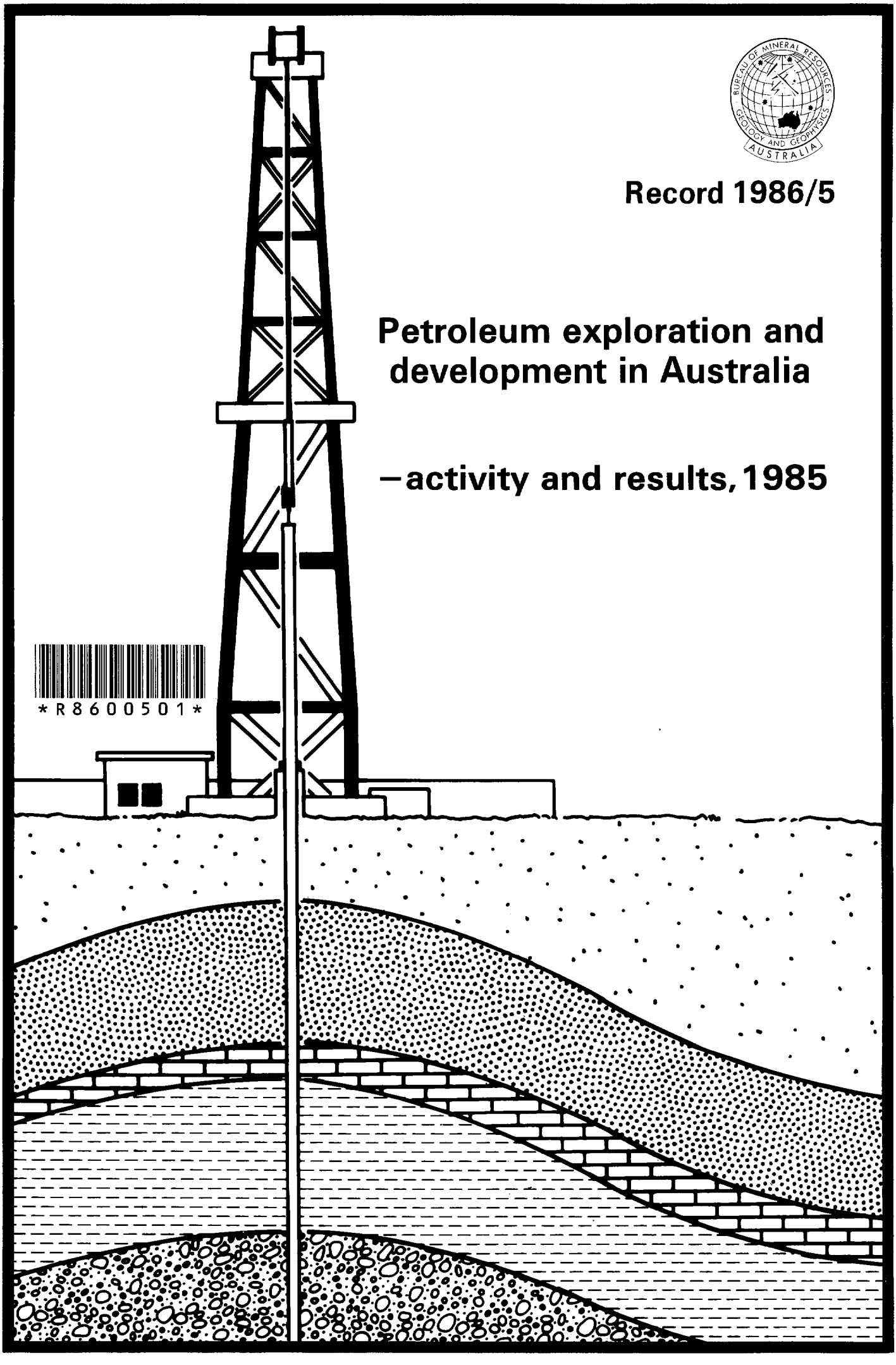

Record 1986/5

Petroleum exploration and development in Australia

—activity and results, 1985

BMR Record 1986/5

Petroleum exploration and development in Australia - activity and results, 1985

Compiled by the
Petroleum Branch, Resource Assessment Division
Bureau of Mineral Resources, Geology and Geophysics
Canberra

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INTRODUCTION

This report has been prepared by the staff of the Petroleum Branch of the Resource Assessment Division of BMR. The functions of the Petroleum Branch include the monitoring of petroleum exploration and development activity, the preparation of estimates of petroleum reserves and resources and their availability through time, and the provision of technical advice in relation to Commonwealth legislation and policies concerning petroleum exploration and production.

The report provides a preliminary summary of petroleum exploration and development activity in Australia during 1985. It also summarises BMR's assessment of Australia's identified petroleum resources (reserves) and undiscovered petroleum resource potential.

In addition to a summary of activity in 1985 in each of the major onshore and offshore sedimentary basins, the report includes a list of the major events in the history of the Australian petroleum industry and a summary of the wells and metres drilled to the end of 1985.

1985 IN RETROSPECT

The high level of petroleum exploration activity achieved in Australia in 1984 was maintained during 1985 and a new record was set for the number of exploration wells drilled. The number of line kilometres of seismic traverse surveyed was also more than in 1984 and approached the high level of activity of 1982. However the total number of development wells drilled was less than in 1984. Although more development wells were drilled onshore, there was a substantial reduction in the number of development wells drilled offshore. The decline in development drilling offshore resulted in a reduction of the total exploration and development expenditure which was at the lowest level since 1981.

The highest proportion of exploration wells, wells to test extensions of fields and appraisal wells, were drilled in the Cooper/Eromanga Basins. Other basins actively explored included the Amadeus, Bowen/Surat, Canning, Carnarvon, and Gippsland Basins onshore and the Bass, Bonaparte, Browse, Carnarvon and Gippsland Basins offshore. Seismic surveying onshore was at about the same level as offshore. The most active area of seismic exploration onshore was in the Cooper/Eromanga Basins. However activity fell off in this area in the latter part of the year and increased in the Canning Basin. Offshore, there was a sharp decline in seismic survey activity in the Gippsland Basin but a high level of activity was maintained on the North West Shelf. Seismic survey activity rose sharply in the offshore Bonaparte and northern Browse Basins late in the year.

Fifty-one oil and gas discoveries were made during 1985; 25 oil, 13 gas, and four oil and gas discoveries were made onshore and two gas, six oil and gas discoveries and one unspecified discovery were made offshore. Crude oil discoveries were in relatively small fields and Australia's demonstrated resources of oil were reduced over the period. A decline in the economic resources in the Gippsland Basin was offset partially by increases in economic resources mainly in the Bonaparte, Carnarvon and Cooper/Eromanga Basins and upgrading of resources from sub-economic to economic mainly in the Carnarvon Basin. The demonstrated recoverable resources of gas increased substantially mainly as a result of increases in resources in the Carnarvon Basin offshore and in the Cooper/Eromanga Basins.

Major development projects which commenced in 1985 included the $1.8 billion development of small, previously uneconomical accumulations in the Gippsland Basin, the construction of facilities on the North West Shelf to supply LNG to Japan, and facilities to develop the Harriet/Lenita oil field. In Queensland the Wallumbilla LNG processing plant opened in March, and construction commenced on a new $2.5 million refinery at Eromanga to refine oil from nearby fields in the Eromanga Basin. In Victoria a petroleum lease was granted for development of the North Paaratte-Wallaby Creek gas field to supply Warrnambool and other nearby areas. In the Northern Territory work commenced on a 1500 km natural gas pipeline from the Palm Valley gas field to Darwin. Plans were also announced for exploiting the Petrel and Tern gas fields to supply gas mainly for the Korean, Japanese and other Asian markets.

PETROLEUM GEOLOGY, RESOURCES AND PRODUCTION

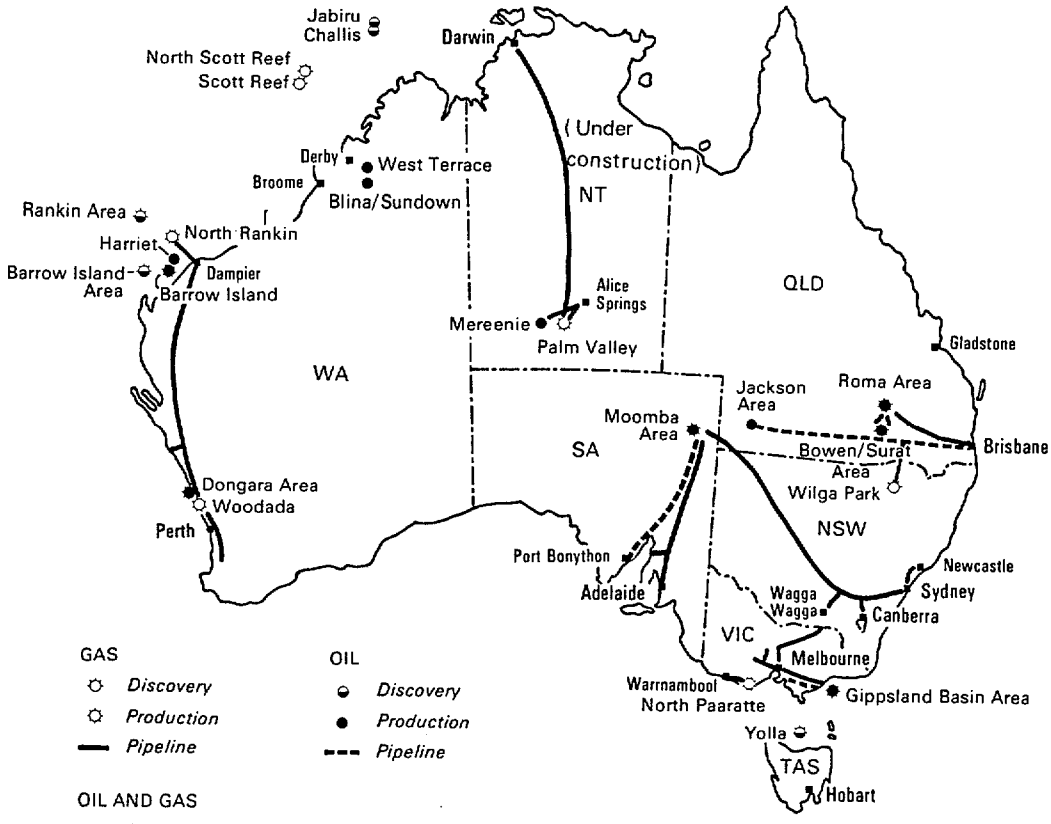
Geology

Sedimentary rocks ranging in age from Proterozoic to Cainozoic underlie about 4.3 million km^2 or about one half of the land area of Australia, and about another 2 million km^2 of the continental shelf (Fig. 2). Forty-eight sedimentary basins are recognised, 20 of which lie wholly or partly offshore.

Proterozoic and early-middle Palaeozoic basins occur mainly in the central and western parts of the continent and in some places extend offshore. Basins that have developed during the late Palaeozoic and Mesozoic underlie large areas of eastern Australia, and exist onshore and offshore around the continental margins. Tertiary strata overlie many of the older basins. The Tertiary basins, and basins that continued to develop into the Tertiary, are mostly distributed along the southern coastline.

Australia's petroleum reservoirs range in age from Precambrian to early Tertiary. Most of the oil resources discovered so far are in offshore early Tertiary reservoirs in the Gippsland Basin. The petroleum reservoirs in the Carnarvon and Browse Basins are Mesozoic, and both Mesozoic and Permian reservoirs exist in the Bonaparte Basin. Onshore, petroleum occurs in Jurassic and Cretaceous reservoirs in the Eromanga Basin, and Jurassic reservoirs in the Surat Basin. The reservoirs are of Permian and Triassic age in the Perth, Bowen, and Cooper Basins, and in the Canning and Adavale Basins which are of Permian and Devonian, and Devonian age respectively. Late Precambrian to late Ordovician reservoirs occur in the Amadeus Basin.

The early-mid Palaeozoic reservoirs in the Amadeus and Adavale Basins are in shallow-marine sedimentary sequences. However, most of Australia's petroleum resources have been discovered in Tertiary, Mesozoic, and late Palaeozoic sequences that were deposited in marginal marine or non-marine environments and which commonly contain extensive coal measures.



FIELD DISCOVERIES IN 1985

Jackson Area
- Bodalla South 5
- Cook
- Epsilon
- Glenvale
- Kenmore
- Koora
- Kooroopa
- Mooliampah
- Moothandella
- Mt Howitt 2
- Takyah
- Talgeberry
- Toobunyah
- Watson
- Watson South
- Winna
- Wippo

Bowen/Surat Area
- Deepwater
- Eluanbrook
- Fairymount
- Louise
- McWhirter
- Mayfield
- Merrit
- Norwood
- Raslie
- Washpool

Gippsland Basin Area
- Angelfish
- East Halibut
- Perch 2
- Snapper 5
- Turrum 3
- Whiptail
- Whiting 2
- Tilana

Rankin Area
- Montague

Barrow Island Area
- Elder
- Saladin

Moomba Area
- Alwyn
- Aroona
- Bagundi
- Baratta
- Gidgealpa 24
- Gooranie
- Jena
- Lepena
- Meranji
- Muteroo
- Nulla
- Ulandi

Fig. 1. Location of oil and gas production, pipelines and discoveries in 1985.

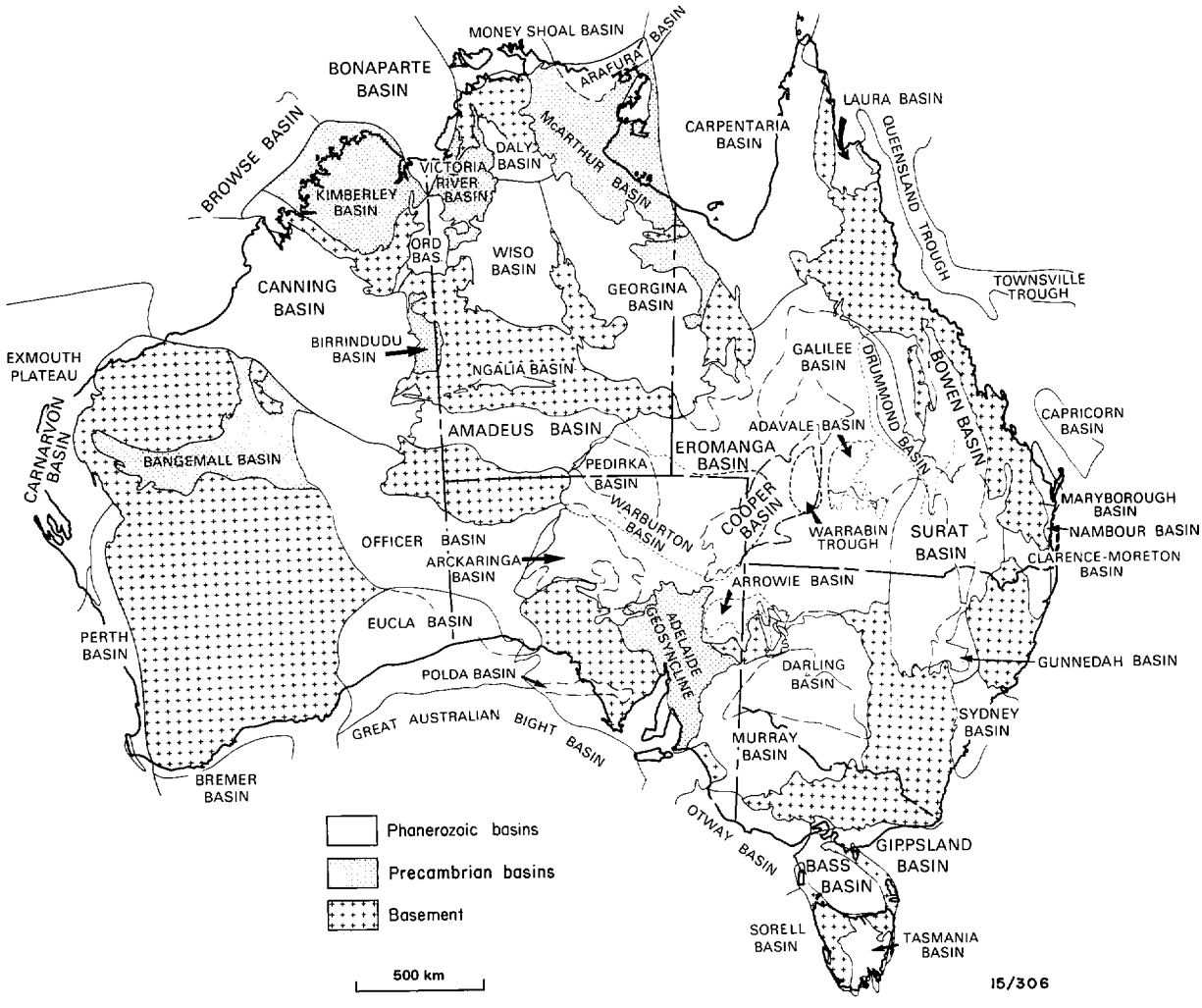


Fig. 2. Australia's sedimentary basins. 'Basement denotes regions generally unprospective for petroleum - mainly areas underlain by crystalline rocks or by tightly folded or metamorphosed strata. The dashed lines are boundaries of concealed basins; locally relationships are complex, e.g. the Galilee Basin overlies the Adavale Basin and underlies the Eromanga Basin.

EON	ERA	PERIOD	EPOCH	AGE
PHANEROZOIC	CAINOZOIC	Quaternary	Recent	0.015
			Pleistocene	1.8
		Tertiary	Pliocene	5.0
			Miocene	24.0
			Oligocene	37.0
			Eocene	53.5
			Paleocene	65.0
	MESOZOIC	Cretaceous		135
		Jurassic		195
		Triassic		235
	PALAEOZOIC	Permian		290
		Carboniferous		345
		Devonian		410
		Silurian		435
		Ordovician		490
		Cambrian		570
PRECAMBRIAN	PROTEROZOIC	Late		900
		Middle		1600
		Early		2300
	ARCHAEAN			> 4100 (greatest age so far measured)

16/1-2

Fig. 3. Geological time scale, showing age of base of each period or epoch in millions of years.

Resources

Most of Australia's identified resources of crude oil occur in the Gippsland Basin (Fig. 1, Table 1); smaller amounts exist in the Carnarvon, Canning, Perth, Bonaparte, Cooper, Eromanga, Bowen, Surat, and Amadeus Basins. Most identified resources of natural gas occur in the Carnarvon, Gippsland, and Cooper Basins. Gas has been discovered in all basins known to contain resources of crude oil, and additionally in the Browse, Bass, and Adavale Basins, and Exmouth Plateau.

Australia's demonstrated recoverable resources of crude oil, condensate, liquified petroleum gas (LPG), and sales gas ('sales gas' is the principal component of natural gas) are outlined in Table 1 (see also Figure 4). Table 1 is based on the McKelvey classification, which sub-divides resources in terms of their economic feasibility of extraction and geological certainty of occurrence. **Economic demonstrated resources** of petroleum are judged to be economically recoverable, their quantity and quality being assessed partly from specific measurements and partly by extrapolation for a reasonable distance on geological evidence; **subeconomic demonstrated resources** are similar in terms of certainty of occurrence but, although physically recoverable, are judged at present to be subeconomic.

TABLE 1. LOCATION AND MAGNITUDE OF AUSTRALIA'S DEMONSTRATED RECOVERABLE PETROLEUM RESOURCES, 30 JUNE 1985

Basin	Oil ($\times 10^6 m^3$)	Condensate ($\times 10^6 m^3$)	LPG ($\times 10^6 m^3$)	Sales Gas ($\times 10^9 m^3$)
Economic Demonstrated Resources				
Bowen/Surat	-	-	-	2
Gippsland	189	21	45	168
Cooper/Eromanga	16	7	13	91
Otway	-	-	-	-
Perth	1	-	-	3
Carnarvon & Canning	16	51	27	411
Amadeus & Bonaparte	9	3	0	16
Total	231	82	85	691

Basin	Oil ($x10^6 m^3$)	Condensate ($x10^6 m^3$)	LPG ($x10^6 m^3$)	Sales Gas ($x10^9 m^3$)
Subeconomic Demonstrated Resources				
Bowen/Surat	-	-	-	5
Adavale	-	-	-	1
Gippsland, Bass	33	7	5	32
Cooper/Eromanga	2	1	2	23
Carnarvon, Browse, Bonaparte	7	20	4	769
Total	42	28	11	830

Exploration Potential

In earlier assessments (National Energy Advisory Committee, 1981, Forman, 1984a), BMR suggested that there was an 80 percent chance of finding at least another 150 million m^3 (950 million barrels) of crude oil and 20 percent chance of discovering more than another 600 million m^3 (3800 million barrels). The average of the estimate was 420 million m^3 (2600 million barrels) of crude oil.

The average of BMR's assessment of undiscovered conventional recoverable gas resources onshore is 3.5 trillion cubic feet (TCF) and onshore plus offshore to the 200 m contour is 20 TCF (Forman, 1984b). The average total potential of undiscovered conventional recoverable gas onshore and offshore, including gas in deep water areas, is 38 TCF.

Such assessments provide an indication of our current understanding of the nation's petroleum potential. However prolonged exploration, particularly drilling, will be required to determine the actual amount of recoverable oil and gas resources in Australia's very extensive sedimentary basins.

Production

Commercial production of oil began in Australia in 1964, from the Moonie field in the Surat Basin (Fig. 2, Tables 2 and 3; see also Fig. 4). Production from Barrow Island (Carnarvon Basin) began in 1967, and from Bass Strait (Gippsland Basin) in 1969. The Gippsland Basin is the major source of petroleum liquids in Australia (86%) and with the completion of a liquids pipeline from Moomba to Stony Point (1982) and the Jackson to Moonie pipeline (1983), the Cooper/Eromanga Basin has become the nation's second largest producer.

Natural gas was first delivered to Brisbane, Melbourne, and Adelaide in 1969 from the Surat, Gippsland, and Cooper Basins respectively. In 1984, the Palm Valley field in the Amadeus Basin supplied gas to the Alice Springs power station, and North West Shelf gas reached the Perth market to supplement the gas from the Dongara field (Perth Basin) first supplied in 1971. Since 1976 Sydney has received its gas from the Moomba and adjoining fields (Cooper Basin). Other major centres, particularly in Victoria and New South Wales, have also been connected to gas supplies and a 1500 kilometre pipeline is presently under construction to link the Amadeus Basin fields to Darwin.

In 1984-85, Australia's crude oil and condensate production were at record levels of 30.9 million m^3 (194.4 million barrels*), which averaged approximately 84 700 m^3 per day - an increase of 15% over output for the preceeding year. Production from the Bass Strait fields were at record levels and amounted to 86% of total production of crude oil and condensate. Three factors accounted for the record production from Bass Strait - a change in late 1983 in Commonwealth Government policy which conditionally permitted the export of indigenous crude oil, a reduction in the level of industrial disputes, and an effective increase in pipeline capacity by the use of a "drag reducer" chemical as an additive at the Halibut platform and at Longford stabilisation plant.

The 9% reduction in natural gas production from the Bass Strait fields and a marginal reduction of production of LPG was the result of decreased demand for gas following the coming on stream Loy Yang power station.

Imports of crude oil and other refinery feedstock were valued at $909 million, a 46% decrease from 1983/84.

* 1 m^3 = 6.29 barrels (bbls)

TABLE 2. COMMERCIAL PRODUCTION OF PETROLEUM IN AUSTRALIA, 1984-85(a)

Basin	Stabilised crude oil, condensate ($x10^6 m^3$)(c)	Naturally occurring LPG ($x10^6 m^3$)(c)	Natural gas (a) ($x10^9 m^3$)(c)
Amadeus	0.07	-	0.03
Gippsland	26.46	3.08	5.31
Carnarvon	1.32	-	1.18
Bowen/Surat	0.13	0.02	0.47
Cooper/Eromanga	2.88	0.74	5.23
Perth	0.01	-	0.74
Canning	0.05	-	-
	30.92	3.84	12.96(d)

Source: Survey & Statistics Section, Department of Resources & Energy.

(a) Fiscal year ending 30 June 1985. (b) Commercial sales plus field and plant usage.

(c) 1 m^3 = 6.29 barrels (liquids), 35.315 ft^3 (gas).

(d) Production of sales gas was 11.78 x $10^9 m^3$.

TABLE 3. CUMULATIVE COMMERCIAL PRODUCTION OF PETROLEUM IN AUSTRALIA TO 30 JUNE 1985

Basin	Stabilised crude oil, condensate ($x10^6 m^3$)	Naturally occurring LPG ($x10^6 m^3$)	Natural gas (a) ($x10^9 m^3$)
Amadeus	0.07	-	0.09
Gippsland	316.66	37.33	57.23
Carnarvon	33.18	0.05	4.15
Bowen/Surat	4.01	0.02	5.32
Cooper/Eromanga	5.44	2.90	38.06
Perth	0.18	0.0	11.02
Canning	0.05	-	-
Total	359.59	40.30	115.87

(a) Commercial sales plus field and plant usage.

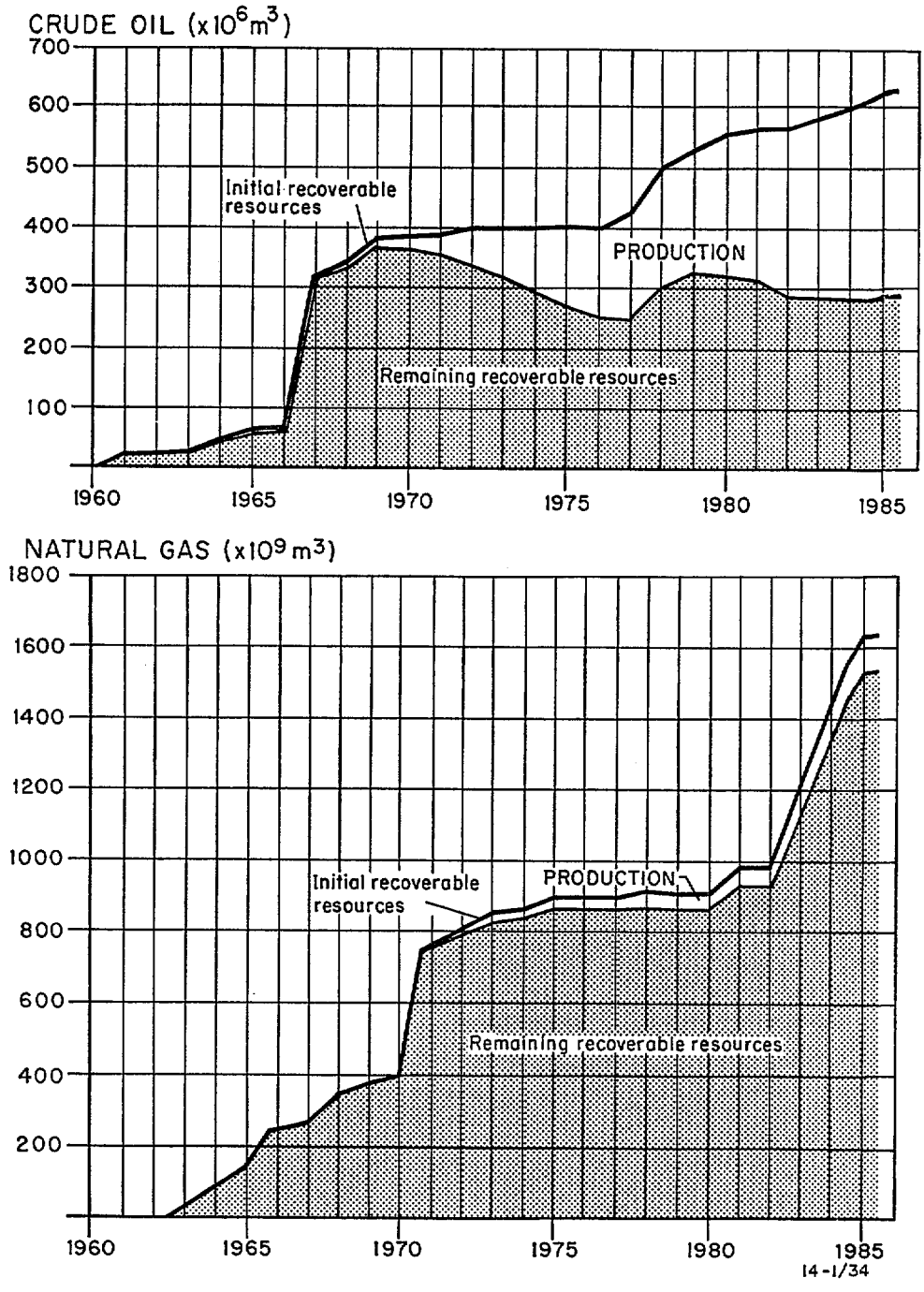


Fig. 4. Australia's demonstrated recoverable resources of crude oil and natural gas. Remaining recoverable resources at 30 June 1985 were: crude oil, 273 million m^3; natural gas (sales gas), 1521 billion m^3.

Summary of Petroleum Exploration in 1985

Statistics of petroleum exploration and development activity in recent years are given in Table 4 and Fig. 5. Discoveries of petroleum in 1985 are listed in Table 5.

The latest data indicate that some $760 million were spent on exploration in 1985, compared with $748 million in 1984 and the record level of $957 million in 1982. There were a total of 361 wells drilled (second highest level ever) in 1985 and exploration drilling accounted for 269 which is the highest number of exploration wells ever drilled in a single year in Australia. Of these exploration wells 226 were onshore and 43 offshore.

Onshore exploration drilling was concentrated in the Cooper/Eromanga, Bowen/Surat, Canning, Carnarvon, Gunnedah, Gippsland and Bass Basins which accounted for the 25 oil discoveries, 13 gas discoveries and 4 oil and gas discoveries. In addition, extensions to known fields in the Amadeus, Cooper/Eromanga, Bowen/Surat, Carnaravon and Canning Basins were successfully proved by appraisal drilling.

Offshore there were 5 oil and gas discoveries, one oil discovery, 2 gas discoveries and one unspecified hydrocarbon discovery. The Saladin discovery in the offshore Carnarvon Basin has upgraded the prospectivity of this area for oil where previous wildcat drilling proved unsuccessful. The Goodwyn No 7 appraisal well clarified the northeastern extent of the Goodwyn field and in addition slightly upgraded the condensate reserves of the field and enhanced the development potential of the field.

The Yolla No 1 well establisihed the oil and gas condensate potential of the Bass Basin sequence and in the Gippsland Basin, a small oilfield was discovered at Whiptail, both oil and gas at Angelfish and appraisal drilling at Snapper and Whiting encountered both oil and gas.

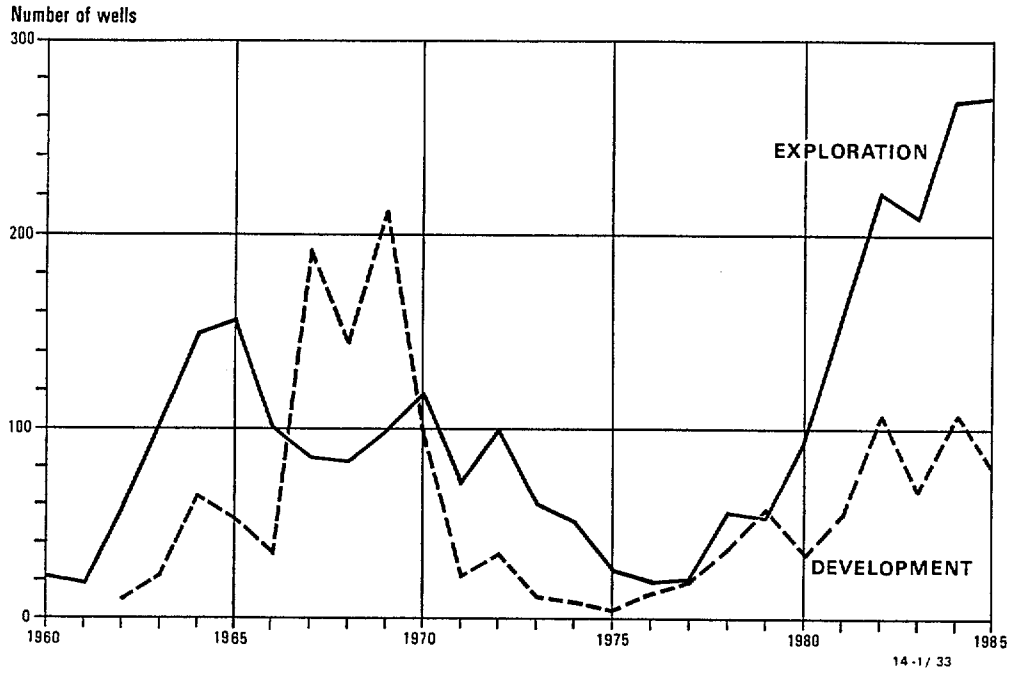
Preliminary figures for seismic survey work in 1985 (Table 4) indicate that a total of 90 169 line kilometres was surveyed - 42 448 offshore and 47 721 onshore which is 100% and 17% respectively higher than in 1984.

The total number of drilling rigs in Australia decreased by 4 from the end of 1984 to 52 at the end of 1985, land rigs (which include those used on offshore production platforms) decreased from 50 in 1984 to 47 in 1985. There were five offshore drilling vessels at the end of 1985 which is one less than at the end of 1984. However the availability of rigs is not expected to be a factor limiting exploration drilling in 1986.

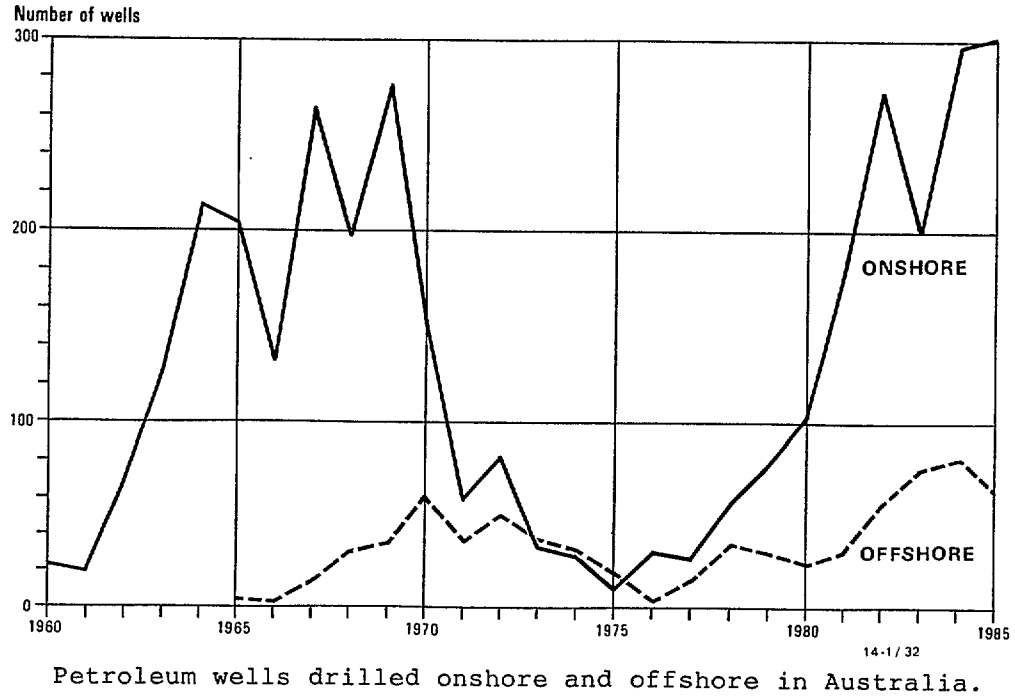
TABLE 4. PETROLEUM EXPLORATION AND DEVELOPMENT EXPENDITURE AND ACTIVITY, 1976-85

	Exploration expenditure ($ million)	Development (including production expenditure) ($ million)	Seismic surveys (line-km)	Exploration wells drilled	Development wells drilled
1976	49	94	94200	19	13
1977	82	114	11600	21	20
1978	112	216	44421	55	37
1979	222	236	41539	52	57
1980	290	358	55445	94	33
1981	458	944	74438	158	55
1982	957	1263	95253	221	108
1983	731	1022	38761	209	66
1984	748	734	61941	264	109
1985(a)	760	850	90169	269	92

(a) Preliminary



Petroleum exploration and development wells drilled in Australia.



Petroleum wells drilled onshore and offshore in Australia.

Fig. 5. Petroleum exploration and development, onshore and offshore wells drilled in Australia 1960-1985.

Summary of Petroleum Development in 1985

Development activity was below the levels achieved in 1982 and 1984 - 92 development wells were drilled, 75 onshore and 17 offshore. Development including production expenditure in 1985 is estimated to have been about $850 million.

The joint venture operators for the Bass Strait fields announced in 1985 plans for a new phase of development involving a total investment of about $1.8 billion. The first stage of this development is underway and involves the construction of a conventional steel jacket platform for exploitation of both oil and gas from the Bream field. A second conventional platform is planned for the Tuna oil field. Development of the Turrum gas field for the initial recovery of oil is under consideration. The smaller oil accumulations of Seahorse, Tarwhine, Perch and Dolphin could be developed around the use of either subsea completions or mini platforms with an appropriate pipeline configuration.

The new developments will result in a welcome addition to economic oil resources and although oil production from these fields will not greatly increase the level of production, it will help maintain the production rate as the older fields begin to decline.

In 1985 the first petroleum lease for the development of the North Paaratte gas field (onshore Otway Basin) was granted to supply natural gas to the town of Warrnambool. This is the first production in Victoria of natural gas from a source other than Bass Strait and it is hoped that further gas discoveries in this area may permit the expansion of this pipeline into a new western Victorian gas grid.

Further east in the onshore part of the Gippsland Basin the green sands oil deposits around Lakes Entrance are also being considered for development.

In the offshore Carnarvon Basin of Western Australia, near Barrow Island, construction work commenced in May 1985 for development of the Harriet oil field. By the end of the year the production platform was in place and limited production commenced in January 1986 at the rate of 1270 m^3 per day via a 6.5 kilometre submarine pipeline to Lowendal Island and from the island to the loading terminal via a 3.5 kilometre submarine pipeline.

The second phase of the North West Shelf gas project is to supply liquified natural gas (LNG) to Japan by 1989. In August 1985 approval was granted for the second phase following the completion of financial and contractual agreements. As well as the onshore LNG plant and associated storage and loading facilities, a second offshore production platform on the Goodwyn Field will be established between 1989 and 1992 to supplement production at the North Rankin 'A' platform 30 kilometres away. A third offshore platform on the North Rankin field is scheduled for 1997 to 2000. The LNG plant will use air rather than water for cooling and gas instead of steam to drive the compressors - a saving of about $1 billion in capital and operating costs. At the end of the year, the engineering design and procurement of major plant was underway and site preparation and construction in progress.

At Barrow Island a 42 well drilling program which combined exploration and development objectives was completed in 1985.

In the Northern Territory work commenced on the 1500 km Palm Valley to Darwin (Channel Island Power Station) natural gas pipeline which is due for completion in December 1986. By the end of the year, over 200 km of pipeline was laid between Darwin and Helling. The pipeline will also supply gas to the Katherine and Tennant Creek power stations. In 1985 the Northern Territory Government announced plans for the exploitation of the Petrel and Tern gas fields in the Bonaparte Basin. The gas project involves the development of either or both fields with the construction of drilling/production platforms, associated pipelines, a liquifaction plant and associated loading facilities near Port Darwin. This LNG project is based on a perceived potential market for 2.3×10^6 tonnes of LNG and is targetted at Korean and Japanese markets in the early to mid-1990s.

In Queensland, production from the Cooper-Eromanga Basin oilfields now accounts for about 90% of the crude oil produced in the State and further increases will occur as other fields are discovered and enter production. The majority of the oil is transported via the Jackson-Moonie-Brisbane pipeline and the remainder is trucked to Moonie and transferred into the pipeline whilst some oil is also supplied to the small refinery at Roma. Presently a new $2.5 million oil refinery is under construction at Eromanga to produce distillate from crude oil obtained from the nearby oilfields of

Bodalla South, Kenmore, Tintaburra and Talgeberry. The refinery has a maximum capacity of 238 m^3 per day and initially daily production will be limited to 140 m^3 per day. The Wallumbilla LPG processing plant was officially opened in Marach at a cost of $12 million and is producing about 35 000 tonnes of LPG a year. Another LPG processing plant at Kincora commenced operations in May at a cost of $6.2 million and will produce about 13 000 tonnes of LPG a year. The Queensland Government has publicly stated its determination that a natural gas pipeline will be built linking gas fields in the southwest with Gladstone on the coast through the Denison Trough area.

In the Cooper Basin of South Australia three new gas fields (Brumby, Mudrangie and Munkarie) and nine new oilfields (Biala, Big Lake, Gidgealpa, Limestone Creek, McKinlay, Muteroo, Narcoonowie, Wancoocha and Woolkina) commenced production. Since the completion of the Liquids Project a number of additions and modifications have been made - additional field compression installed to increase production rates at Daralingie, Kidman, Merimelia, Strzelecki, Tirrawarra and Toolachee. Crude oil from more recently discovered small fields is presently being trucked to Moomba at the rate of 600 m^3 per day.

DETAILS OF MAJOR ACTIVITIES IN 1985

ONSHORE BASINS

Amadeus Basin (NT)

Development drilling in the East Mereenie oil field accounted for 10 of the 15 wells drilled in the Amadeus Basin. Successful development drilling was also carried out in the Palm Valley gas field. The only exploration well (Waterhouse No 2) was plugged and abandoned without testing.

Construction commenced on the proposed 1500 kilometre gas pipeline between the Amadeus Basin gas fields and Darwin. The pipeline is scheduled for completion at the end of 1986.

Barrow Island (WA)

Exploration and development drilling ceased in October after completion of a 42 well drilling program during 1985.

Bowen/Surat Basins (Qld)

Wildcat drilling predominated in the Bowen and Surat Basins, accounting for 33 of the 39 wells drilled during the year. Nine new field discoveries and one new pool discovery were made. The Triassic Showgrounds Sandstone was the prime reservoir, providing oil discoveries in four new fields, oil condensate in one new field, and a new pool gas discovery in the Raslie Field. The most exciting of these discoveries was Fairymount No 1 which flowed approximately 320 m^3/d on a drill stem test. Louise No 1 flowed 120 m^3/d and McWhirter No 1 24 m^3/d plus small quantities of gas. Three small gas discoveries were made in the Jurassic Precipice Sandstone. Flows of 136 000 m^3/d and 121 000 m^3/d were recorded in the Merrit and Mayfield fields respectively, and a flow of 37 000 m^3/d28 MMCFD in the Deepwater field.

Successful appraisal drilling carried out in the Carbean gas field discovered in 1984. The follow up well to the Washpool No 1 discovery was unsuccessful, and Washpool No 2 was plugged and abandoned without finding significant shows.

Canning Basin (WA)

Twenty-three wells were drilled in 1985, of which one, West Terrace No 1, was an oil discovery. Three of the wells were successful appraisal wells drilled in the Blina and Sundown fields. Four of the unsuccessful wells recorded shows of hydrocarbons. A total of 9533.7 line km of new seismic traverses were recorded.

Carnarvon Basin (WA) (including Pilbara Basin)

Five wells were drilled during 1985, all were plugged and abandoned.

Clarence-Moreton Basin (QLD/NSW)

Rappville No 1 well was plugged and abandoned after failing to find significant hydrocarbons. The well was one of the few wells to test the New South Wales part of the basin. Recent drilling activity has been concentrated in the Queensland part of the basin.

Cooper/Eromanga Basins (QLD/SA)

Activity in the Cooper and Eromanga Basins dominated onshore exploration and development drilling in 1985. 140 wells were drilled within or near the limits of the Cooper Basin. At the end of 1985 there were 17 new oil field discoveries and 9 new gas field discoveries; 5 new oil pool discoveries and 1 gas pool discovery had also been made. All the oil discoveries were in Eromanga Basin reservoirs and the gas discoveries were confined to Cooper Basin reservoirs. Several wells have multiple pools and two wells (Meranji No 1 and Epsilon No 3) contain oil and gas pools.

COOPER/EROMANGA DISCOVERIES

	No. wells	No. pools
New field discoveries:		
Oil	17	26
Gas	9	14
New pool discoveries:		
Oil	5	6
Gas	1	1

Intensive drilling along the eastern edge of the Cooper Basin has resulted in the discovery of 8 new small Eromanga Basin fields including Talgeberry, northeast of the Jackson field, which had the largest Wyandra Sandstone oil flow yet (405 m^3/d). Concentrated wildcat drilling, mainly in the southern Cooper Basin, has yielded several new small oil and gas fields in the South Australia and Queensland parts of the Cooper Basin. Cook No 1 in a sparsely drilled part of the Cooper Basin flowed 143 m^3/d from the Hutton Sandstone. Watson South No 1 flowed 495 m^3/d from the Hutton Sandstone, and Muteroo No 1 an appraisal well recorded a flow of 1588 m^3/d, the largest onshore Australian oil flow rate. Aroona No 1 and Bagundi No 1 reported good gas flows of 266 000 m^3/d and 238 000 m^3/d respectively from the main Cooper Basin reservoirs.

Seventy-six appraisal/development wells were drilled; this is over half the total number of wells drilled in the Cooper Basin area. The Tirrawarra field, in which 9 out of the 10 wells drilled this year were successful, was the most active field. Less successful was the Limestone Creek field drilling where 3 out of the 5 wells drilled were plugged and abandoned, decreasing the possible field reserves.

Eromanga Basin (QLD/SA/NT/NSW)

Tests north and south of the Cooper Basin have yet to find significant amounts of hydrocarbons, however the recovery of 9 m of oil from the Hutton Sandstone in Corona No 1 gives some encouragement to further exploration in the northern Eromanga Basin.

Stratigraphic drilling was undertaken on the Thargomindah Shelf by the Geological Survey of Queensland and in the southern part of the Eromanga Basin in northwestern New South Wales by the New South Wales Mines Department.

Eromanga/Galilee Basins (QLD)

Seven wildcat wells were drilled in the Galilee Basin with targets primarily in the overlying Eromanga Basin sequence. All seven wells were plugged and abandoned without significant indications of hydrocarbons.

Eromanga/Pedirka Basins (NT/SA)

Appraisal drilling in the western Eromanga Basin was also disappointing. Poolowanna No 2, a follow up well to the 1977 Poolowanna No 1 oil discovery, was plugged and abandoned without encountering significant hydrocarbons. Four wildcat wells drilled in the Pedirka Basin were similarly unsuccessful.

Gippsland Basin (VIC)

Five shallow wells were drilled onshore in the Gippsland Basin. Three of these were near the basin's northern margin (Comely No 1, Fairhope No 1, and Paynesville No 1). Paynesville No 1 encountered gas shows, but all three wells were plugged and abandoned. Two unsuccessful wells were drilled further south in the basin (Wrixdale No 1, and Burang No 1).

Gunnedah Basin (NSW)

1985 saw a revival of drilling interest in the Gunnedah Basin. Wilga Park No 1 flowed 28 000 m^3/d of gas during testing. It is the first gas discovery in the Gunnedah Basin.

Officer Basin (SA/WA)

A series of cored exploration wells were commenced in the eastern Officer Basin. These stratigraphic holes are testing the Upper Proterozoic and Cambrian sections of the basin. Giles No 1 and Ungoolya No 1 were fully cored before being plugged and abandoned.

Otway Basin (VIC/SA)

Two unsuccessful exploration wells were drilled in the Otway Basin, both in Victoria. Barton Corner No 1 was drilled southeast of Warrnambool to a depth of 2100 m, and Fahley No 1 was drilled west of Portland to a depth of 3211 m. No hydrocarbons were reported in either well.

Perth Basin (WA)

Four wells were drilled during 1985, all were plugged and abandoned; 2 of the wells recorded gas shows. A total of 1180.5 line km of new seismic was recorded.

Sydney Basin (NSW)

Four wells by AGL in the southern Sydney Basin are the first hydrocarbon drilling in the basin in several years. All four wells were plugged and abandoned. Cut Hill No 1 flowed minor amounts of gas (2400 m^3/d and 255 m^3/d from the Cole Vale sequence.

Table 5. Discoveries of Petroleum in 1985 (a)

BASIN	WELL NAME	OPERATOR	STATE	NATURE OF DISCOVERY	PRODUCTIVE FORMATION	CLASSI-FICATION	REMARKS
				ONSHORE			
Bowen/Surat							
	Deepwater No 1	AAR	Qld	Gas	Precipice Ss	NFD	
	Eluanbrook No 1	Pancontinental	Qld	Oil/Cond	Showgrounds Ss	NFD	
	Fairymount No 1	Sydney Oil	Qld	Oil	Showgrounds Ss	NFD	
	Louise No 1	Bridge	Qld	Oil	Showgrounds Ss	NFD	
	Mayfield No 1	AAR	Qld	Gas	Precipice Ss	NFD	
	McWhirter No 1	Sunland	Qld	Oil	Showgrounds Ss	NFD	
	Merrit No 1	AAR	Qld	Gas	Precipice Ss	NFD	
	Norwood No 1	Sunland	Qld	Gas	Tinowon Fm	*	Suspended as a possible future producer
	Raslie No 6	AAR	Qld	Gas	Showgrounds Ss	NPD	
	Washpool No 1	Hartogen	Qld	Oil	Showgrounds Ss	NFD	
Canning							
	West Terrace No 1	Home	WA	Oil	Grant Fm	NFD	
Cooper/Eromanga							
	Alwyn No 1	Delhi	SA	Oil	Murta Mbr	NFD	
	Aroona No 1	Delhi	SA	Gas	Toolachee Fm Patchawarra Fm	NFD	
	Bagundi No 1	Delhi	SA	Gas	Toolachee Fm Patchawarra Fm	NFD	
	Baratta No 1	Delhi	SA	Gas	Patchawarra Fm	NFD	
	Bodalla South No 1	Lasmo	Qld	Oil	basal Jurassic	NPD	
	Cook No 1	Delhi	Qld	Oil	Hutton Ss	NFD	
	Epsilon No 3	Delhi	Qld	Oil Gas	Birkhead Fm Nappamerri Fm	NPD	Appraisal well completed for gas only in Nappamerri & Toolachee Fms

(a) Preliminary subject to revision.
*To be determined

BASIN	WELL NAME	OPERATOR	STATE	NATURE OF DISCOVERY	PRODUCTIVE FORMATION	CLASSI-FICATION	REMARKS
			ONSHORE - Cont				
Cooper/Eromanga (Cont)							
	Gidgealpa No 24	Delhi	SA	Oil	basal Namur Mbr	NPD	Development well completed in basal Namur Mbr and Hutton Ss
	Glenvale No 1	Lasmo	Qld	Oil	Westbourne Fm	NFD	
	Gooranie No 1	Delhi	SA	Gas	Patchawarra Fm	NFD	
	Jena No 1	Delhi	SA	Oil	Murta Mbr	NFD	
	Kenmore No 1	Lasmo	Qld	Oil	Hutton Ss basal Jurassic	NFD	
	Koora No 1	Pancontinental	Qld	Oil	Adori Ss	NFD	
	Koora No 2	Pancontinental	Qld	Oil	Murta Mbr Birkhead Fm	NPD	
	Kooroopa No 1	Hartogen	Qld	Oil	Adori Ss	NFD	
	Lepena No 1	Delhi	SA	Gas	Toolachee Fm Epsilon Fm	NFD	
	Meranji No 1	Delhi	SA	Oil Gas	Namur Mbr Toolachee Fm Patchawarra Fm	NFD	
	Mooliampah No 1	Delhi	Qld	Oil	Murta Mbr Namur Mbr Adori Ss	NFD	
	Moothandella No 3	Elf Aquitaine	Qld	Oil	Westbourne Fm	NPD	Suspended for fraccing
	Mt Howitt No 2	Delhi	Qld	Gas	Toolachee Fm	NFD	

BASIN	WELL NAME	OPERATOR	STATE	NATURE OF DISCOVERY	PRODUCTIVE FORMATION	CLASSI-FICATION	REMARKS
				ONSHORE			
Cooper/Eromanga (Cont)							
	Muteroo No 1	Delhi	SA	Oil	Hutton Ss	NFD	
	Nulla No 1	Delhi	SA	Gas	Patchawarra Fm	NFD	
	Takyah No 1	Hartogen	Qld	Oil	Murta Mbr Birkhead Fm	NFD	
	Talgeberry No 1	Hartogen	Qld	Oil	Murta Mbr Transition Bd Birkhead Fm	NFD	
	Toobunyah No 1	Hartogen	Qld	Oil	Birkhead Fm Hutton Ss	NFD	
	Ulandi No 1	Delhi	SA	Oil	Murta Mbr Birkhead Fm Hutton Ss	NFD	
	Watson No 1	Delhi	Qld	Oil	Hutton Ss	NFD	
	Watson South No 1	Delhi	Qld	Oil	Hutton Ss	NFD	
	Winna No 1	Pancontinental	Qld	Oil	Murta Mbr	NFD	
	Wippo No 1	Delhi	Qld	Gas/cond	Toolachee Fm Patchawarra Fm	NFD	
Gunnedah							
	Wilga Park No 1	Hartogen	NSW	Gas	Porcupine Fm	NFD	

BASIN	WELL NAME	OPERATOR	STATE	NATURE OF DISCOVERY	PRODUCTIVE HORIZON	CLASSI-FICATION	REMARKS
				OFFSHORE			
Bass							
	Tilana No 1	Amoco	Tas	?	Eastern View Coal Measures	NFD	Hydrocarbons indicated during logging, well suffered formation damage. Testing inconclusive.
	Yolla No 1	Amoco	Tas	Oil Gas/cond	Eastern View Coal Measures	NFD	
Carnarvon							
	Elder No 1	Wesminco	WA	Gas/cond	Mungaroo	NFD	
	Montague No 1	Woodside	WA	Gas	Mungaroo	NFD	
	Saladin No 1	Wapet	WA	Oil Gas	Barrow Group Barrow Group	NFD	
Gippsland							
	Angelfish No 1	Esso	Vic	Oil Gas	Latrobe Group Latrobe Group	NFD	
	Snapper No 5	Esso	Vic	Oil Gas	Latrobe Group Latrobe Group	NPD	
	Whiptail No 1A	Esso	Vic	Oil Gas	Latrobe Group	NFD	Suspended as a potential subsea completion
	Whiting No 2	Esso	Vic	Oil Gas	Latrobe Group Latrobe Group	NPD	

OFFSHORE BASINS

Bass Basin (TAS/VIC)

Three exploration wells were drilled in Tasmanian waters. Yolla No 1 was suspended as a gas/condensate and oil discovery in the Eastern View Coal Measures. Testing over two intervals resulted in a gas flow of 420 000 m^3/d accompanied by condensate at a rate of 92.2 m^3/d from the lower interval, and gas at a rate of 330 000 m^3/d accompanied by 148.3 m^3/d condensate from the upper interval. Oil (44.5° api) at a rate of 47.7 m^3/d was also recovered from the upper zone.

In Tilana No 1 wireline log interpretation indicated a hydrocarabon discovery in the Eastern View Coal Measures. However, the results of production testing were inconclusive, and suggestive of formation damage. Korkah No 1 was plugged and abandoned as a dry hole. Three marine seismic surveys were completed in the Bass Basin in 1985.

Bonaparte Basin (WA/NT)

The offshore part of the Bonaparte Basin was an active area for exploration during 1985. Six wells were completed during the year, one well, Skua No 2, was still drilling at the end of the year. No discoveries were recorded but two wells, Barnett No 1 and Swift No 1, recorded shows of hydrocarbons. A total of 10 154 line km of new seismic traverse was recorded.

Four new exploration permits were awarded in the Timor Sea, with a total commitment of 32 wells and 18 750 km of seismic traverse over the first six year period.

Browse Basin (WA)

No wells were drilled in the Browse Basin, but 800.7 line km of new seismic traverse was recorded.

Carnarvon Basin (WA)

The offshore part of the Carnarvon Basin was the major focus of exploration and appraisal drilling in 1985. A total of 19 wells were completed to the end of the year. Significant discoveries were made at Montague No 1 (gas), north-northeast of the North Rankin field, which flowed 510 000 x $10^3 m^3$/d of gas during production testing, Elder No 1 (gas/ condensate) 1.4 km south-southeast of the Chervil field which flowed gas at a rate of 244 000 m^3/d, and Saladin No 1, 22 km southwest of the Chervil oil field which flowed oil at 945 m^3/d and gas at 43 000. Harriet Nos C1, C2 and Lenita Nos 2 and 3 were successful appraisal wells in the Harriet-Lenita field.

A total of three wells were successfully completed in the North Rankin gas field.

Gippsland Basin (VIC/TAS)

Eleven exploration wells, including six appraisal wells, were completed.

Hydrocarbons were encountered in Whiptail No 1A some 2½ km west of the Barracouta field, and Angelfish No 1 some 8 km southwest of the Tuna field. Wireline tests in Whiptail No 1A recovered oil, and the well has been suspended as a possible subsea completion. In Angelfish No 1 wireline tests recovered oil and gas. Snapper No 5 and Whiting No 2 were both successful appraisal wells, and possible new pool discoveries. Perch No 2 was a successful appraisal well in the small Perch oil field discovered in 1968, but Omeo No 2 drilled to further delineate Omeo No 1 (1982/83) hydrocarbon intersections, was a dry hole.

Five development wells were drilled from the Flounder platform, 6 from the Cobia platform, and 7 from the Fortescue platform during the year. Three marine seismic surveys were completed.

Great Australian Bight Basin (SA/WA)

No wells were drilled in this basin in 1985. A site survey for the Duntroon No 1 well was undertaken.

Otway Basin (SA/VIC)

No wells were drilled in the Otway Basin in 1985. One marine seismic survey was completed.

REFERENCES AND FURTHER READING

NATIONAL ENERGY ADVISORY COMMITTEE, 1981 - Australia's Energy Resources, 1980, NEAC Report No 14, 24-36. Australian Government Publishing Service, Canberra.

FORMAN, D.J., 1984a - Australia's prospects for future discoveries of petroleum. In Stuart T. Watson (Ed), Transactions of the Third Circum-Pacific Energy and Mineral Resources Conference. 139-144.

FORMAN, D.J., 1984b - The future outlook for petroleum in Australia in 1984 - speaking notes and slides. Bureau of Mineral Resources, Australia Record 1984/21.

APPENDIX I

WELLS AND METRES DRILLED - AUSTRALIA 1970-85

WELLS DRILLED

Year	Exploration			Development			Totals	
	Onshore	Offshore	Sub-total	Onshore	Offshore	Sub-total	for year	Cumulative
To 1970	1 396	87	1 483	768	59	827	-	2 310
1971	54	18	72	4	18	22	94	2 404
1972	62	38	100	21	12	33	133	2 537
1973	29	31	60	5	6	11	71	2 608
1974	20	31	51	8	-	8	59	2 667
1975	6	19	25	4	-	4	29	2 696
1976	16	3	19	13	-	13	32	2 728
1977	8	13	21	18	2	20	41	2 769
1978	33	22	55	24	13	37	92	2 861
1979	31	21	52	48	9	57	109	2 970
1980	77	17	94	26	7	33	127	3 097
1981	142	16	158	41	14	55	213	3 310
1982	177	44	221	95	13	108	329	3 639
1983	160	49	209	40	26	66	275	3 914
1984	221	43	264	71	38	109	373	4 287
1985*	226	43	269	75	17	92	361	4 648

* Preliminary figures subject to revision

METRES DRILLED

Year	Exploration		Development		Totals	
	Onshore	Offshore	Onshore	Offshore	Yearly	Cumulative
To 1970	1 794 911	272 994	776 656	148 654	-	2 993 215
1971	108 683	59 860	9 359	46 453	224 355	3 217 570
1972	107 002	117 429	47 365	23 643	295 439	3 513 009
1973	50 301	80 616	11 347	9 644	151 908	3 664 917
1974	37 206	84 078	15 531	-	136 815	3 801 732
1975	12 579	35 658	10 351	-	58 588	3 860 320
1976	32 393	15 119	24 863	-	72 375	3 932 695
1977	23 675	36 827	44 508	6 419	111 429	4 044 124
1978	52 709	56 900	56 332	42 493	208 434	4 252 558
1979	59 635	76 424	44 110	36 612	216 781	4 469 339
1980	137 296	62 012	41 337	27 142	267 787	4 737 126
1981	277 258	45 126	77 602	34 473	434 459	5 171 585
1982	324 288	128 213	154 030	28 379	634 910	5 806 495
1983	273 571	137 472	82 019	86 425	579 487	6 385 982
1984	403 329	113 486	147 294	137 645	801 754	7 187 736
1985*	405 019	104 096	124 499	61 304	694 918	7 882 654

* Preliminary figures subject to revision

APPENDIX 2

EVENTS IN PETROLEUM EXPLORATION, DEVELOPMENT AND PRODUCTION IN AUSTRALIA

1839 Commander Stokes discovers "bitumen", Victoria River NT.

1885 Gas discovered in Narrabeen Nos 1 and 2 during search for coal in Sydney Basin NSW.

1892 First exploration drilling for petroleum: Alfred Flat, Coorong area, SA.

1900 Roma (Qld) No 2 town water bore encounters natural gas.

1907 First gas appraisal well: Roma, Qld, caught fire in 1908 and extinguished with difficulty.

1908 Roma streets lit by gas for 10 days.

1924 Lakes Entrance oil field discovered (Vic).

1930 Shafts sunk at Lakes Entrance (Vic) to mine heavy oil.

1953 Rough Range No 1 (WA) flows oil 550 barrels per day.

1954 AAO finds gas in the Hospital Hill field, Roma, Qld.

1956 BMR aeromagnetic program in Bass Strait indicates existence of sedimentary basin offshore Gippsland (Vic).

1957 Commonwealth Government introduces Petroleum Search Subsidy scheme.

1958 BMR seismic survey indicates possible drilling targets at Cabawin and Moonie.

1959 Frome-Broken-Hill's Port Campbell No 1 (Vic) produces strong gas flow on test.

1960 Associated Group discover Timbury Hills and Pickanjinnie gas fields near Roma.

1961 Cabawin No 1 (Qld) drilled by Union-AOG, discovers significant gas and condensate. Moonie No 1 (Qld) discovers oil. First sustained commercial use of natural gas in Australia at Roma from Hospital Hill and Timbury Hills gas fields.

1963 Associated Group discovers the Richmond oil and gas field near Roma.

1964 First offshore well in Australia, Esso Gippsland Shelf No 1 (later renamed Barracouta No 1) discovers gas in 46 m of water offshore Victoria (Bass Strait). Santos's Gidgealpa No 2 discovers gas in the Cooper Basin, SA. Wapet's Barrow Island No 1 (WA) and Yardarino No 1 (Perth Basin, WA) discover oil. Mereenie No 1 (NT) discovers oil and gas. Moonie oilfield starts commercial production.

1965 Palm Valley No 1 (NT) discovers gas. Gingin No 1 (WA) discovers gas.

1966 Delhi-Santos discover the Moomba gas field in Cooper Basin (SA) and Esso/BHP discover the Marlin gas field offshore Victoria. Dongara No 1 (WA) discovers gas in the Perth Basin.

1967 Esso/BHP discover major oilfields at Halibut and Kingfish in Bass Strait.

1968 Esso/BHP discover the Tuna oil and gas field in Bass Strait. Mondarra No 1 (WA) discovers gas. Commonwealth (Submerged Lands) Acts come into force on 1 April.

1969 Roma-Brisbane gas pipeline operational March 1969. Melbourne supplied with natural gas from Bass Strait fields in April 1969. Adelaide supplied with natural gas from Gidgealpa/Moomba in November 1969. Crude oil production commenced in Bass Strait fields. Esso/BHP discover Mackerel oil field in Bass Strait.

1970 Bridge Oil discovers the Tirrawarra oil and gas field in the Cooper Basin SA, and the Boxleigh gas field in the Bowen Basin Qld.

1971 The North Rankin and Scott Reef gas fields and the Rankin and Goodwin oil and gas fields on the Northwest Shelf discovered. Natural gas production from the Dongara field for Perth, Kwinana, and Pinjarra commenced in October 1971. Walyering No 1 (WA) discovers gas.

1972 Esso/BHP discover the Cobia oil field NW of the Mackerel oil field in Bass Strait. Delhi/Santos discover the Dullingari and Della gas fields in the Cooper Basin. Mondara, Gingin, and Walyering gas fields began producing into Perth-Kwinana-Pinjarra pipeline.

1974 Operations under the terms of the Petroleum Search Subsidy Act terminated with effect from 30 June 1974.

1975 Commonwealth Government's "new oil" pricing policy announced on 14 September 1975.

1977 Esso/BHP drill Cobia No 2 in Bass Strait and prepare the well for completion as Australia's first sub-sea completion.

1978 Wapet announces further Barrow Island drilling spurred on by "new oil" policy. Delhi-Santos discover oil in Strzelecki No 3 (SA) in the Eromanga Basin. In Bass Strait Esso Fortescue Nos 2 and 3 confirm Fortescue field discovery and Seahorse No 1 discovers oil.

1979 Beach Petroleum discovers gas at North Paaratte No 1 onshore in the Otway Basin. Exploration in the deep water on the Exmouth Plateau starts and Esso makes a major gas discovery there in Scarborough No 1 in 912 m of water. Oil production begins from Cobia No 2 subsea completion.

1980 Beach Petroleum finds gas in Grumby No 1 and Wallaby Creek No 1 in the Otway Basin (Vic). Gas discovered at Woodada No 1 in the Perth Basin (WA).

1981 Hudbay Oil discovers oil in West Seahorse No 1 in Bass Strait. Esso discovers oil in Yellowtail No 1 and Tarwhine No 1 in Bass Strait. Delhi finds oil in Jackson No 1 in Eromanga Basin in Qld. Home Oil discovers oil in Blina No 1 in the Canning Basin (WA), and Wapet makes a major offshore gas discovery at Gorgon No 1 in the offshore Carnarvon Basin (WA). In all there are 8 oil and 20 gas discoveries in 1981.

1982 Major development of new Bass Strait fields by Esso/BHP. North West Shelf gas project construction phase commences. Major gas discovery in deep water at North Scott Reef. Production commenced from Woodada gas field in Perth Basin. Home Energy discovers oil in Sundown-1 in Canning Basin.

1983 BHP discovers Jabiru oil field in the Bonaparte Basin. Palm Valley (NT) gas supply to Alice Springs commences. First Commercial oil production from Blina field (WA). Significant oil discoveries in Harriet No 1 (Occidental) and South Pepper No 1, North Herald No 1, Chervil No 1 and South Chervil No 1 (Mesa-Wesminco), all located near Barrow Island (WA). First shipment of liquids from Cooper/Eromanga Basin from Port Bonython facility in SA. First production of Fortescue oil (Vic). Several oil discoveries in Jackson area (Qld).

1984 Record year for total wells drilled - 374. Significant offshore discoveries in Challis (BHP), Talisman (Marathon) and Lenita (Occidental) wells. Numerous small oil and gas discoveries in Cooper/Eromanga Basins (Delhi/Santos et al) - record flows from Wancoocha No 2. Oil and gas discoveries in Gippsland Basin at Tuna, Grunter, Manta, Chimaera, West Fortescue and Veilfin. First phase North West Shelf gas completed - Perth market supplied. Oil production commenced from Jackson to Moonie and Mereenie to Alice Springs. Oil production licence granted for Mt Horner field (Perth Basin). Cooper Basin Liquids Scheme completed (oil, LPG, condensate).

1985 Record year for exploration drilling - 269 wells. Cooper/Eromanga Basins record 29 discoveries of oil and gas or both. Significant offshore gas discoveries at Saladin and Montague in the Carnarvon Basin. Oil and gas at Angelfish, Snapper, Whiptail and Whiting in

the Gippsland Basin and at Yolla in the Bass Basin. Construction of LNG phase on North West Shelf commenced. New development plans for Bass Strait fields announced - construction of Bream platform underway. Development of North Paaratte onshore gas field underway in Otway Basin to supply Warrnambool. Development of Harriet oilfield in offshore Carnarvon Basin nearing completion. Construction of Alice Springs/Darwin natural gas pipeline commenced. The Wallaumbilla and Kincora LPG processing plants in Surat Basin commenced production. Mini-refinery (distillate) at Eromanga under construction. In Cooper Basin of South Australia three more gas fields and nine oilfields commenced production.