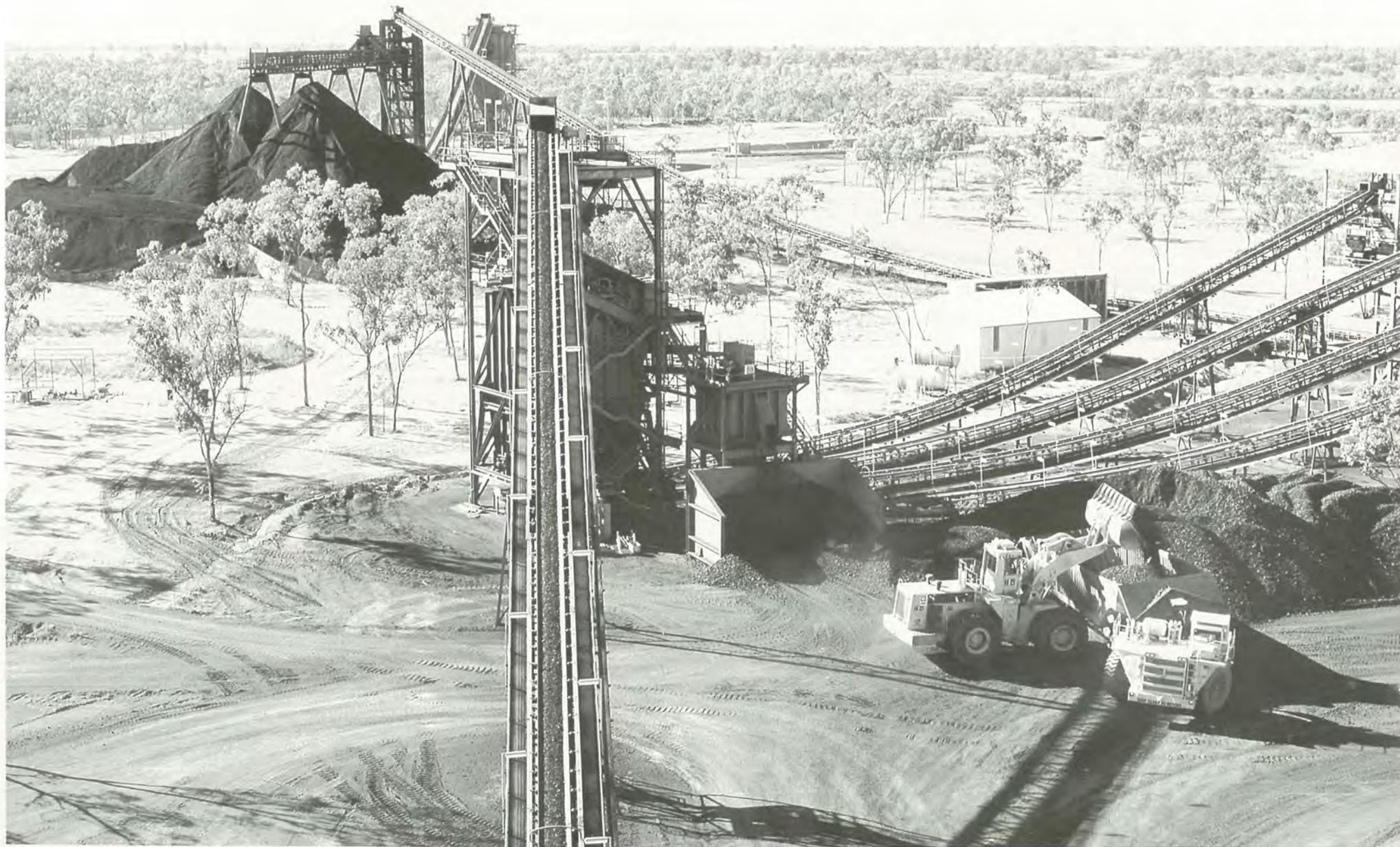
As a result of divestment actions in the US against Kennecott Copper Corporation, that company had to sell its subsidiary Peabody Coal. So in 1976 BHP (having moved quickly when the opportunity arose) was able to buy Peabody's Australian assets, thereby acquiring a 58

per cent share of TPM. (That company then became Thiess Dampier Mitsui, Dampier Mining Co Ltd being BHP's mining subsidiary). For about \$90,000,000 BHP bought its majority interest in the producing mines at Moura and Kianga, and in extensive deposits proved in the Nebo area some 200 km south west of Mackay, together with some smaller coal operations in Western Australia. One of the Nebo deposits, Riverside, was put under development almost at once and by 1983 had itself become a \$390,000,000 project shipping up to 3,300,000 tonnes a year through a new loading terminal built by the state government at Dalrymple Bay south of Mackay.

For BHP, export coal is not exclusively a Queensland affair. Soon after drilling started on the Gregory prospect other BHP teams moved on to the Warkworth reserves near Broke in northern New South Wales. Large deposits of low-sulphur energy coal found there were then developed as the Saxonvale open cut, projected eventually to ship 4,500,000 tonnes. While that work began in 1980, the company also committed itself at a \$135,000,000 programme to lift output of coking coal and to produce steaming coal from the Steel Division's underground mines for overseas sale. This involved introduction of longwall mining first in John Darling and then in Macquarie and Stockton Borehole, and the building of a new washery at Teralba for the export product.

Two other NSW coal interests are at the pending stage. At Boggabri in the state's north west, BHP and AMAX are partners in a deposit which may prove commercial for either energy or blending purposes as markets improve. BHP also has a one-third interest in a joint venture to develop an underground coking coal mine at Bargo, west of the Illawarra escarpment.

In all of these plans and developments, teamwork within the group was very important. BHP Engineering had a major role, particularly in building the Gregory mine and also as contractor in building new railway and port facilities at Gladstone. BHP Research was also active. Work on



Stockpile capacity at the Gregory mine (left) is about 200,000 tonnes. Product coal is shipped down a 67km spur line to the main state railway to the coast, and loaded out at the Clinton terminal near Gladstone.

Establishment of the mine involved upgrading the railway track and facilities, and the building of a new all-weather road to Emerald 64km away, where most of the workforce live.

The mine's original reserves were estimated to be 154,000,000 tonnes, more than half of it at depths of less than 60m.

in-seam seismic underground exploration for instance proved a valuable aid in mine planning while a system of methane draining from seams was applied at Appin. A method of transporting coal as a slurry by pipeline, developed in association with BP Australia, was brought to the licensing stage. With an eye to the longer term, intensive work was carried on at Melbourne Research Laboratories into techniques for the conversion of coal to liquid transport fuels. Special grants were provided by the Commonwealth Government for some of these projects which have national significance.

Apart from efficient mining operations, coal shipment is itself a vital aspect of the industry. The two shipping terminals at Newcastle were already congested when BHP and other producers came forward with new expansion plans. The State Government then decided that in the third loader which was clearly necessary private enterprise should play a larger role. The upshot was that BHP took a 30 per cent share in a new \$250,000,000 terminal built at Kooragang Island across the Hunter River from the steelworks. BHP Engineering designed and built the plant and a BHP subsidiary manages it. Kooragang loaded its first ship ahead of schedule in May 1984; the terminal could ultimately have the capacity to ship 50,000,000 tonnes a year.

By 1983 BHP had committed about \$800,000,000 in mines and plant for the coal export trade. In that year, the group's overseas shipments totalled just on 5,000,000 tonnes. But already something larger again was in train. A few months earlier, a man from General Electric of the US had called on Chairman McNeill in Melbourne to enquire if BHP would be interested in talking about acquiring Utah International. What followed from the conversations is another story involving larger dimensions than ever.

In the meantime, BHP's board and management had been making conscious efforts to diversify in the resource industries, moves which call for patience and persistence and then are not always successful, as indeed the company found.

Aluminium was one of the company's target industries and active searches began around the mid '60s for bauxite, the mineral base. The deposits found proved uneconomic, and then in 1970 the company joined Alwest Pty Ltd in a project to develop low-grade bauxite areas in the Darling Ranges near Boddington about 145 km south east of Perth. Alwest, a subsidiary of Mr. Rupert Murdoch's News Ltd, had already bought the prospect which adjoined the concessions of the Alcoa/Western Mining aluminium venture. After two years of investigations and talks, BHP/Alwest were joined by the Reynolds Metals Group of the US and extensive studies then evolved into a plan to build an alumina refinery at Worsley near the Collie-Bunbury rail line. It was not until November 1979 that a joint venture was formalised. News Ltd then sold its interest, Reynolds took 40 per cent, Shell Australia 30 per cent and BHP 20 per cent, with 10 per cent held by a group of Japanese companies headed by Kobe Steel.

Construction began in the following year and the 1,000,000 tonne refinery was opened in May 1984. For BHP it represented a commitment of \$220,000,000 and a toe-hold in aluminium.

With the refinery in train, BHP in 1980 took a 35 per cent interest in a smelter planned by Alumax Inc for the Hunter Valley NSW. But with the aluminium metal market prospect turning down and doubts about cost factors, Alumax withdrew from the project in April 1981 and subsequently the Lochinvar smelter plan was abandoned.

Considerable efforts were made to find nickel about this time. BHP field parties found lateritic nickel deposits around Rockhampton but exhaustive research with International Nickel of Canada could not find a satisfactory treatment for these difficult ores. BHP/International Nickel joint exploration in Western Australia found traces at Widgiemooltha near Kambalda, but a trial shaft yielded





It was in May 1972 that BHP took up a section of the Warkworth coal reserve near Broke in the Hunter Valley, NSW, to open the Saxonvale mine (left).

There are 24 seams in the deposit totalling over 50m in thickness and with reserves of over 1,000,000,000 tonnes. The coal is generally high in volatility and medium ash.

The mine is a multi-seam multi-bench development operated without draglines. Shipment of energy grades through the port of Newcastle began in June 1982.

Sir James McNeill (above left) became managing director in 1971 and chairman in 1977. A Newcastle boy, he joined the company as a young accountant in 1933 and held a sequence of finance appointments before going on to the BHP board in 1970. He was knighted in 1978 and retired in 1984.

Brian Loton (above right) followed J.C. McNeill as chief executive, first as chief executive, first as chief general manager and then in 1982 as the group's present managing director. A Melbourne-trained engineer, B.T. Loton joined BHP in Newcastle as a cadet in 1954. His appointments include membership of a number of industry, government and academic bodies.

unpromising results. In 1981, however, BHP did join Western Mining Corporation Ltd in a venture to work a small deposit at Carnilya Hill WA. BHP had its 44 per cent share of the ore toll-refined by WMC for use in the group's steelplants.

In 1975 BHP returned to gold, and some said fancifully that it was to Lassiter's lost reef. ("Possum" Lassiter claimed to have discovered rich gold reefs in the Petermann Ranges, but disappeared in 1930 after walking away from an expedition searching for them. The area concerned was well to the south east of BHP's new interest). A few years earlier Newmont Mining Corporation of USA had been shown quartz reef outcrops out on the edge of Western Australia's Great Sandy Desert some 480 km east of Port Hedland. It was hardly the most accessible place but the grade of ore and extent of reserves justified development. The outcome was the Telfer project (named for a former WA under-secretary for mines), an open cut mine and treatment plant with a village and airstrip, and the only supermarket, social club and children for many kilometres around. Government clearances were granted in 1975, and then at Newmont's invitation BHP took a 30 per cent interest; the exploration people of the two companies had co-operated in several field programmes. A Newmont subsidiary operates the mine, which has become a successful and steady gold producer.

While the Minerals Division people were busy with these diverse activities they were also making progress at Grootte Eylandt and at the Bell Bay ferro-alloy plant. From an initial production rate of 200,000 tonnes of manganese ore a year in 1976, Grootte's capacity was progressively increased to 2,400,000 tonnes by 1982. Treatment and shipping facilities enabled metallurgical grades of ore to be shipped to close specifications, with the product winning markets worldwide, becoming a major export earner, and having a significant influence on world prices. Steel's world

turn-down in the early '80s affected sales from the island, but Grootte then shared in the process of recovery.

A major expansion of the ferro alloy plant at Bell Bay was completed in 1977 with the addition of two new large electric furnaces. A sinter plant also was built to handle manganese ore fines. The new capacity was installed with an eye to the emerging world market for ferro-alloys (as distinct from ores), a development hastened by higher energy costs. Only about one third of Bell Bay output is now needed at the Australian steelplants; the much larger fraction is for the export trade.

Meanwhile, back at headquarters, . . .

The top management plan adopted in the mid '60s served well during these ensuing years as the span of operations widened and devolution became more and more necessary. Sir Ian McLennan followed Syme as chairman in April 1971, when also J.C. McNeill, who had joined the board a year earlier, became managing director. (McNeill, an accountant, went to work for BHP in Newcastle in 1933, the year in which engineer McLennan joined in Melbourne).

The company's articles require a chairman to retire at 68, which meant McLennan standing down in 1977. Jim McNeill then became chairman. It had been arranged that Fred Rich, another Newcastle man who had followed McNeill as executive general manager finance, should become managing director, but he died suddenly in December 1976. Rich, a forward-thinking executive, was sorely missed. Brian Loton, who had been heading the Steel Division and had just joined the board, became chief general manager first and then in February 1982 managing director.

Sir James McNeill (he was knighted in 1978) retired in turn in 1984 after 50 years with the company and was succeeded by Sir James Balderstone, a non-executive director since 1971. David Adam, the lawyer who left



private practice for BHP in 1971 and went on the board six years later, remained the only other executive director until 'Bud' Wilson, the Utah International chief executive, became a parent company director in July 1984. A few months earlier top ranks had again been depleted by sudden loss: Bill Burgess, a former Steel Division head who had been appointed chief general manager operations, died in May 1983; his 42-year service had been outstanding.

The rate of growth in this last decade of the company's century was indeed impressive. In just ten years to 1984 group sales *trebled* to \$5392 million and shareholders' funds *trebled* to \$5365 million. BHP group profit passed the \$100 million mark for the first time in 1972, rose to over \$200 million in 1978 and then leaped by increments of about \$100 million in *each* of the next three years. After a check in 1982 and 1983, growth in earnings resumed in 1984 with a \$638,692,000 profit result. (The accounting policy adopted in 1969 to adjust for effects of inflation on asset replacement values was dropped in 1983 in favour of a more conventional approach to depreciation. BHP had been virtually alone in attempting such an adjustment and importantly, Australian taxation authorities rejected the principle. The results referred to have the conventional base).

And then there was the qualitative side of company life. In BHP thinking at the time this included a concern for management style, with a search for the means of shifting from steelmasters' traditions to ideas of management by consent; and a concern to maintain skills in a world of rising standards, which meant even more attention to the trade and professional training programmes initiated in Lewis' day.

There was another company concern: to get the burgeoning technologies adopted down there in the workplace. Establishment of the Central Research Laboratory at Shortland NSW in 1957 was followed in 1969 by the opening of the Melbourne Research Laboratory.



BHP's second major research establishment (above) was opened at Clayton, a Melbourne suburb, in 1969, the building in which it is housed having won an architectural award. (The structure is of BHP-made self-coating steel).

Melbourne Research Laboratory is particularly concerned with the development of new products such as the range of steel sleepers and accessories for use in heavy-haul railway applications. Picture at left shows a steel sleeper fastening assembly (inset above) under test at the laboratory.

The work led to the design of a successful range of products now manufactured at the Whyalla works.

This in turn followed the recruitment three years earlier of Dr Bob Ward as director of research; Ward, an Englishman, had been Stelco Professor of Metallurgy at McMaster University in Canada. Under his direction, research programmes became more broadly based and staffs were increased. At the same time research units at the major plants, including those at JLA and AWI, found greater scope. By 1984, research and development staff in the group totalled over 600.

Typical of the technical advances during the early '70s was the development by AWI of a successful gas-wiping process for use in galvanising of wire. This is now licensed in seven countries under world-wide patents. JLA also took out world patents on a "miniline" galvanising process which is licensed to several producers. A major project at CRL and Port Kembla was the development of a pilot plant for a continuous coke-making process. There was world-wide interest in such moves at the time, largely for environmental reasons, but the general turn-down in earnings changed the industry's priorities. New products resulting from work at Melbourne Laboratories included such things as light gauge high-alloy steels for the newly weight-conscious automakers and head-hardened rails rolled at Whyalla for the iron-ore producers' railways.

In 1973 BHP made newspaper headlines in a move that appealed to a wide audience. Bob Ward, watching television one evening, saw Perth inventor Ralph Sarich demonstrate his revolutionary car engine which substituted an orbiting function for reciprocal motion. Ward flew to Perth the following day and from that contact with Sarich a new company was formed to develop the concept with BHP as a major shareholder.

The Orbital Engine Co Pty Ltd under Sarich's direction and with finance and technical help from BHP carried the early design to a fully operational prototype to be evaluated by the world's carmakers.

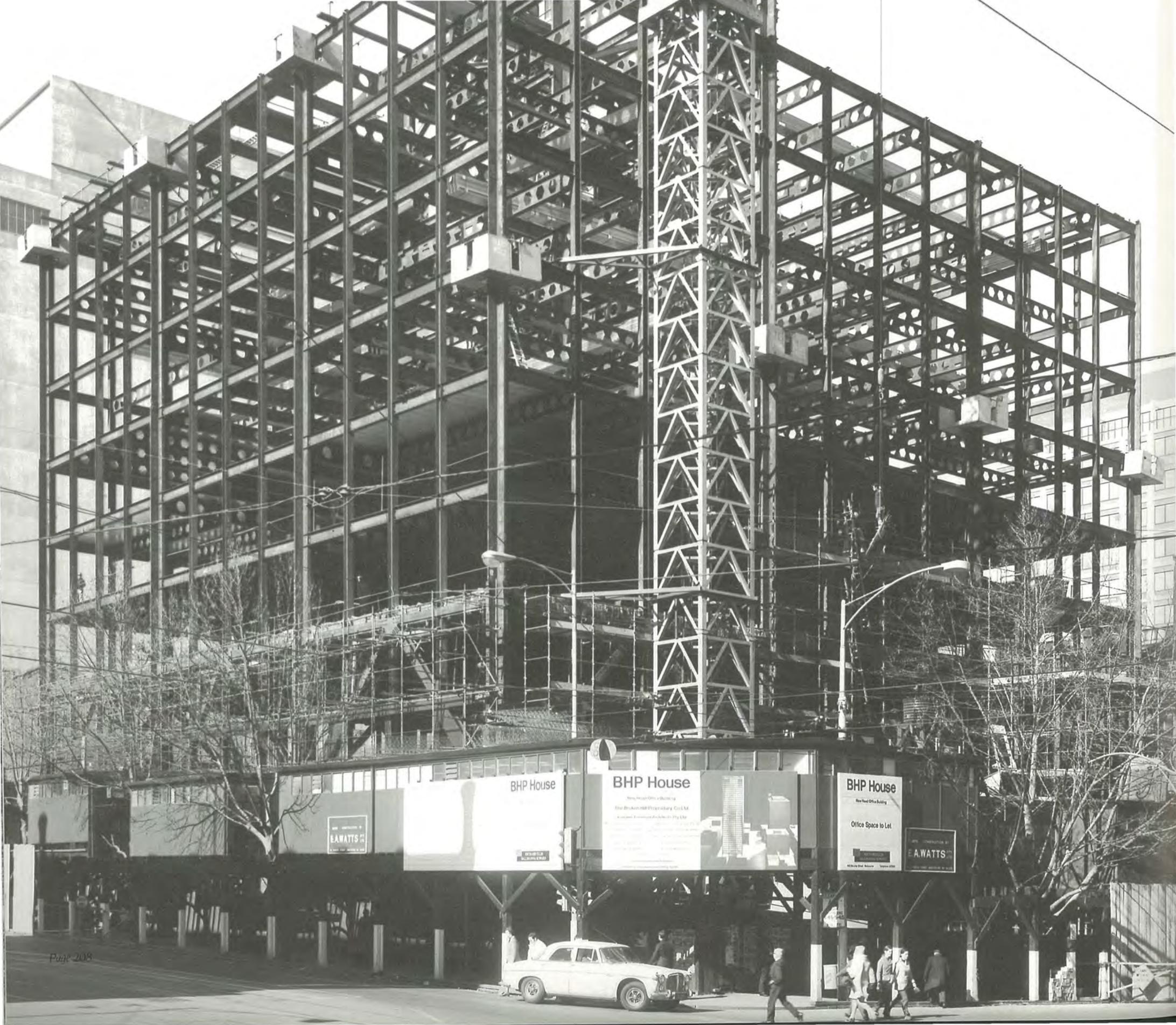
By 1983 group patents held and applied for numbered over 600 with some 65 technology sale agreements in

force. Research programmes were increasingly centred on such things as the use of lasers and fibre optics in instrumentation, development of industrial ceramics and solar technology and the use of plasma technology in smelting.

On a more day-to-day basis research people were becoming involved in the specification of mineral performance to aid marketing, and in optimising plant operation and maintenance programmes, while the use of mathematical models and simulation techniques was becoming more widespread.

The introduction of computers brought new scope to process control and to management decisions. BHP's first computers installed at Newcastle and Port Kembla in 1958 largely replaced clerical functions but one unit at Newcastle was used for operations research from the start. Larger machines were put in progressively as they became available until from 1970 four large CDC units made possible on-line production control facilities first at Newcastle and Port Kembla, and then throughout the group. From 1975 onwards there was an increasing use of mini-computers, and from the early '80s, group-wide installation of word processing facilities and communications networks. Among the problems of keeping pace with growth and the new opportunities was that in 1984 of converting to very large IBM computers.

With all these activities it was hardly surprising that by the end of the '60s the Melbourne staff should have outgrown its own first building, Essington Lewis House. There came then a Monday in December 1972 when the head office people walked across Bourke Street to their newly completed BHP House, built under a lease-back arrangement with Australian Mutual Provident Society. Architect Barry Patton had provided a structure thoroughly functional as befitting the company's engineering base, an all-steel building with 41 levels, housing a collection of



BHP House

BHP House

BHP House

AWATTS

AWATTS

AWATTS

Architectural awards also went to BHP House, the new 41-level steel structure (left) built in Melbourne as the company's head office and occupied in 1972.

Built in the strictly functional style, the structure was a showpiece in state-of-the-art techniques for building in steel, with exposed black-painted beams and columns featuring in the building's internal finish.

In just 14 years the company had outgrown its previous (and first) head office building in Bourke Street, admittedly one of a modest ten levels.

Prior to 1958 the group head office was in leased quarters in various Melbourne buildings.

contemporary Australian art, and generating its own power in a total energy system fuelled by Bass Strait gas. BHP's headquarters had been in Melbourne for 87 years; for the first time it was conspicuous on the city's skyline.

Ranging from cement to Coca-Cola

As BHP neared its centenary, the manufacturing subsidiaries brought into the group from Lewis' time accounted for about one fifth of total sales. They have involved BHP in downstream Australian manufacturing to a far greater degree than is generally appreciated and in several cases also they have involved BHP in joint operations with overseas companies that are world leaders in their respective fields.

Production of wire products, the earliest of the downstream industries, was reorganised in 1980 into divisions under the banner of Australian Wire Industries Pty Ltd; AWI by then had become the world's third largest wire producer, filling 90 per cent of Australia's market requirements and exporting large tonnages. (There had been a shift, incidentally, in local market composition: only a quarter of AWI wire was going to the farmers, and the biggest buyers were the builders with 40 per cent). AWI output peaked in 1980 at 593 000 tonnes of product.

From the mid '60s, Comsteel faced years of difficult trading with import competition becoming ever more damaging. There was substantial over-capacity in special steelmaking throughout the world. Protection levels were repeatedly reviewed, while at Waratah and the new plant at Unanderra near Port Kembla, technical improvements such as vacuum degassing and bright annealing maintained product standards. In 1973 a Sendzimir mill was installed at Unanderra to roll wide stainless sheet, a major investment. Finally, after some years with market pressure continuing particularly on the forging and heavy manufacturing side of the industry a merger was arranged between Comsteel and the Australian subsidiary of Vickers Ltd of UK. A new

company, Comsteel Vickers Ltd resulted in 1983, with BHP and Vickers UK each holding 38 per cent. For Vickers, it was a return to the fold: the English company had bought into Comsteel in the '20s, and later sold out to BHP.

Among the A&S assets acquired by BHP was a controlling interest in Southern Portland Cement Ltd, with its plant near Berrima NSW drawing limestone from nearby Marulan. By the post-war years, and particularly following completion of the Snowy Mountains project, it was clear that opportunities for growth from the Berrima base were limited. After a brief flirtation in 1971/72 with another cement company, BHP merged SPC with the Australian operation of the big British Blue Circle group, forming Blue Circle Southern Cement Ltd with each major shareholder having a 42.5 per cent interest. BCSC then undertook a major expansion programme which by 1978 gave it the largest cement manufacturing units in the country.

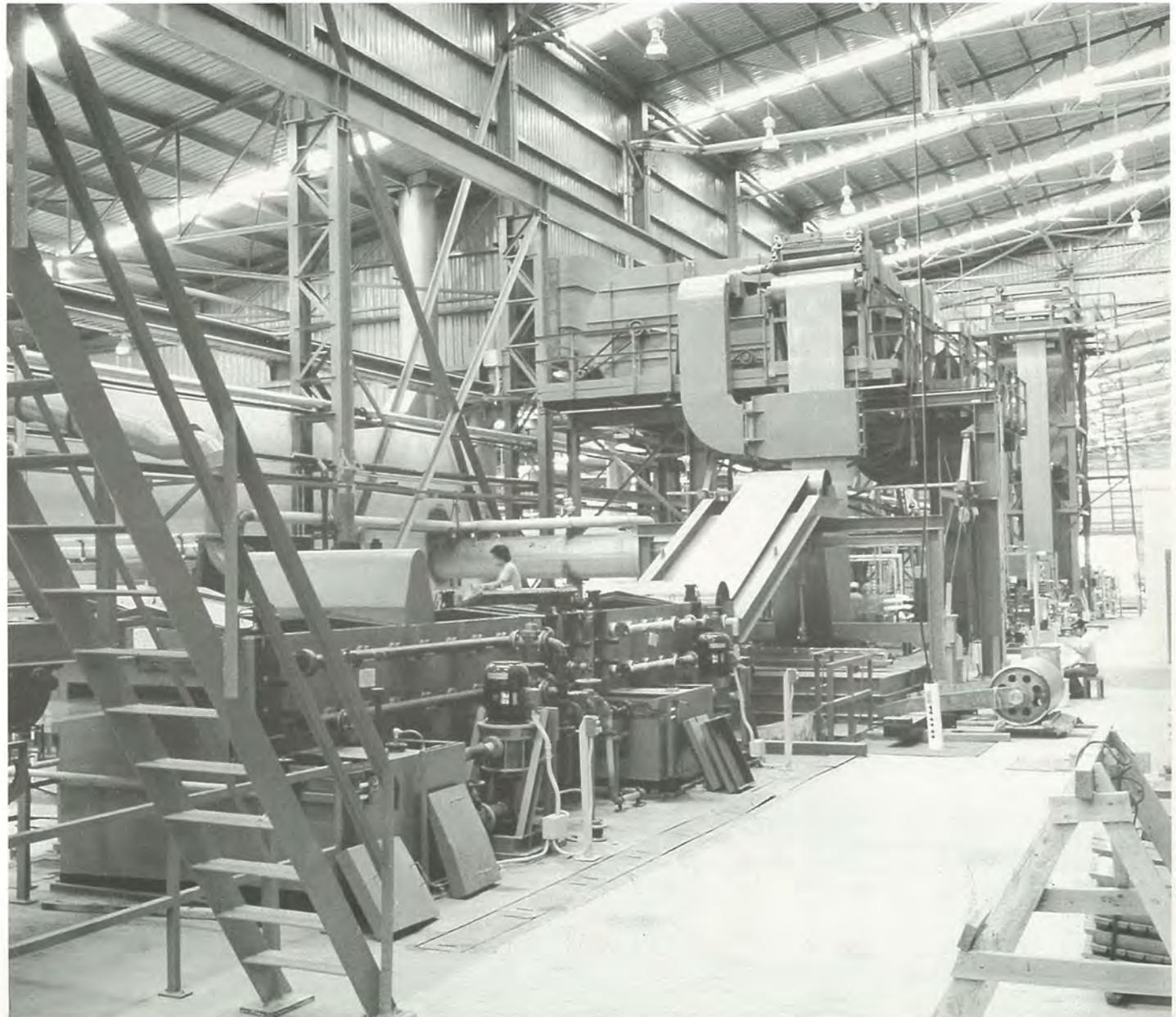
In what was seen at the time as another farm-buying-back deal, BHP in August 1973 bought the US-held share of Rheem Australia Ltd, leaving that company with a third of its stock publicly listed. Rheem, originally an oil-drum maker, had already become a large-scale manufacturer of containers, consumer appliances and packaging materials of many types with operations throughout Australia and with subsidiaries in New Zealand, Indonesia and Papua New Guinea. The PNG interests were later sold but in a bold expansionary move in 1984, Rheem bought from ACI Ltd a consumer products group that included some of the best-known appliance brand names in this country. (Not that the Rheem stable lacks brands — its activities even include Coca-Cola distribution over much of Queensland and New South Wales).

With the break-up of the Newbold group of companies in 1974 following a takeover of that old-established brickmaker, BHP bought in the refractory manufacturing plants at Mayfield, Thirroul and Unanderra

From 1977 the group's ferro-alloy subsidiary, Tasmanian Electro Metallurgical Co Pty Ltd at Bell Bay Tas looked to much wider markets overseas, following installation of two new large electric furnaces (far right). This lifted annual capacity to about 135,000 tonnes of alloy on a standard ferro-manganese basis, with another semi-closed furnace producing about 22,000 tonnes of ferro-silicon. Temco was one of the producers to pioneer development of a world trade in ferro-alloys.

John Lysaght Australia was successful during the '70s in developing a range of designs and production techniques which could be licensed overseas. An example is the design of a mini-galvanising line, the basic feature of which is that it can be used to install about 50,000 tonnes of annual capacity, far less than conventional lines, at an economic level of operation.

The line is particularly suited to operations in South East Asian conditions. Two have been installed in Malaysia, and one each in Indonesia, Thailand and the Philippines (picture at right).





NSW. These supplied about a third of the Australian market for refractory bricks, including the steelworks. Australian Industrial Refractories Pty Ltd, the subsidiary formed to operate the plants, has since extensively refitted and modernised the works to keep pace with rapid changes in refractory technology.

In spite of the technical progress made in the '60s, it was inevitable that the Whyalla Shipyard should fall victim in 1978 to the world-wide diseconomies of limited-scale shipbuilding. For some years, heavy Commonwealth government subsidies had enabled work to be carried on, but with this assistance scaled down and the order book empty, the 45,000 tdw coal carrier *Iron Curtis* became the last ship built there. She was vessel No. 64. Staffing at the yard had been progressively run down, with redeployment and redundancy plans for the men and women involved worked out with the unions in great detail.

Pipe and tube manufacture starting from Stewarts and Lloyds at Newcastle had expanded steadily over the years to other centres, embracing a wide range of products and resulting in formation of Tubemakers of Australia Ltd as the holding company for a successful and diverse group. By 1981, BHP had built up its holding in TOA to 49.8 per cent with purchases from British shareholders. In 1980, the Japanese Sumitomo group bought a 26 per cent share in TOA, also purchased from British shareholders.

Tungsten carbide production carried on after World War Two by Titan Manufacturing, based on the pioneering work done at Newcastle, soon met serious competition from technically advanced companies from overseas, particularly the Swedes. After various moves to strengthen Titan's position in this market, a new company, Seco-Titan Pty Ltd was formed in 1972 jointly owned by BHP and Seco Tools of Sweden, with the dual role of distributing tools and tips and manufacturing locally.

Titan gave BHP its first offshore operating subsidiary in 1968 with the formation of Titan (Taiwan) Pty Ltd to make tools and tips with powders shipped from Newcastle.



After early struggles Titan Taiwan now operates successfully as a subsidiary of Seco-Titan.

Among the remaining BHP manufacturing interests is the company formed in 1967 jointly with Koppers Inc of USA; that US corporation is a world leader in the treatment of coal chemicals. Koppers Australia Pty Ltd was established to process by-products from BHP coke ovens. It has since extended its operations to timber preservation and food processing machinery and has become a substantial exporter.

Bigger numbers and wider scenes

Even with such activities on their hands, BHP's top management people had that recurring idea during these years: continued growth would involve investment offshore.

It was not as if, in the matters before them day by day, there was any lack of contact with a wider world. Representatives of various parts of the group were selling minerals, metals and products in every continent. BHP made its first sale to China in 1891 and had been doing business in Asia whenever possible ever since. JLA's operations and those of other group companies involved manufacturing and warehousing around the entire Pacific rim. Companies such as AWI and Titan were coming to grips with the intricacies of South East Asian investment regulations. Exploration for minerals and for oil was carrying BHP men wherever the action was and into some very exotic places indeed.

BHP's stature in world capital markets was gaining year by year, and investment programmes and joint ventures involved negotiations around the world on an increasing scale of value. And so there was that not-to-be-denied question: where to find a worthwhile investment offshore on a suitable scale, consistent with group objectives, and likely to provide a basis for future growth?

It was against such a background that there were quiet investigations into the possibilities of rolling mills or

Left: early work on the Ok Tedi gold/copper mining venture in Papua New Guinea. Dense rain forest covered the mountains in which the mine is located while access difficulties created by the steep terrain meant that much equipment had to be lifted in by helicopter.

The building of the 134 km road from the base village of Tabubil to the supply port of Kiunga on the Fly River was itself an engineering feat. Basic agreement for the project go-head was reached in 1976 and first-phase mining operations began in 1984.

ferro alloy plants in Saudi Arabia, mineral deposits in the Philippines and Thailand, wire products manufacture on the US west coast, and others. (Business prospects in America were particularly closely watched). Then in 1975 there came an opportunity to look over the sea at a breathtaking mountain of copper and gold.

Mt Fubilan is a 1700 m peak in the Star Mountains in western Papua New Guinea, around 7 degrees south of the equator and about 18 km from the Irian Jaya border. Dense rainforest covers the precipitous mountain sides. The whole landscape drips. It is helicopter country — when the racing clouds clear. It was on this mountain, in 1968 about a thousand meters or so from the summit, around a place named Folomian, that field teams from Kennecott Copper Corporation of US found porphyry copper of good grade.

For three years Kennecott explored the Ok Tedi deposit and then pondered the really formidable engineering problems involved in working it. Finally in 1975 the Americans withdrew. The PNG government, keen to see a mine established, carried on with further drilling work.

BHP exploration men were working on various PNG prospects at the time, and had been following these developments with interest. Their reports prompted Minerals Division chief Bill Sweetland, with colleagues Dick Carter and Pete Horgan, to go to Port Moresby to look into the possibilities. Those talks were encouraging, and the outcome was that in March 1976, BHP and the PNG government signed a concession agreement, contingent upon BHP being able to form a consortium to go further. This agreement set out a basis upon which the mine could be developed, and covered such matters as royalties and taxes, both normal and "super-normal".

By October, BHP had found the necessary partners: one a subsidiary of Standard Oil Company of Indiana, and the other a company representing three German metal

firms. By November 1979 a detailed (and costly) feasibility study of all aspects of the Ok Tedi project was handed to the PNG government. It was based on mineable ore reserves of about 410,000,000 tonnes, including 34,000,000 tonnes of gold-bearing ore most of which formed a capping over the main copper orebody. Production was planned to be in three stages: first, processing gold-bearing ore only, then both gold and copper, and finally working copper only. Tabubil, the nearest village to the minesite, would become the base camp, to be linked by a 134 km road to the Fly River port of Kiunga. Supplies would be carried in and concentrates shipped out by barge from Kiunga to the coast.

It was imaginative engineering planned for an incredibly difficult terrain, and undertaken largely because of the relative accessibility of the gold ore for early production. All parties accepted the plan. In February 1981 Ok Tedi Mining Ltd was incorporated in PNG to operate the venture. BHP and the Amoco subsidiary each hold 30 per cent of the shares, the PNG government 20 per cent, with three German firms each holding smaller interests.

Commissioning of the first stage of the mine began in June 1984. Up to then, the capital cost was about \$1,000,000,000; by the time Stage III is completed, capital invested is expected to be twice that amount. Meanwhile, back at BHP House, they were already looking at the numbers for another venture, bigger still.

It was on an August day in 1982 that John Burlingame, deputy chairman of General Electric Company of USA came to lunch at BHP House in Melbourne. And it was after lunch that the guest put to Chairman Jim McNeill his surprise question: would BHP be interested in talking about buying Utah International? It was indeed a thought to be conjured with.

Utah Construction Company was formed with a capital of \$24,000 at Ogden in the State of Utah in 1900.



Teams of Australian and American lawyers worked for months to prepare the complex documentation for BHP's purchase of Utah International Inc and its associated interests from General Electric. Picture above shows David Adam, BHP director and corporate solicitor (right) and Stanley Hock, senior GE representative, with some of the paper work on settlement day, Monday 2 April 1984.

There were six investors, including two brothers named Wattis who had got the group together after they lost their jobs when a railroad contractor went broke. The new company was formed to take over the contract concerned and was immediately successful. From bigger and bigger railroad jobs Utah went on to major construction projects, built such things as the Hoover Dam and the San Francisco Oakland Bay Bridge, and established a world-wide reputation for engineering excellence.

After the Second World War, with the company still controlled by the founding families, there was a shrewd change of direction; Utah took to construction work on its own account, first on an iron ore mine in Utah state, then on coal deposits in Arkansas. Mining operations expanded rapidly in the years that followed, and in 1950 Utah signed the first long-term overseas iron ore contract ever negotiated by the Japanese steel mills.

Meanwhile, the company was still in the construction and civil engineering business, with some large jobs on hand in Australia, including Big Eildon Dam in Victoria and parts of the Snowy Mountains project. By 1960 there were about 100 Utah jobs scattered around the world. But increasingly, the board saw resource development as the major strategy.

After setting up some successful mines in the Americas, including an iron ore property in Peru and a steaming coal deposit in New Mexico, Utah exploration manager Weston Bourret hired Richard Ellett to look at mineral possibilities in Australia. Ellett, a geologist, had spent some years working in Australia for another American company. He looked first at iron ore prospects, and his work led to the formation of the Mt Goldsworthy project in Western Australia, the first big Pilbara development.

Ellett's brief was to look also for coal so that, having gathered a small staff around him, attention was centred on Queensland's Bowen Basin. The result was the discovery of the important Blackwater field in 1962 and later the deposits

as far north as Goonyella. By 1969 Utah had opened its first Queensland mine at Blackwater, established markets in Japan, arranged financing for the big operations to follow, sold its world-wide construction assets to Fluor Corporation (two thirds of the workforce went with that sale) and changed its name to Utah International Inc. Headquarters had earlier been moved to San Francisco.

Several new mining developments followed in both north and south America, and then in 1976, in what was the largest corporate merger ever up to that time, Utah became part of the General Electric group.

John Burlingame explained to Jim McNeill that as the GE directors saw it, Utah just did not fit the strategies they had in mind for their group's future. They were therefore looking for a buyer. No price was indicated at that stage. To get a fuller perspective of the possibilities it was arranged that teams from BHP and GE would meet. In some secrecy in October 1982 David Adam, Bill Hunter (then EGM Finance), Russell Fynmore (EGM Petroleum) and Dick Carter (GM Resource Development) went to the Kahala Hilton behind Diamond Head in Hawaii to talk to the GE people. Secrecy was hardly helped by the notice on the door of the room reading "General Electric Meeting" provided by the helpful hotel, but there were no leaks up to late January 1983 when David Adam in San Francisco signed a memorandum of intent for the purchase.

By then the scope of the deal had been agreed. Included would be:

- ▣ the Queensland coal mines: Blackwater (100 per cent owned), Goonyella, Norwich Park, Peak Downs, Saraji and the Harrow Creek trial mine (all 76.25 per cent).
- ▣ three US energy coal mines (all 100 per cent owned): Navajo, San Juan and Sierra Coal.
- ▣ Island Copper (100 per cent) copper/molybdenum producer, British Columbia.
- ▣ Samarco (49 per cent) iron ore mine, Brazil.

- ┌ two undeveloped properties: Escondida (50 per cent) copper mine, Chile; and Delmas Eloff (100 per cent) steaming coal deposit, South Africa.
- ┌ and some small interests.

The agreed basis price was \$2,400,000,000. It was quite the largest acquisition on the Australian business scene.

From BHP's point of view, the strategy proposed by David Adam, Bill Hunter and their team and accepted by the directors was to find partners to join in the Queensland coal acquisitions, while retaining control; to include existing BHP coal properties in Queensland in those partnerships; but to retain 100 per cent ownership of the other Utah mining interests included in the purchase. It fell to Bill Hunter, working with a small support group, to work out the financing.

It was a most complex deal, finally completed in April 1984. Two new joint ventures were formed for the Queensland mines thereby accommodating the existing partners in five of them. The existing group, central Queensland Coal Associates, was extended to take in additional partners and also to take over the Blackwater mine. Another joint venture with almost identical participation took over Gregory. Both are managed by the Utah Division of BHP (as it had become).

BHP (through various subsidiaries) holds 35 per cent of the COCA joint venture and 47 per cent of the Gregory joint venture. A new partner, Queensland Coal Trust, was launched on Australian stock exchanges to hold a 21.75 per cent interest in each, and GE also took a 15.5 per cent interest in each. The TDM mines were excluded, leaving that company a BHP subsidiary.

Bill Hunter and his team arranged for 30 Australian and international banks to provide funding of \$US785,000,000 on a non-recourse basis to facilitate formation of the two joint ventures. It was a massive operation by any standard. (Soon after its completion Bill Hunter retired as EGM Finance and was succeeded by his colleague Geoff Heeley).

David Adam signed the formal acquisition agreements

in New York on 2 April 1984 while at the same time there was a function in Brisbane at which Brian Loton signed the many agreements and contracts establishing the new coal ownership arrangements. At the same time it was announced that Alexander M. (Bud) Wilson, chairman and chief executive office of Utah International, would join the BHP board. The Utah board and management would continue to operate from San Francisco, with Brian Loton, David Adam and Geoff Heeley joining the Utah board as non-executive directors. Said Jim McNeill, not one given to hyperbole: "It was another great milestone."

The Utah International operations first discussed with GE included a petroleum subsidiary, but at the time BHP could not meet the larger investment involved. Oil prospects in USA were recognised as attractive however and BHP Petroleum already had a drilling programme there managed from a Denver headquarters. Then in November 1984 BHP announced an agreed bid for the Kansas-based Energy Reserves Group Inc. which included taking over responsibility for ERG's exciting debt. The \$590,000,000 deal brought to the group a successful oil and natural gas producer with an extensive exploration programme in North America, managed by Richard Volk as chairman and chief executive and an experienced team. It was planned that ERG would assimilate BHP's existing US-based petroleum operations. Said Brian Loton at the time of this acquisition: "The North American environment, both for the finding of oil and as one that will reward success, is the sort of environment we want to see more of".

By the end of 1984 it was as though BHP was drawing breath before plunging forward once more. It all seemed a long coach-ride in time back to the great day when William Jamieson borrowed a good suit to go to Adelaide. But it was clear that the Australians in company (including the many who by now were honorary Australians, so to speak) were looking forward to a second century with a good deal of relish.

BHP Group Operations and Interests

Operating Centres

Major Investments

Joint Ventures

	Unit	Location	Principal Activities	Company	BHP %	Location	Principal Activities	Project	BHP %	Location	Principal Activities
Petroleum Industry	BHP Petroleum Pty Ltd	Aust	Exploration; production; petrochemicals.	Hydrocarbon Products Pty Ltd	50	Aust	Styrene monomer manufacture	Bass Strait	50	Aust	Oil and Natural gas production
	BHP Petroleum (USA) Inc	USA	Exploration; production.	Woodside Petroleum* Ltd	21.3	Aust	North West Shelf natural gas venture participant and operator.	China Oil exploration	20	China	Oil exploration.
	BHP Petroleum International Ltd Group	Hong Kong, UK	Exploration					Browse Basin exploration	Various	Aust	Oil exploration incl. Jabiru and Challis fields.
	Energy Reserves Group Inc	USA	Exploration; production.					NW Shelf LNG phase (planned)	16.6	Aust	Liquefied natural gas.
								NW Shelf WA phase	8.3	Aust	Natural gas.
				* An unconditional bid made jointly by BHP and Shell for the 57.4 per cent of Woodside shares not already held by the two companies was pending at time of printing.							
Minerals Industry	Utah International Inc	Worldwide	Mining	Kooragang Coal Loader Ltd	30	Aust	Coal terminal operator	Mt Newman	30	Aust	Iron ore mining
	Utah Development Co Ltd Group	Worldwide	Coal mining; exploration; port operations; shipping.	Ok Tedi Mining Ltd	30	PNG	Gold/copper mine development	Telfer	30	Aust	Gold mining
	Umal Consolidated Ltd Group	Aust, Sth Africa, USA	Mining; mineral technology	Samarco Mineracao SA	49	Brazil	Iron ore mining	Worsley Alumina	20	Aust	Bauxite mining; alumina refining.
	BHP Minerals Ltd	Aust	Mining of iron ore, coal, nickel, gold; exploration.					CRRIA	50	Aust	Rail and Port facilities.
	Thiess Dampier Mitsui Coal Pty Ltd (58% owned)	Aust	Coal mining; exploration.					Central Queensland Coal Associates	35	Aust	Coal mining
	Groote Eylandt Mining Co Pty Ltd	Aust	Manganese ore mining.					Gregory	47	Aust	Coal mining.
	Tasmanian Electro Metallurgical Co Pty Ltd	Aust	Alloy production.								
Steel and Steel Forming Activities	The Broken Hill Proprietary Co Ltd	Aust	Iron & steel production; mining; shipping.	Comsteel Vickers Ltd	38	Aust	Heavy engineering; special steels; railway equipment.				
	Australian Iron & Steel Pty Ltd	Aust	Iron & steel production; mining.	Tubemakers of Australia Ltd	49.8	Aust	Pipe and tube manufacture; steel distribution.				
	Queensland BHP Steel Ltd	Aust	Steel products.								
	Australian Wire Industries Group	Aust, NZ	Wiremills; wire rope distribution; mining equipment.								
	ASC Pacific Inc	USA	Rollformed steel.								
	John Lysaght Australia Group	Aust, SEA, Sth Pacific	Sheet steel products, steel furniture and equipment.								
	Australian Industrial Refractories Ltd	Aust	Refractory manufacture.								
Other Activities	Rheem Australia Ltd (69.9% owned)	Aust, Indonesia, NZ	Containers; domestic appliances; packaging; investment.	Blue Circle Southern Cement Ltd	40.9	Aust	Portland and blended cement manufacturer.				
	Vulcan Australia Ltd (69.9% owned)	Aust	Domestic appliance manufacture.	Commonwealth Aircraft Corporation Ltd	33.3	Aust	Manufacturer of aircraft, defence equipment and high technology products.				
	Orbital Engine Co Pty Ltd	Aust	Engine research and development.	Koppers Australia Pty Ltd	42.5	Aust	Refined tar products.				
	BHP Engineering	Aust, Overseas	Engineering studies, management and construction.								
	BHP Transport	Aust, Overseas	Transport, principally bulk shipping.								

