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Petroleum Exploration Activity in Australia

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by
L. W. Williams

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PETROLEUM EXPLORATION ACTIVITY IN AUSTRALIA

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ABSTRACT

The highlight of the 1970 petroleum exploration in Australia was the number of onshore discoveries. These were mostly gas and were mainly in two basins. A success ratio of about one discovery in eight exploration wells was achieved. The offshore results were disappointing with no major discoveries recorded.

An analysis of the level of exploration activity up to the end of 1970 shows onshore exploration continuing at a steady rate for the last three years, but a small decrease in offshore activity was apparent in 1970. However, estimates of activity in 1971 indicate that a decrease in the level of activity can be expected this year and that this decrease may intensify if oil discoveries are not made.

INTRODUCTION

This paper is based largely on information kindly supplied by exploration companies whose co-operation is gratefully acknowledged. It is presented with the permission of the Director, Bureau of Mineral Resources, Geology and Geophysics, Canberra A.C.T.

EXPLORATION IN 1970

Exploration activity was spread widely throughout most of the sedimentary basins during 1970, although the level of activity varied considerably among them.

The onshore areas which received most attention were the Cooper, Surat and Canning Basins. Papua can probably also be included in this category on the basis of expenditure although geophysical coverage and number of wells were not high. Other areas which had received little recent attention and which were explored again in 1970 were the Laura, eastern Officer and Arckaringa Basins and the Toko Syncline. Little or no work was done in the Amadeus, Adavale and Carnarvon (onshore) Basins.

Offshore activity was concentrated mainly off the northwest of the continent and, during the first part of the year, in Bass Strait. Some geophysics was carried out in other areas.

The outstanding result of exploration during 1970 was the discovery of several onshore gas fields. The most notable of these were in the Cooper Basin, where large flows were recorded, and in the Surat Basin. These discoveries were in addition to other wells which increased the known reserves in several fields.

The Cooper Basin discoveries were at Della No. 1, Strzelecki No. 1, Merrimelia No. 5, Packsaddle No. 1, Mudrangie No. 1 and Tirrawarra No. 1. In the Surat Basin new discoveries were made at Boxleigh No. 1, Euthulla No. 1, Westlands No. 1, Kincora Northeast No. 1 and Noorindoo No. 1. A small gas flow was also recorded from Hogarth No. 2 in the Clarence-Moreton Basin.

A significant onshore oil discovery was made at Tirrawarra No. 1 where a flow of over 600 b.p.d. was encountered. This discovery requires confirmation, but is very interesting in that it is the first oil flow in the Cooper Basin.

Offshore exploration was again very disappointing with none of the 26 wells which reached total depth discovering commercial petroleum. However, a considerable amount of seismic work was carried out, particularly on the Northwest Shelf and in the Timor Sea, and there is no shortage of drilling targets in these areas.

It is interesting to note in comparison with the offshore lack of success, that approximately one in eight of the onshore exploration wells drilled in 1970 encountered a significant new accumulation of petroleum.

LEVEL OF ACTIVITY

There are various indicators which may be used to measure the level of exploration activity and, for many reasons, these need not necessarily give consistent assessments of trends. This has happened recently in Australia.

One indicator is the number of active exploration units, which are shown in Figure 1. The upper graph shows the annual average number of drilling rigs engaged on exploration from 1965 to 1970 with a breakdown into onshore and offshore rigs. The lower graph shows the same information for seismic crews.

From 1966 to 1968 the increase in numbers of active offshore rigs roughly balanced the decrease in numbers of onshore rigs and it is only in 1970 that we see a decrease in the average number of rigs both onshore and offshore. In 1970, the average number of active exploration rigs was about half the average number in 1965, which was the peak year for rig activity in Australia.

The lower graph shows that the average number of active seismic crews fell from 1965, which was also the peak year for seismic activity, until 1968 and then after a minor recovery in 1969 dropped slightly in 1970. This drop in 1970 in total crews is due to the decrease in the number of offshore crews, which has fallen steadily since 1966. The average number of onshore crews was about the same in 1970 as in 1969.

The number of idle rigs in the country and the fact that drilling contractors are sending rigs overseas have been mentioned as indications that the level of exploration is falling off. This argument is not valid. During the last two years there has been an average of 31 onshore rigs available in Australia. Several of these have not worked at all during the period and many others have worked for less than half the time. This indicates a surplus of drilling rigs and, while the number of active drilling rigs may be considered to be one of the indicators of level of exploration activity, the ratio of active rigs to available rigs should certainly not be. It must also be remembered that the same rigs can be used on exploration and development projects.

The next indicator that can be used is the amount of exploration work done by these active units. This is very difficult to assess on a consistent basis for seismic crews and so I have confined this part of this analysis to drilling rigs. Figure 2a shows annual exploration footage drilled and Figure 2b shows the number of exploration wells for the same period, 1965 to 1970.

The total exploration footage drilled (onshore and offshore) fell from a peak in 1965 until 1967 and has increased each year since. The same pattern applies to number of wells. We see a similar pattern also in onshore footage and number of wells except that the minimum was in 1968, and only in the offshore is a different pattern apparent. The shape of the curves for number of offshore wells and exploration footage drilled is similar to that for number of active offshore rigs (Fig. 1). Both the number of offshore wells and footage drilled increased from 1966 to 1969 and then dropped off in 1970. This is an indication of what we can expect in 1971.

If we consider the totals for onshore and offshore in Figures 2a and 2b, this indicator shows that the level of drilling activity has increased over the last three years.

The third indicator which may be used is expenditure. Figure 3 shows annual exploration expenditures and the breakdown into onshore and offshore expenditures for the years 1965 to 1969. Expenditure figures for 1970 are not yet available. The total expenditure figure does not reflect the 1965 peak for number of active units, footage drilled and number of wells. In fact exploration expenditure has increased each year. Figure 3 shows quite clearly that this increase is entirely due to increased expenditure offshore. Onshore expenditure dropped sharply until 1967 and remained reasonably constant for the next two years.

To summarise what these various indicators show, it is desirable to consider onshore and offshore separately. Every indicator shows the recent onshore exploration effort to be considerably less than in 1965. However, during the last three years, they show different trends. Without putting emphasis on any one indicator it is reasonable to conclude that the onshore exploration effort has been reasonably steady or even increasing slightly since 1968.

All the offshore indicators (except number of seismic crews) show a steady increase until 1969. There is then a drop in rig activity, footage drilled and number of wells in 1970. This drop could be significant.

PREDICTIONS FOR 1971

The indicators of the level of exploration activity which have been discussed earlier show that onshore activity has been fairly steady over the last few years but that offshore activity may have begun to fall off. However, it is far more important to consider what is likely to happen than what has happened and the figures which I have for 1971 do not present a very bright picture.

Considering onshore exploration drilling first, there is unlikely to be an increase in the number of wells and there may be a decrease of as much as 10%. Another significant fact is that over 60% of this exploration drilling in 1971 will be in the Cooper and Surat Basins.

Offshore exploration drilling will also be down, possibly by about 20%. This figure is very difficult to estimate as it is so dependent on rig availability. It could be more or less than the 20% depending on whether, and when, an additional offshore rig is brought into the country.

Offshore seismic activity will continue at the relatively low level of the last year or two.

The greatest change is likely to be in onshore seismic activity. It appears that the amount of seismic work to be done in 1971 could be down by about 40% compared with 1970. This will be a drastic reduction and the level of activity will then be close to the lowest we have seen for a decade.

This reduction in seismic activity is particularly significant because it means that fewer targets will be found for later drilling. It can therefore be taken as an indication that a further reduction in onshore exploration drilling activity may occur in later years unless something happens to reverse the trend.

The analysis of various indicators of the level of exploration over the last few years and what I can predict about 1971 indicate that offshore activity has passed a peak and is starting to decline. Onshore, although exploration drilling has proceeded at a steady, if modest, pace the expected decrease in seismic activity and possible decrease in drilling indicate that a decline in onshore activity is also starting.

The big danger at this time is that the indications which we now see of a decline are the start of a major rundown in the level of exploration activity. Once such a rundown starts it is very difficult to stop because it is self supporting. The fewer wells that are drilled the less chance there is of a discovery and this lack of success becomes the reason for further reductions in the level of exploration.

In 1967-1968 we saw a similar reduction in onshore exploration activity which was halted, or perhaps slightly reversed, in 1969 and 1970. It may be argued that a similar thing could happen again but there is one important difference. The revival in 1969 and 1970 was largely due to the many new exploration companies which were floated and the farmouts which they were able to acquire. The same thing is not likely to happen in 1972, partly because of the present stock market climate which is not conducive to new floats and partly because, through the farmouts, a second look has been taken at many areas.

What we must strive for is to maintain a reasonable level of exploration in the hope that discoveries will be made which will lead to an increase in that level.

GENERAL

Up until a year or two ago, following the series of Gippsland Shelf discoveries, there was a fairly generally held opinion that much of Australia's offshore area was highly prospective and certainly far more prospective than the onshore areas. Recent results have not supported this opinion.

There has not been a major offshore oil discovery since 1967 and substantial gas discoveries have been restricted to the Gulf of Papua

and Bonaparte Gulf. This is in contrast to the onshore areas where we have seen a string of successes. These have been mostly gas and possibly not large enough to be commercial offshore, but a success ratio of about one in eight in 1970 may be considered encouraging.

The reduction in offshore activity is understandable in view of the very little recent success. Companies cannot be expected to continue this very expensive exploration indefinitely without sufficient encouragement to persuade them that they have a reasonable chance of at least recovering their expenses.

On the other hand the onshore successes could reasonably be expected to supply the impetus to increase activity. This has not occurred. The drawback is that the discoveries have been mostly gas and, with contracts already written or being negotiated for the major existing gas markets, the incentive to discover more gas is considerably reduced.

It appears that oil discoveries are necessary to give the required impetus to exploration. For this reason it is desirable that more exploration be carried out in areas other than the general Moomba-Gidgealpa area of the Cooper Basin and the Roma area of the Surat Basin. Although oil has been discovered in these areas and it is possible that more will be found, at this stage in their exploration they must be considered primarily as gas provinces. Fortunately there are still large areas in Australia which have not been adequately explored and which may be capable of producing large quantities of oil. It is to these areas which we must look for the oil discoveries which are necessary to supply the incentive for increased exploration.

CONCLUSIONS

The results of exploration during the last two or three years have not supplied the incentive necessary to maintain the past level of exploration activity in 1971. The offshore results have been disappointing but nevertheless there are still large areas to be explored which appear to have all the necessary requirements to produce large quantities of petroleum. The onshore results have been encouraging but, because gas

is being found and not oil, there has not been sufficient incentive to encourage increased exploration.

The decrease in the level of exploration which is expected in 1971 could very well be the start of a major slump. The expected decrease in onshore seismic activity in 1971 is of prime concern partly because few drilling targets will be delineated and partly because it shows a decrease in interest on the part of companies in the areas which they are holding.

Efforts should be made now to prevent this slump developing, but it appears that oil discoveries are needed this year if we are not to see a further reduction in exploration activity in 1972.

Fig. 1

ACTIVE EXPLORATION UNITS

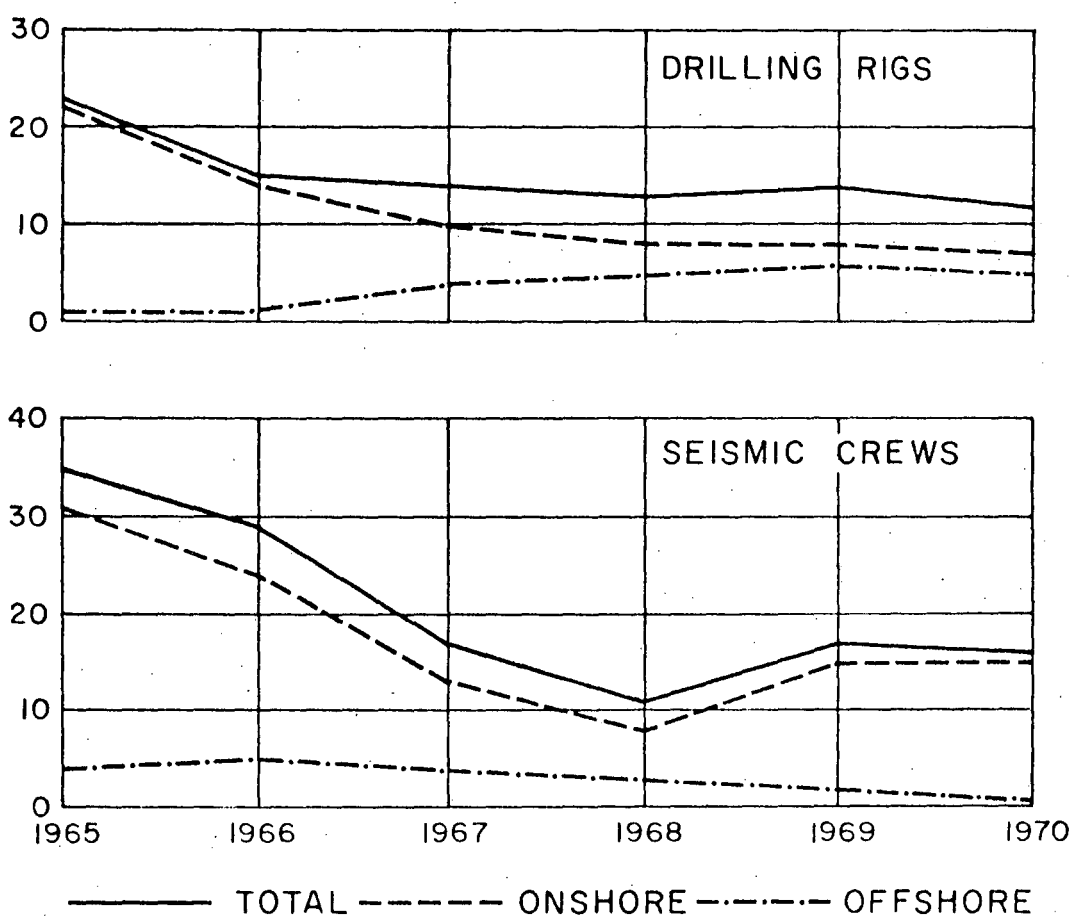


Fig.2a

EXPLORATION FOOTAGE DRILLED

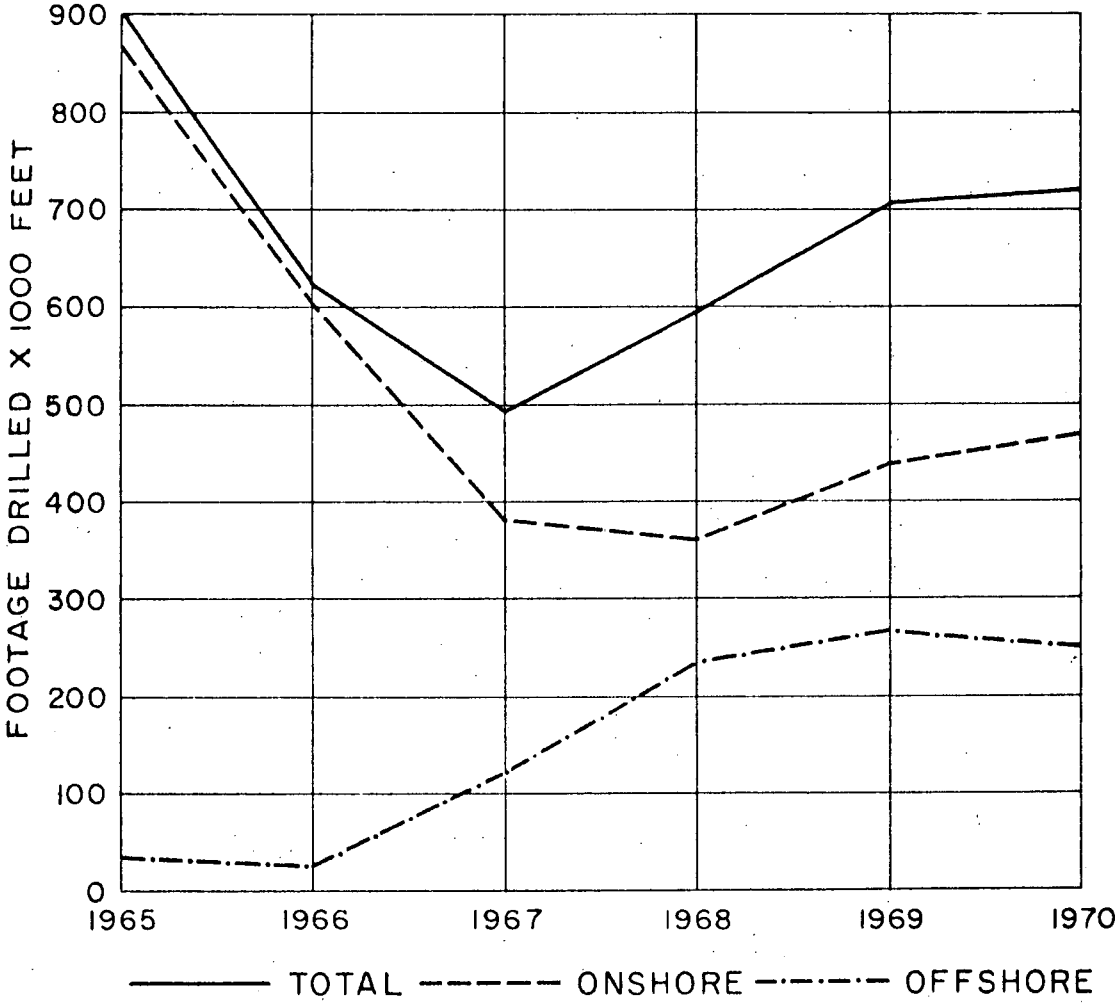
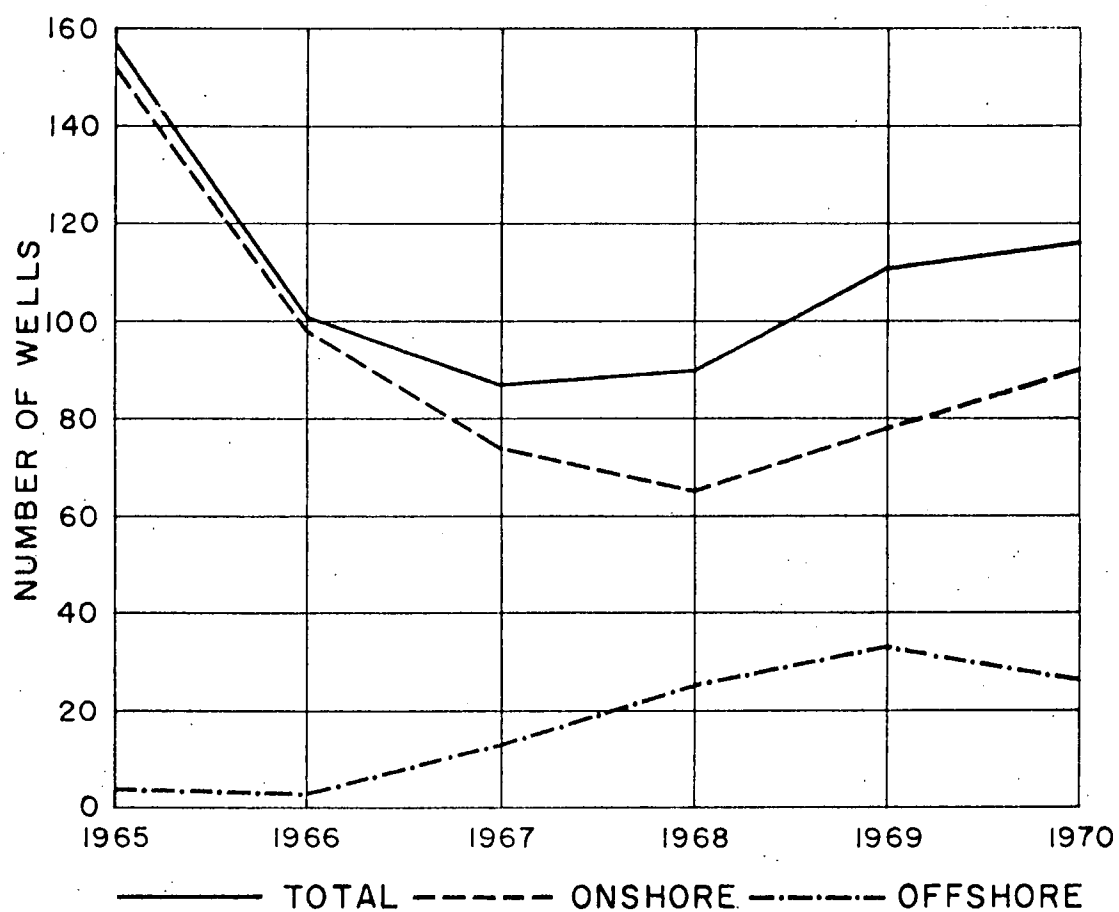


Fig.2b

NUMBER OF EXPLORATION WELLS



EXPLORATION EXPENDITURE

Fig. 3

